ICOBI 2023

INTERNATIONAL CONFERENCE ON BUSINESS INNOVATION

MINISTRY OF EDUCATION

NSBM GREEN UNIVERSITY TOWN

PROCEEDINGS
VOLUME I

ACCELERATING SOCIETAL CHANGE THROUGH DIGITAL TRANSFORMATION

NOVEMBER 24, 2023

7th ANNIVERSARY CELEBRATION 2016 - 2023

THE 06TH INTERNATIONAL CONFERENCE ON BUSINESS INNOVATION

"ACCELERATING SOCIETAL CHANGE THROUGH DIGITAL TRANSFORMATION"

FOCUSING

- *Marketing, Branding and Business Strategy in Digital Age*

- *Tourism and Sustainable Business Practices for Digital Disruption*

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Organized by

NSBM Green University
Colombo, Sri Lanka
November 24, 2023

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CONFERENCE AGENDA

08.30 AM	Registrations and Welcome
09.30 AM	Lighting of the Traditional Oil lamp
09.40 AM	Welcome Dance
09.45 AM	Welcome Speech: Ms. Thilini De Silva, Dean – Faculty of Business
09.50 AM	Conference Profile Video
10.10 AM	Keynote Speech 1, Professor Archie Clements, Deputy Vice-Chancellor, Research & Innovation University of Plymouth, UK
11.00 AM	Entertainment Act
11.15 AM	Keynote Speech 2, Professor Roshan Gabriel Ragel, Head - Department of Computer Engineering, University of Peradeniya, Sri Lanka
12. 05 PM	Concluding Remarks
12.15 PM	Lunch
13.00 PM onwards	Commencements of the Conference Parallel Sessions and Poster Presentations

PREFACE

We are delighted to present the proceedings of ICOBI 2023, and it is with great pleasure that we extend a warm welcome to all the authors and delegates of this esteemed event. We trust that the contents within will prove to be not only insightful but also transformative.

For the sixth consecutive year, NSBM Green University proudly hosts the International Conference on Business Innovation (ICOBI), pushing the boundaries of academic discourse. In the landscape of higher education, NSBM continues to pave the way, fostering innovation and scholarly exchange. ICOBI 2023 signifies our commitment to exploring the intersection of business and technology.

This year, under the theme "Accelerating Societal Change Through Digital Transformation," ICOBI takes a bold step into the realm of cutting-edge technologies that are reshaping the fabric of our societies. In an era marked by rapid digital advancements, this conference aims to be a catalyst for discussions on leveraging technology to drive positive and impactful societal changes.

Digital transformation has become an imperative for organizations and nations alike. The fusion of business and technology offers unprecedented opportunities and challenges. ICOBI 2023 serves as a vital platform to bring together local and international researchers, academics, and industry experts to deliberate on the profound impact of digital transformation on society. Our theme aligns with the contemporary need to harness digital innovation for social good. The conference will delve into how businesses, governments, and communities can collaboratively accelerate positive societal changes through the strategic implementation of digital technologies.

As we embark on this intellectual journey, we would like to express our deepest gratitude to Prof. E. A. Weerasinghe, the Vice-Chancellor of NSBM Green University, and Prof. Chaminda Rathnayaka, the Deputy Vice-Chancellor, for their unwavering support and visionary leadership. Special thanks also go to Prof. J. Baratha Dodankotuwa, the Head of Academic Development and Quality Assurance, for his expert input.

We extend our sincere appreciation to all local and international presenters and participants whose contributions enrich the conference. The success of ICOBI 2023 would not be possible without the dedication of our reviewers and the diligent work of the Conference Organizing Committee.

In conclusion, we anticipate that ICOBI 2023 will not only foster meaningful academic discussions but also pave the way for innovative solutions that will contribute to a digitally transformed and socially progressive future. We extend our best wishes to all attendees, confident that your experience with us will be both enriching and enduring.

The Conference Organizing Committee
ICOBI 2023

MESSAGE FROM VICE-CHANCELLOR

PROF. E.A. WEERASINGHE

It is with great pleasure and pride that I extend a warm welcome to the International Conference on Business Innovation (ICOBI) 2023, organized by NSBM Green University. As we embark on the sixth edition of this prestigious conference, we find ourselves at the nexus of academia, innovation, and the transformative power of digital technologies.

Our theme for ICOBI 2023, "Accelerating Societal Change Through Digital Transformation," echoes the evolving landscape of research and innovation. In the context of today's dynamic global environment, the fusion of digital technology with business practices becomes not only relevant but imperative for societal progress.

Building on the success of our previous conferences, ICOBI 2023 serves as a beacon for scholars, researchers, and industry experts to collectively explore the profound impacts of digital transformation on societal change. We stand at the forefront of a new era where the integration of technology into our social fabric has the potential to shape a future that is not only sustainable but also inclusive.

Universities play a pivotal role as catalysts for research and innovation, influencing societal and economic growth. ICOBI 2023, as a testament to this commitment, seeks to create a platform for multidisciplinary scholars to present their research, fostering a productive discourse on the transformative power of digital technologies in the pursuit of societal advancement.

I extend my heartfelt congratulations to the organizing committee for their dedication in curating a conference that promises to be a reservoir of knowledge, ideas, and innovative solutions. The high-quality papers and expert insights gathered for this event are a testament to the commitment of our academic community to push the boundaries of knowledge.

My sincere appreciation goes to all presenters and delegates who contribute to the richness of our annual conferences with their insightful presentations and meaningful discussions. Your efforts are instrumental in enhancing our university's research culture and, more importantly, in contributing to the broader development of our nation.

I look forward to witnessing the informative and fruitful discussions that will unfold at ICOBI 2023. May this conference be a source of inspiration, collaboration, and transformative ideas that will propel us toward a future where digital transformation accelerates positive societal change.

Thank You.

MESSAGE FROM DEPUTY VICE-CHANCELLOR

PROF. CHAMINDA RATHNAYAKE

It is with great pleasure that I extend my warmest greetings to the sixth International Conference on Business Innovation (ICOBI 2023) organized by NSBM Green university. As the Deputy Vice Chancellor of NSBM Green University, it is an honor to welcome you to this prestigious event focused on the theme, "Accelerating Societal Change Through Digital Transformation."

In an era marked by unprecedented technological advancements, the impact of digital transformation on various facets of society is profound and far-reaching. ICOBI 2023 serves as a crucial platform for the exchange of ideas, insights, and research findings that contribute to our collective understanding of the transformative power of digital innovation.

NSBM Green University is committed to fostering an environment of academic excellence, innovation, and collaboration. The ICOBI conference series aligns seamlessly with our mission to promote cutting-edge research and facilitate discussions that pave the way for advancements in business practices and societal well-being.

As we delve into discussions on accelerating societal change through digital transformation, I encourage you to engage actively, share your expertise, and explore collaborative opportunities. The diverse perspectives gathered here will undoubtedly enrich our understanding of the challenges and opportunities presented by the digital era.

I would like to express my gratitude to the organizing committee, sponsors, and all participants for their dedication and efforts in making ICOBI 2023 a reality. Your commitment to advancing knowledge and driving positive change is commendable, and I am confident that this conference will serve as a catalyst for meaningful developments in the field of business innovation.

May your interactions during ICOBI 2023 be both intellectually stimulating and personally enriching. I wish you a productive and inspiring conference experience.

Thank you.

MESSAGE FROM THE HEAD OF ACADEMIC DEVELOPMENT AND QUALITY ASSURANCE

PROF. J. BARATHA DODANKOTUWA

It is my distinct pleasure to extend a warm welcome to all participants, researchers, and scholars who have gathered for the sixth International Conference on Business Innovation (ICOBI 2023), hosted by NSBM Green University. As the Head of Academic Development and Quality Assurance, I am delighted to see the convergence of brilliant minds and innovative ideas around the central theme, "Accelerating Societal Change Through Digital Transformation."

The landscape of academia and industry is undergoing a profound shift, driven by the rapid evolution of digital technologies. ICOBI 2023 provides a unique opportunity for us to collectively explore the myriad ways in which digital transformation is reshaping the business landscape and, by extension, accelerating societal change.

NSBM Green University is dedicated to maintaining the highest standards of academic excellence, and events like ICOBI are instrumental in fostering a culture of inquiry, collaboration, and continuous improvement. As we embark on this intellectual journey, I encourage you to actively participate in the various sessions, share your research findings, and engage in stimulating discussions with your peers.

The theme of this conference underscores the imperative for businesses and societies to adapt to the digital age. It is our hope that the insights shared and collaborations formed during ICOBI 2023 will contribute to a deeper understanding of the challenges and opportunities presented by this transformative era.

I extend my sincere appreciation to the organizing committee, sponsors, and all contributors for their dedicated efforts in making ICOBI 2023 a reality. Your commitment to advancing knowledge and fostering innovation is crucial for the continued success of conferences like ICOBI.

May your experiences during this conference be intellectually rewarding, and may the connections you forge here lead to lasting collaborations that further the frontiers of business innovation and societal progress.

Thank you.

MESSAGE FROM THE CONFERENCE CHAIR

DR. MOHAMED SHAFRAZ
CONFERENCE CHAIR

I am humbled and honoured to pen down this message for the International Conference on Business Innovation (ICOBI), 2023 to be held on 24 November at the NSBM Green University. The journey of the ICOBI continues for the 6th consecutive year, and each year, the conference addresses timely and pressing local and global issues and concerns. Being South Asia's first green university, we always strive to contribute our best to the nation and world through research and development as a part of our pivotal role in academic endeavours.

This year's conference theme is "Accelerating Societal Change Through Digital Transformation". With the exponential growth of technology, it is imperative to recognize the vital role that digital transformation plays in reshaping our societies. The intersection of technology and societal progress is the focal point of our discussions, reflecting the dynamic landscape in which we find ourselves. This conference aims to enhance the impact of digital transformation on societal change, exploring its multi-faceted contributions and the potential it holds for accelerating positive transformations. Digital transformation, once confined to business and technology, has evolved into a powerful force shaping our societies. In our interconnected world, the rapid adoption of digital technologies influences how we communicate, learn, work, and address societal challenges. This conference serves as a platform to delve into the transformative potential of digital innovations across various sectors.

In making this conference a success, many individuals contributed to all the phases in the process. I am particularly thankful to the ICOBI 2023 organizing committee and staff members. They have given me tremendous support without any hesitation in organizing the conference. Their contribution to making this conference a success is truly commendable. All these would have been impossible without the guidance and leadership of our visionary leader Prof. E.A. Weerasinghe, Vice-Chancellor. We are always indebted to him for his guidance and encouragement. Further, I would like to especially mention Prof. Chaminda Rathnayake, Deputy Vice-Chancellor and Prof. Baratha Dodankotuwa, Head of Academic Development and Quality Assurance, for their immense support and dedication to enhancing the research culture at the university.

On behalf of the Organizing Committee, a special note of gratitude is extended to all the local and international speakers, authors, reviewers, researchers and presenters for their time and efforts toward the success of this ICOBI 2023. As the Conference Chair, I encourage participants to actively engage in discussions, share insights, and forge collaborations. The collective expertise gathered here has the potential to drive meaningful change. Let us seize this opportunity to shape the digital transformation narrative, ensuring that it aligns with our shared values and forces us toward a future where technology accelerates positive societal change.

Thank you.

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KEYNOTE SPEECH 1

PROF. ARCHIE CLEMENTS
*DEPUTY VICE-CHANCELLOR,
RESEARCH & INNOVATION UNIVERSITY
OF PLYMOUTH, UK*

INFECTIOUS DISEASE DATA VISUALISATION PLATFORMS FOR PUBLIC CONSUMPTION: ADVANCES IN THE ERA OF COVID-19

The COVID-19 pandemic is the first major pandemic of the digital age and has been characterised by unprecedented public consumption of disease data via online data visualisation platforms. A variety of state and non-state actors, and collaborative initiatives between them, collated and presented maps, charts, and plots of data related to the pandemic in both static and dynamic formats. In particular, there was a proliferation of online COVID-19 dashboards. The sources and types of information displayed evolved rapidly during the pandemic, with a general trend towards providing more specialised information pertinent to specific aspects of epidemiology or disease control, as opposed simply to disease and death notifications. Limited evaluation of the quality of COVID-19 data visualisation platforms has been conducted and significant effort now needs to be spent on standardisation and quality improvement of national and international data visualisation systems including developing common indicators, data quality assurance mechanisms and visualisation approaches, and building compatible electronic systems for data collection and sharing. The increasing availability of disease data for public consumption presents challenges and opportunities for government, media organisations, academic research institutions, and the general public. Public access to disease data can enable greater transparency and accountability of governments to the public for their public health decisions, but capitalising on opportunities for greater government accountability for public health decision-making, and more effective mobilisation of public health interventions, is predicated on the provision oaccurate and timely information and the COVID-19 pandemic demonstrated many of the challenges that impact on accuracy and timeliness. Additionally, online data platforms created by non-state actors can disseminate information that doesn't have official endorsement and can be inconsistent with officially endorsed information and public health messaging. Information consistency underpins the ability to mount a coordinated response and generate public trust in intervention strategies. Governments should acknowledge and accept the future role of non-state actors in disseminating data and information to the public during pandemics and seek to work with non-state entities to ensure the public need for accurate and timely information is met. This will not only enhance public trust in government decisions, but also leverage the technological capabilities and innovativeness of non-state actors, which can often be mobilised in the short timeframes required for effective pandemic responses.

KEYNOTE SPEECH 2

PROFESSOR ROSHAN GABRIEL RAGEL
*HEAD - DEPARTMENT OF COMPUTER
ENGINEERING, UNIVERSITY
OF PERADENIYA, SRI LANKA*

GENERATIVE AI IN EDUCATION: CATALYZING DIGITAL TRANSFORMATION FOR SOCIETAL ADVANCEMENT

INTRODUCTION

The education landscape has been significantly transformed, catalyzed by rapid advancements in digital technologies. Generative Artificial Intelligence (GenAI) emerges as a particularly transformative force, poised to redefine the educational paradigm. This article delves into the potential of GenAI in revolutionizing the approach to learning and teaching, particularly in mastery learning and addressing the historical challenges identified in Bloom's 2-sigma problem.

Benjamin Bloom, a renowned educational psychologist, first introduced the concept of mastery learning in 1968. This approach, predicated on the belief that students must attain a particular understanding of prerequisite knowledge before progressing, has been substantiated by numerous studies for its effectiveness in enhancing student outcomes (Kulik, Kulik, & Bangert-Drowns, 1990). However, the practical implementation of mastery learning on a large scale has been historically impeded by significant resource constraints, particularly in providing the individualized attention integral to this method (Clary, L. 1986).

In 1984, Bloom articulated what is now known as the "2-sigma problem." Based on the dissertation research of his graduate students, Joanne Anania and Joseph Arthur Burke, this observation revealed that average students who received one-to-one tutoring using mastery learning techniques outperformed 98% of students in a conventional classroom setting (Bloom, 1984). While this finding underscored the potential of personalized educational support, it also highlighted the impracticality of such an intensive approach, given the resource limitations of most educational systems.

This article proposes that the advent of GenAI presents a viable solution to these historical challenges. GenAI's capability to generate personalized educational content and experiences aligns with mastery learning and one-to-one tutoring requirements, potentially at a scale and cost that traditional methods cannot match. By exploring the intersection of GenAI with established educational theories and practices, this article aims to illuminate how technological advancements can bridge gaps in education, contributing to societal progress in line with the theme of the conference, "Accelerating Societal Change Through Digital Transformation."

HISTORICAL CONTEXT OF MASTERY LEARNING

a. The Origins of Mastery Learning

Mastery learning, an educational philosophy that has profoundly influenced modern educational practices, was first proposed by Benjamin Bloom in 1968. At its core, mastery learning challenges the traditional pace-based approach to education. Instead of moving students through an educational program based on a set timetable, mastery learning insists that students master prerequisite knowledge before learning subsequent information (Bloom, 1968). This approach is predicated on the belief that with sufficient time and appropriate instructional methods, nearly all students can achieve a high level of understanding.

b. Empirical Support for Mastery Learning

The effectiveness of mastery learning has been substantiated by extensive research. A seminal meta-analysis by Kulik, Kulik, and Bangert-Drowns (1990) examined the impact of mastery learning programs and found significant positive effects on student achievement. These researchers analyzed 108 studies and concluded that students in mastery learning classes frequently outperformed those in control groups regarding academic achievement.

Further supporting evidence comes from Clary, L. (1986), who noted that students engaged in mastery learning often exhibit more satisfaction with their instruction and develop more positive attitudes towards the content they are taught. This approach improves students' academic performance, enhances their academic self-concept, and instils aspects of a growth mindset.

c. Challenges in Mastery Learning Implementation

Despite its proven effectiveness, implementing mastery learning on a large scale has been challenging. One of the primary hurdles has been the resource-intensive nature of this approach. Mastery learning requires frequent and timely assessments, individualized feedback, and often additional instructional time and resources to ensure all students achieve mastery. These requirements pose significant logistical and financial challenges, especially in larger educational systems with limited resources.

d. Summary

Mastery learning represents a shift from the traditional educational model, focusing on student mastery rather than time-based progression. While research has consistently demonstrated its effectiveness in enhancing student learning outcomes, the practical challenges of implementing this approach on a large scale have remained a significant barrier. This historical context sets the stage for exploring how modern technological advancements, specifically GenAI, can address these implementation challenges.

BLOOM'S 2-SIGMA PROBLEM

a. Introduction to the 2-Sigma Problem

In education, Benjamin Bloom's 2-Sigma problem, articulated in 1984, is a pivotal observation that has guided much of the discourse on educational efficacy and personalized learning. Bloom's research stemmed from a simple yet profound observation: the average student tutored one-to-one using mastery learning techniques performed two standard deviations better than students taught via conventional classroom methods. This finding, reported in Bloom's seminal paper in The Educational Researcher, illuminated the remarkable poten-

tial of personalized instruction (Bloom, 1984).

b. The Implications of the 2-Sigma Problem

Bloom's observation, often called the 2-Sigma problem, has profound implications. It suggests that if educators could effectively replicate the conditions of one-to-one tutoring on a larger scale, they could significantly enhance students' educational attainment. Bloom's paper analyzed the dissertation results of his graduate students, Joanne Anania and Joseph Arthur Burke, who quantified this improvement: "The average tutored student was above 98% of the students in the control class" (Bloom, 1984). This stark contrast highlighted the effectiveness of individualized instruction and mastery learning in fostering academic success.

c. The Challenge Posed by the 2-Sigma Problem

However, the 2-Sigma problem also underscored a significant challenge: achieving the benefits of one-to-one tutoring within the constraints of conventional educational systems. Given its intensive resource requirements, Bloom recognized the impracticality of one-to-one tutoring as a widespread educational approach. In his paper, Bloom challenged educators and researchers to find methods of group instruction that could be as effective as one-to-one tutoring, a task that has proven daunting over the years.

d. Summary

The 2-sigma problem, therefore, encapsulates the quest within the educational field to bridge the gap between the ideal (personalized instruction) and the feasible (group instruction). It highlights the necessity of innovative approaches to achieve the level of educational efficacy that one-to-one tutoring offers, but within the practical constraints of educational institutions. This historical challenge sets the context for exploring how GenAI might offer solutions to the constraints posed by the 2-sigma problem.

The Unresolved Challenge of Resource Limitations

a. The Core Issue of Resource Constraints

One of the most significant barriers to the widespread implementation of personalized education approaches, such as those highlighted by Bloom's 2-Sigma problem, is the issue of resource limitations. While the benefits of one-to-one tutoring and mastery learning are well-documented, the practicality of these methods in typical educational settings has been persistently hampered by resource constraints.

b. Historical Perspective on Resource Limitations

Historically, educational systems have grappled with various limitations, including inadequate teacher-to-student ratios, limited time for individualized instruction, and insufficient financial resources to support personalized learning initiatives. Bloom acknowledged these challenges in his discussion of the 2-sigma problem, noting that, while highly effective, one-to-one tutoring is "too costly for most societies to bear on a large scale" (Bloom, 1984). The need for individualized attention, frequent assessments, and additional teaching materials substantially strains educational resources.

c. Empirical Evidence of Resource Challenges

Research has consistently highlighted these resource challenges. In a study examining the feasibility of implementing mastery learning in public schools, Guskey and Pigott (1988) found that while teachers recognized the effectiveness of the approach, they were often unable to implement it fully due to a lack of time and support. Similarly, a report by Slavin (1987) on cooperative learning models, which sought to address some aspects of the 2-sigma problem, also identified resource limitations as a significant barrier to effective implementation.

d. The Persistence of the Problem

Despite educational technological advancements, resource limitations have persisted. The challenge is not merely one of financial investment but also involves structural and systemic factors that hinder the adaptation of educational systems to more personalized approaches. A study by Terhart, E. (2011) reiterated the ongoing struggle of educational systems to balance resource constraints with the need for effective instructional strategies.

e. Summary

The unresolved challenge of resource limitations thus remains a central issue in the quest to improve educational outcomes. It underscores the need for innovative solutions to circumvent these constraints, potentially through emerging technologies such as GenAI. Understanding these historical and ongoing challenges is crucial for appreciating the potential impact of GenAI in transforming educational practices.

THE ROLE OF DIGITAL TRANSFORMATION IN EDUCATION

a. Introduction to Digital Transformation

The concept of digital transformation in education encapsulates a broad range of technological integrations and pedagogical shifts that redefine the educational landscape. This transformation is characterized by the adopting of digital tools and a fundamental change in how education is delivered, experienced, and managed.

b. The Shift to Digital Pedagogies

Digital transformation has ushered in new pedagogical approaches, such as flipped classrooms and blended learning, which have been shown to enhance student engagement and learning outcomes. A study by Abeysekera and Dawson (2015) found that the flipped classroom approach, which integrates digital technologies for out-of-classroom content delivery and in-class interactive learning, significantly improves student learning experience and performance. Similarly, Aronoff, et al. (2017) reported in their meta-analysis that blended learning environments, combining online and face-to-face instruction, often result in stronger learning outcomes than traditional classroom settings.

c. The Impact on Mastery Learning

Digital technologies has also made it more feasible to implement mastery learning principles. With online platforms and learning management systems, educators can now provide personalized learning experiences, track student progress in real time, and offer tailored feedback and support. In a study by Steen-Utheim and Foldnes (2018), using digital tools in a mastery learning framework significantly improved student engagement and academic performance.

d. Technological Advancements and Resource Optimization

One of the critical contributions of digital transformation is the optimization of resources. Technologies such as AI and machine learning offer potential solutions to the resource constraints previously hindering personalized education. For instance, Chen, L., Chen, P., & Lin, Z. (2020) and Crompton, H., & Song, D. (2021) discussed how AI in education can streamline the learning process, facilitate personalized learning paths, and optimize the allocation of educational resources.

e. Summary

Digital transformation in education is not merely about incorporating technology into teaching and learning; it represents a paradigm shift in educational delivery and design. This transformation, emphasising personalized

learning and resource optimization, provides a fertile ground for integrating GenAI, offering new possibilities for addressing historical challenges such as those posed by Bloom's 2-sigma problem.

GENERATIVE AI AS A SOLUTION

a. Introduction to Generative AI in Education

Generative AI (GenAI) represents a significant leap in artificial intelligence, particularly in its application to education. GenAI refers to AI systems capable of generating new content, including textual materials, learning resources, and interactive experiences, based on extensive data analysis and pattern recognition. The potential of GenAI in education is vast, from creating personalized learning materials to offering adaptive learning experiences.

b. Personalized Learning Through GenAI

One of the most compelling applications of GenAI in education is its ability to facilitate personalized learning. GenAI can analyze student performance, learning styles, and preferences and generate customized content and learning paths. Research by Nagao, K. (2019) demonstrated that AI-powered personalized learning systems significantly improve student engagement and learning outcomes. These systems adapt to each learner's needs, providing personalization akin to one-to-one tutoring, thereby addressing a key aspect of Bloom's 2-sigma problem.

c. Overcoming Resource Limitations

GenAI also offers a solution to the resource limitations that have traditionally hindered the implementation of personalized education approaches. By automating content generation and adapting to individual learner needs, GenAI reduces the need for extensive human resources. A study by Johnson, Adams Becker, Estrada, and Freeman (2015) highlighted the potential of AI in reducing the time and effort required by educators in creating and tailoring learning materials, thus optimizing educational resources.

d. Enhancing Mastery Learning

In the context of mastery learning, GenAI can play a crucial role. It allows for the frequent assessment and feedback that mastery learning requires but at a scale and efficiency unattainable through traditional methods. Han, S. (2022) explored the integration of AI in mastery learning environments and found that AI systems could effectively support mastery learning principles, providing timely feedback and adaptive learning pathways to students.

e. Challenges and Future Prospects

While GenAI presents immense opportunities, it also challenges ensuring equitable access and addressing ethical concerns related to data privacy and AI biases. The future of GenAI in education hinges on addressing these challenges while harnessing its potential to revolutionize how education is delivered and experienced.

f. Summary

Generative AI stands at the forefront of educational innovation, offering scalable and efficient solutions to longstanding educational challenges. Its capacity for personalization, resource optimization, and support for mastery learning principles makes it a promising tool for transforming the educational landscape and addressing the historical challenges outlined by Bloom's 2-sigma problem.

CONCLUSION

a. Summarizing the Argument

This article has explored the transformative potential of Generative AI (GenAI) in education, particularly in addressing the longstanding

challenges outlined in Bloom's 2-sigma problem. Beginning with a historical overview of mastery learning and the empirical evidence supporting its effectiveness, we delved into the persistent challenge of resource limitations that have traditionally impeded the implementation of personalized education methods. The discussion then transitioned to the role of digital transformation in education, highlighting how technological advancements have begun to reshape pedagogical approaches and offer solutions to these historical challenges.

The focus shifted to GenAI, a groundbreaking development in AI, and its capacity to facilitate personalized learning at an unprecedented scale and efficiency. GenAI's ability to generate customized learning materials and experiences, adapt to individual learner needs, and optimize educational resources addresses key aspects of Bloom's 2-sigma problem. This technology promises to overcome the previously faced resource constraints and enhance mastery learning principles, paving the way for a more effective and personalized educational experience.

b. Vision for the Future

Looking forward, GenAI holds immense potential to contribute to societal advancement through transformative changes in education. As GenAI continues to evolve, its integration into educational systems worldwide could mark a new era of personalized, efficient, and equitable education. This evolution could significantly narrow the educational achievement gaps and democratize access to high-quality, individualized learning experiences.

The future of education, empowered by GenAI, envisions a world where the barriers to personalized learning are dismantled, and every student can achieve their full potential. This augurs well for educational outcomes and broader societal impacts, as a well-educated populace is crucial for addressing the complex challenges of the 21st century.

In conclusion, integrating GenAI into education represents a beacon of hope and a path forward in overcoming historical educational challenges. It invites educators, policymakers, and technologists to collaborate in harnessing its potential, ensuring ethical considerations are met, and laying the groundwork for an educational revolution that promises far-reaching positive impacts on society.

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Applicant Tracking System: A Definitive Pillar of Support for Employer Branding

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ABSTRACT

Human resource management practices have undergone a significant transition as a result of information technology, including how data is collected, used, stored, and shared. Further, it allows organisations to keep track of all their human resources data. Organisations should ensure a well-established procedure to evaluate the pool of candidates because wrong onboarding may wreak havoc on the recruitment strategy. Particularly for entry-level jobs, organizations receive a large number of applications, and organisations take more weeks or months to proceed with the screening and shortlisting of top-notch candidates, which may negatively affect employer branding. Therefore, Applicant Tracking Systems (ATS) can handle thousands of applications promptly, however, there is a dearth of research focusing on the impact of ATS and employer branding.

The purpose of this study is to identify the influence of ATS on employer branding. Further, we have used the theory of job signalling to identify the opportunities and challenges of implementing the ATS for Small and Medium scale organisations in Sri Lanka. The data were collected from 413 school leavers and fresh graduates in Sri Lanka. Moreover, twenty-three (23) managers in SMEs took part in semi-structured interviews. Content analysis and Structural Equation Modelling (SEM) were performed to identify the association between ATS and employer branding. The findings of the study showed a positive association between ATS and strong brand image with the theory of job signalling. Further, the study showed the opportunities and challenges of implementing an ATS by SMEs to ensure employer branding. Consequently, the paper synthesises the findings from the works of literature related to the organization that is currently in the process of implementing an ATS. Theoretical and practical implications are provided in ATS and employer branding with job signalling theory.

Keywords - Applicant tracking system, Employee branding, job signalling theory, Artificial Intelligence

1. INTRODUCTION

In this turbulent world, Human resource management ensures the identifying, attracting, and retaining top-notch human resources that lead to achieving corporate goals and objectives. However, most organizations are facing multiple severe challenges when they recruit, select, and onboard top-notch candidates for job openings. Recruitment is the process of finding people who are interested in joining a group or organization, whether as employees or as clients. Therefore, in this modern world, there are technological tools to supprt this.

There is a growing concern to ensure employer branding in organizations (Berthon et al., 2005). To ensure an employer branding organizations are trying their best to provide a positive candidate experience. Organizations are involved in recruiting top-notch talent regularly or as per their needs. Many organizations still practice the long-way traditional methods of recruitment and selection processes resulting in high costs and days. Therefore, spending organizational resources in that way has created many issues. Further, the major reason behind the days and days-long process of recruitment is mainly due to the use of outdated application posting methods and manual methods of screening the applications one by one.

Moreover, there are multiple issues with the traditional recruitment processes; there are difficulties in screening the large sets of applications received by the candidates, communicating the results, and finding the best-qualified candidates for the position by comparing and sorting the most suitable candidates. Further, the involvement of organizational politics and other external influences by the government rankers affects the recruitment process because of the flexible adjustments that can be carried out easily with the traditional methods of screening applications resulting in selecting not the qualified but only the candidates who have contacts and favouritism. Therefore, recruitment management systems are playing major roles in recruitment and selection.

1.1 Problem Statement

The selection of the right person for the right job has become challenging due to the large number of competitive candidates available in the current context. The higher number of students that are passed out within a year has created a huge challenge concern in selecting the most talented. In addition, the organization's level of ability in reaching the candidates, and their names that has created among the job seekers is an issue that needs to be addressed.

1.2 Aims and Objectives

The main purpose of this study is to identify the effectiveness of the applicant

tracking system to overcome the issues that could arise during the sorting and screening of a large number of applications that carry similar skills and qualifications by reducing time and cost wastage. Further, this study focuses on addressing two objectives: (1) To identify the impact of ATS on employer branding and (2) To identify the role signalling theory plays in the relationship between ATS and employer branding. Moreover, the research opts to find means of eliminating the hindrances that could occur during the recruitment process because of certain mismanagement practices favoring or political interventions.

2. LITERATURE REVIEW

2.1 Application Tracking System

Application Tracking Systems (ATS) have emerged as an indispensable tool in the modern recruitment process, streamlining the process of recruiting talent and enhancing efficiency and effectiveness. ATS provides a set of solutions designed to manage, organize, and analyse job applications (Ahmed & Adams, 2010) and candidate data. The implementation of the ATS aids recruiters in automating various tasks such as parsing resumes, matching applicants' profiles to the defined job descriptions (Ndlela, 2020) and specifications of the organization, and facilitating communication between stakeholders (Pathak, 2019). Moreover,

ATS not only expedites the initial screening processes but also supports maintaining compliance with hiring regulations by maintaining all the required standards of evaluation criteria (Laumer et al., 2015) as expected by the organization. Additionally, ATS contributes to a reduction in manual labor and administrative overhead, allowing human resource professionals to allocate more time to strategic decision-making and personalized candidate interactions (Tessema et al., 2017).

2.2 Employer Branding

Employer branding is particularly impacted in the digital world, where job seekers have access to varied forms of information and news through online platforms. Therefore, the strategic handling of employer branding is quite essential. The presence of social media, company websites, and employee review sites like Glassdoor allow candidates to gain insights into an organization's working environment, values, employee experiences, and many more regarding the organization which makes applicants motivated to get into that organization under any circumstances (Lievens & Slaughter, 2016). Therefore, ATS that emphasises employer branding through customized application interfaces and personalized communication contributes to a more engaging candidate experience (Breaugh & Starke, 2000). This alignment between ATS and employer branding is essential for fostering a

positive impression of the organization, even before a candidate sets foot in the door for an interview with that particular organization.

Employer branding not only attracts suitable candidates but also contributes to increased employee engagement and retention rates (Berthon et al., 2005). Because the candidates who come with a good impression builds their career plan for further years with that organisation. The congruence between the promises made during the recruitment process and the actual work experience enhances job satisfaction and commitment (Berthon et al., 2005)Thus, integrating ATS capabilities with a strong employer brand can have far-reaching effects, from the initial candidate attraction phase to long-term employee engagement and tenure.

2.3 Theory of Job Signaling

With the concept of job signaling, the candidates are providing the skills, qualifications, and other varied requirements to the potential job employers through various signals, such as educational qualifications, job experiences, and personal characteristics (Market et al., 1973; McCracken et al., 2016). The implementation of the ATS with the integration of employer branding strategies has created a sense of comprehensive understanding of the Theory of Job Signaling in contemporary recruitment practices.

The Application Tracking System acts as a competitive tool that bridges the gap between the skills and qualifications of the candidates as well as the requirements of a specific organization (Potočnik et al., 2021). Moreover, the congruence between the signals candidates convey through their applications, ATS-enabled evaluations, and employer branding constructs a more accurate and holistic understanding of candidate suitability. As candidates signal their abilities through qualifications and experiences (Kumari et al., 2019), there are ATS that aids in streamlining the evaluation process (Hemalatha et al., 2021), enabling recruiters to place their application in the right place while supporting them assess and align to the real job specification of the organizations.

It is evident that the integration between the ATS, employer branding, and the theory of job signalling plays a major role in shaping the modern recruiting process (Dermody, 2002; McCracken et al., 2016). Moreover, with the proper flow of the signals, ATS supports the efficient and accurate assessment of candidate suitability, where employer branding strategies are focused while enhancing the perception of the organization as an appealing employer (Lievens & Slaughter, 2016).

3. METHODOLOGY

This study is predominantly designed as a pragmatism study utilising both qualitative and quantitative methods; to

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conduct a critical analysis of the necessity of ATS in addressing the challenges associated with the conventional manual screening and shortlisting of job applicants. Both primary and secondary data have been utilised in the current study. Secondary data pertaining to recruitment management systems, concepts, and models have been documented in various sources such as international journals, publications, conference papers, ATS market data, and websites.

Primary data were collected by conducting a semi-structured interview and through a questionnaire survey. Semistructured interviews took place based on a purposive sampling method, targeting SMEs in Sri Lanka that had experience with tracing app adoption. This approach was chosen to ensure the inclusion of relevant and knowledgeable participants from SME including Union Assurance, hSenid Mobile, Pioneer House Learning, Citizens Development Business Finance PLC, Taco Bell, Capital Alliance Ltd, and three small-scale organizations. Twenty-three (23) participants in SMEs took part in semi-structured interviews (Table 01) and evaluated their readiness toward ATS, and content analysis was performed to identify themes. The objective was to assess the fundamental requirements that ATS must fulfil to ensure an efficient, effective, and equitable recruitment process for employees across all domains.

Table 1. Interview Data

Respondents	Interview time	Designation
1.2.3.4,15	25 Mins	Talent Acquisition
5.6.7,16,19	15 Mins	Assistant Manager
8,9,17,18	30 Mins	HR Executive
10,11,12	20 Mins	Founder
13,14,20	15 Mins	Deputy General Manager
21, 22, 23	15 Mins	Owner

Source: Based on Interview data (2023)

The online self-administered questionnaire was developed based on the literature, and five point Likert scale ranging from unconcerned (1) to very concerned (5). The employer branding scale was adapted from Highhouse et al., (2003); Van Hoye et al. (2013) with three dimensions: employer image, symbolic attributes, and employer attractiveness. Perceptions of ATS scale were developed based on semi-structured interviews. Finally, job signalling was measured with individual-level and organizational-level market signals from recruitment activities (Highhouse et al., 2003). The theoretical framework is shown in annexures (Figure 01). Convenient sampling was used to collect from 413 school leavers and fresh graduates in Sri Lanka yielding an 82.6% response rate from online self-administered questionnaires and it was pre-tested and revised. Respondents' demographic information was collected

for gender, age group, job category, education, and marital status. Collected data were analysed using SPSS and AMOS for structural equation modelling (SEM) to identify the association between ATS and employer branding. Further, the theory of job signalling was used to identify the opportunities and challenges of implementing the Applicant Tracking System for Small and Medium scale organisations in Sri Lanka.

4. RESULTS AND DISCUSSION

Model 01: according to the analysis, 65% of respondents believed that their organization was ready for an ATS, while 35% indicated that they might not be prepared for such a transition. This distribution suggests that a significant portion of organizations recognize the potential benefits of an ATS in managing their recruitment efforts. Moreover, SIXER Tech (ATS) simplified the MAS Management Trainee Programme, streamlining initial virtual screenings and capturing trainee personality and confidence effectively (1,2,3). Nevertheless, job seekers need immediate gratification from their job search, and they are more mobile than ever; 41% in bed, 38% while traveling, and 30% at work. Moreover, job seekers use 10% of their time to surf jobs on a daily basis (Alexander, Durai, and Keetticka, 2017). Therefore, hiring managers can publish advertisements easily and it is at their fingertips, as well as provide seamless communication with candidates.

According to the content analysis, we have identified the issues pertaining to the manual recruitment and selection process and the readiness for ATS. Therefore, the majority of the participants confirmed that the current Human Resource staff is exhausted when they shortlist applicants, sometimes they take weeks and months to process the shortlisting process due to a shortage of staff. Moreover, nearly 60% of the candidates have quit their application process because of its complexity and lengthiness (4,6.7,15) in the process. Further, they have stated that there is high turnover due to the economy of the country, therefore ATS might be a good remedy to address it.

It is identified that 65% of respondents believed that their organization is ready for an ATS, while 35% indicated that they might not be prepared for such a transition. This distribution suggests that a significant portion of organizations recognize the potential benefits of an ATS in managing their recruitment efforts (9,10,11,12,20). However, a substantial minority remains cautious, possibly due to concerns about implementation challenges or budget constraints (21,22,23). 55% of respondents expressed difficulties in tracking and reporting HR and legal compliance (Wijesinghe & Wickremeratne, 2020), indicating potential gaps in their current processes. Conversely, 45% of respondents seemed

to have a relatively smoother experience in this regard.

ATS made the hiring process easier, streamlining candidate selection through their Automated Candidate Screening System, saving us time and ensuring efficiency (12,13,5,8,18). In addition, "Rooster Technology" is another major Applicant Tracking System that has marked its name in many candidates and companies. However, a substantial minority remains cautious, possibly due to concerns about implementation challenges or budget constraints. These findings underline the necessity for organizations to enhance their compliance tracking systems and invest in training or technology to address these challenges

Model 02: The descriptive statistics of the study were 67% male and 33% female school leavers or fresh graduates. The age group of 18 to 24 was 71% and 25 to 30 was 29%. Moreover, the majority of people were employed either in part-time or permanent job positions. 80% of the candidates are not happy with the status updates they receive during the recruitment process and say that they would not re-apply to a company that did not notify them of their application status and they have commented negatively, "That's how they treat their employees" highlights the link between the process of recruitment and employer branding. Table 02 shows the descriptives and correlation analysis of the study.

According to Table 02, there was a positive relationship between ATS and signalling (r = 0.617), while ATS had a positive relationship with employer branding (r = 0.712). Furthermore, there was a moderate positive relationship between signalling and employer branding (r = 0.445).

Table 2. Descriptives and Correlation

	Mean	SD	Correlations	
			1.	2
Male	0.67			
Female	0.33			
1 ATS	2.65	1.17		
2 Sign	2.79	1.01	.617**	
			.000	
3 EB	3.59	0.91	.712**	.445**
			.000	.000

Note: *ATS – Applicant Tracking System, Sign. – Signalling, EB – Employer Branding*
Source: Sample survey (2023)

Parametric assumptions were tested to ensure the appropriateness of statistical tools. Therefore, it ensures that data are normally distributed and linear. There was no significant multicollinearity issue. Moreover, Harman's single-factor test was performed to identify the CMB issue. It ensures that there is no single-factor issue.

According to the measurement model data, AVE ensures the convergent validity of the model. The composite

reliability values of each construct are more than 0.7. and researchers achieved the optimum level of discriminant validity. CMIN/DF value is 1.747 which is less than the threshold value. Therefore, this study is considered an acceptable model fit for the CFA model. The RMSEA value of less than 0.06 reflects a good fit. RMSEA value ensured the adequate fit of the measurement model of the data. CFI, NFI, and TLI are important to measure the measurement model fit of incremental indices. CFI (0.896) and TLI (0.892) are almost close to 0.9 which is the threshold value. All the indices reflect the goodness of the model. According to the Structural model output data emphasized the positive relationship between ATS and employer branding and all the values were significant under 95% confidence level.

5.CONCLUSION AND IMPLICATION

This study's aim was to identify the need to develop a reliable, accurate, and efficient ATS to support people who have the same skillset and network together while offering a fair recruitment experience and ensuring employer branding. There are loopholes in the manual recruitment process such as the accuracy of shortlisting candidates, and the ignorance of the hiring managers to send the regret email to those who are not selected during the shortlisting process. However, in ATS, the candidates who do

not match the expected qualifications of the organization's job post will automatically receive regretful messages (Alexander et al., 2017). Further, notifying the status of the application process will aid in promoting the employer branding. The finding of the study shows that ATS positively relates to ensuring employer branding. Larger organizations widely use ATS to give better candidate experience, however, there are few small and medium-scale organizations that use ATS.

The adoption of ATS in companies have achieved numerous, benefits by many companies and the popular ATS that many companies adopted SIXER Tech, and AI integrated candidate screening tool. Further, ATS should ensure the trustworthiness and safety of candidate data. This study also determines the role the theory of job signalling plays in ATS and employer branding, it allows candidates to determine the quality of employer before joining to the organization. Further, it has modern communication channels such as email, social media, and mobile app to influence candidates attraction.

Applicant tracking systems will provide benefits in many different aspects when considering both the organization as well as the candidates. Theoretical implications are the use of the theory of signalling to identify the importance and usefulness of ATS while ensuring employer branding. Practical implications of the study are organizations can provide

better candidate experience, prompt communication, mobile application; easy for candidates to use and navigate with their mobile devices, chatbot assistants in multiple languages, and encourage applicants from international borders. Moreover, ATS allows video interviewing for remote jobs while matching job descriptions and job specifications based on artificial intelligence-based tools. Further, it ensures a standardized candidate assessment, which may lead to mitigating all the recruitment biases and unfairness.

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ANNEXURES
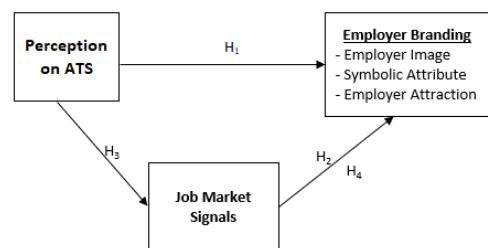
Figure 1. Theoretical Framework
Source: Survey Data (2023)

Impact of Influencer Marketer Advertising on the Cognitive, Affective and Behavioral Attitudes of Millennial Travelers: With Special Reference to the Instagram Platform

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ABSTRACT

With the prevalence of influencer marketing, this concept paper provides initiation to explore the impact of influencer marketing on the attitudes of millennial travellers on the behavioral intention development. Under the deductive approach, a quantitative analysis can be conducted grounding on the hierarchy of effects theory with relevance to measuring the effectiveness of influencer marketing communications. Data can be collected targeting the millennial generation travellers who are following travel influencers on the Instagram platform due to its wide popularity under the social media platforms umbrella. Existing literature has denoted an adequate level of impact on the visiting intention of social media users considering the cognition and affection effect resulted due to social media marketing and influencer marketing. Hence, it is proven that influencer marketing impacts travel decision making of social media users. However, research lacks in terms of identifying the impact on millennials' visiting intention. Studies conducted in this phenomenon can be significant for the decision making of Destination Management Organizations (DMOs) and responsible governmental authorities relating to travel, tourism and hospitality in developing impactful social media marketing strategies to effectively utilize influencer marketing for destination branding and tourism development aiming the millennial travellers. Hence, this study is accounting the ninth goal of Sustainability Development Goals representing industry, innovation and infrastructure as tourism development count on proper mutual coordination in both public and private infrastructure in an innovative environment.

Keywords - influencer marketing, cognition-affect-conative model, visiting intention

1. INTRODUCTION

In the present era, social media platforms play a crucial role in destination marketing strategies by enabling travelers to share their real-time travel experiences (Kilipiri et al., 2023). A staggering 84% of marketers have also recognized influencer marketing as one of the most

potent tools in modern marketing and branding strategies worldwide (Weinlich & Semerádová, 2022). Moreover, utilizing influencer marketing on social media provides brands with a fresh avenue to establish a direct, organic, and expansive connection with consumers, seamlessly integrating into their daily routines (Glucksman, 2017). Consequently, influencer marketing is now gradually proving highly effective not only for promoting cities, places, or countries but also for National Tourism Organizations (NTOs), Destination Management Organizations (DMOs), travel agencies, venues, or hotels in the realm of destination marketing (Weinlich & Semerádová, 2022).

Furthermore, influencer marketing has been identified as one of the fastest expanding communication platforms, which also undermines or even weakens various advertising cliches. This assertion is based on the findings of studies conducted, which show that the target demographic is considerably better penetrated and has a more favourable attitude toward influencer marketing induced advertising (Kádeková & Holienčinová, 2018). Furthermore, Kadekova and Holiencinova (2018) justifies that the influencer marketers' viewpoints employ a significant influence, particularly over the younger generation.

As per the study conducted by Duffett (2017), it was found out that social media marketing communications exerted a positive impact on the cognitive, affective, and behavioral attitudes of young consumers, although with a diminishing trajectory, aligning with the principles of the purchase funnel model. According to Xiang and Gretzel (2010) as cited in Augustin & Liaw (2020), underscored the significance of comprehending the profound influence of technological advancements on the dissemination and availability of travel information. Given that the tourism industry heavily depends on information, this understanding becomes pivotal.

However, it is imperative for businesses to remain aware of the potential drawbacks linked to overwhelming consumers with information, which can adversely affect their decision-making process, as previously explored. Central to the expansion of existing models aimed at addressing contemporary challenges in the tourism sector has been identified as the incorporation of novel concepts stemming from recent technological advancements.

Given the dynamic nature of consumer behavior, which continually adapts to varying circumstances, the study of consumers' actions retains its significance and will continue to do so. And according to the study by Duffett (2017), various social media formats are embraced by Generation Z. However, in the study of Duffett, its investigation focused on collectively analyzing the interactive Information and Communication Technology (ICT) platforms Generation

Z utilize, while acknowledging the possibility of individual scrutiny. The study refrained from delving into particular brand advertisements or any other interative platforms or mechanisms but rather concentrated on a comprehensive evaluation of social media marketing communications, only focusing on the Generation Z.

According to Han & Chen (2022) it is identified that the influence of social media is notably distinct among Millennials (also recognized as Generation Y, born between 1981 and 2000), marking them as the inaugural generation to grow up immersed in and exposed to easily accessible technology, thus shaping their interaction with it. Furthermore, Millennials are recognized as a cohort of consumers extensively employing mobile technologies across all stages of trip planning, as highlighted by Femenia-Serra et al. (2018). Hence, this approach opens up avenues for further research in the realm of novel broader tourism and hospitality marketing strategies across these new social media platforms and related strategies. Yet, despite its significance in the tourism industry, there remains a scarcity of research examining the influence of social media influencers on Millennials' intentions in travel behavior.

Furthermore, Millennials have now been identified as the generation willing to invest more in experiences, are anticipated to continually drive the tourism sector due to their promising

purchasing power in the coming years, as per the findings of Femenia-Serra et al. (2018). Also as cited in the same study according to Klein (2018), it is identified that in the decision-making process of this demographic, influencer marketing stands out as a pivotal factor.

This inquiry also holds significance by augmenting attitudinal research in developing nations, which often lack comprehensive exploration into the realm of social media marketing communications. Hence, significance was identified to conduct a study in measuring the effectiveness of influencer marketing as a form of social media marketing communications in the context of Sri Lanka as a developing nation and influencer marketing being a trending mechanism.

Furthermore, Lim et al. (2017) pinpointed a noticeable empirical void that necessitates future investigations to encompass a broader spectrum of millennial consumers. In another study it is acclaimed that millennials openly express that conventional media like television, newspapers, and magazines no longer hold primary relevance for them (Kádeková & Holienčinová, 2018). Instead, they gravitate towards social networks, cultivating a daily engagement with social media. Their interest centers around visual content encompassing videos, photos, and music, while lengthy written texts tend to be overlooked. Consecutively, this study recommends to focus on measuring how effective

influencer marketing which cultivates daily engagement with online consumers on social media platforms, has been in terms of cognitive, affective and behavioral attitude components in millenial travelers in Sri Lanka.

In the study conducted by Lim et al. (2017) analysis of social media was conducted in a comprehensive manner, without accounting for the diversity of distinct social media platforms, which could potentially be scrutinized separately. Hence, this study focused on social media travel influencers specifically populated on the Instagram platform due to Instagram platform being recognized as the most popular platform among social media users according to (HyperAuditor (2022). And as per Hashoff (2017), 99.3% of influencer marketers prefer to work on the Instagram platform than Facebook and Snapchat. Consequently, considering all of the above interpretations, this study exclusively focused on the Millennial cohort; however, it is also feasible to evaluate attitudes toward social media marketing communications among other generational groups.

2. LITERATURE REVIEW

2.1 Instagram Influencer Marketing in the Tourism Industry

In contemporary times, a majority of consumers rely on social media as a source of product-related information, actively seeking out endorsement posts from influencers for product recommendations further (Lee & Kim, 2020). Moreover, social media has evolved to not only reshape consumer behavior and decision-making processes but also to revolutionize information acquisition, destination selection, and the sharing of traveler experiences (Han & Chen, 2021).

Out of the well-known social media platforms, owing to its extensive engagement and interactive nature, Instagram has emerged as a hub for influencers and opinion leaders who capitalize on their talents and creativity by partnering with brands, thus generating income (HyperAuditor, 2022). According to the study conducted by Woods (2016) as cited in Femenia-Serra et al., (2018), influencers represent the figures consumers actively follow, and they possess the ability to amplify a brand's message through word of mouth, potentially stimulating purchasing intentions. Consecutively, Kolarova (2018) emphasizes the significance of influencers presenting their social media content distinctly as a representation of the brand and as sponsored content, as cited in Femenia-Serra et al., (2018). Social media influencers have emerged as a novel category of brand advocates and opinion influencers with substantial authority to exert influence (Femenia-Serra & Gretzel, 2020). Influencers have been identified as possessing a profound understanding of their target audience and expert communication skills are primarily attributed to the creation of

viral social media content with notably high user engagement rates (Baltezarevic & Baltezarevic, 2022).

Furthermore, a substantial 99.3% of influencer marketers show a preference for the Instagram platform, as compared to Facebook and Snapchat (Hashoff, 2017). Instagram's captivating visual appeal coupled with its extensive base of 1 billion active users has also established as a significant avenue for influencer marketing. It is acclaimed that Instagram effectively reaches a youthful demographic, specifically the Millennials, aged between 22 and 37 years (Lin et al., 2019). Millennials have also been recognized as a cohort of consumers extensively employing mobile technologies across all stages of trip planning, as highlighted by Femenia-Serra et al. (2018). This generation is characterized by a preference for visually engaging content, attributable to their inclination to favor captivating visual messages over text-based communication according to the research conducted by the Pew Research Center in 2018 as cited in (Lin et al., 2019). Therefore, it is important consider this generation to measure the psychological processes these Millennials go through as they move from being unaware of a destination to becoming loyal travellers of a destination.

According to Javed et al., (2020), their study unveiled that actively utilizing social media while traveling to share narratives, images, and videos significantly impacts potential future travelers, enticing them to explore exotic destinations and amplifying the appeal of Web 2.0 and social media platforms. Web 2.0 has also given rise to a novel trend of tracking "social media influencers." As cited in the same study, according to Hwang and Zhang (2018) explained that these "influencers" manipulate considerable authority over the purchasing decisions of their virtual followers.

During the COVID-19 lockdown a clear rise of social media influencer content was witnessed where influence originates from an influencer's persona, encompassing their authority, experiences, thought processes, leadership leanings, persuasive accompanying content, or simply the followers' trust in said influencer (Hwang & Zhang, 2018; Daniela Garbin, 2020). Considering the Sri Lankan context, the significance of travel influencer marketing also came to the forefront under the "So Sri Lanka" campaign in 2021, as recognized by the Sri Lanka Tourism Development Authority during the post COVID-19 period with the aim of reviving Sri Lanka tourism status (Thavapalakumar, 2020). Therefore, the magnitude of applying influencer marketing as a novel social media marketing strategy has been identified in measuring the impact of travel influencer marketing on the travel decision making of Millennial travellers.

While the majority of the aforementioned research was conducted within developed nations, investigations within developing countries are still evolving. Hence, underscoring the significance of conducting research on the application of influencer marketing and its contribution to attitudinal research in the tourism sector, particularly concerning tourist attractions is required.

2.2 Hierarchy of Effects Model

According to (Lin et al., 2019), User Generated Content (UGC) encompasses all content crafted and shared by unpaid contributors or more appropriately placed enthusiasts. In a similar disposition, a sponsored Instagram post can be regarded as an advertisement, as it features an amalgamation of imagery and text intended to convey information to a specific audience. Supporting the same, according to Evans et al., (2017), companies are frequently employing paid electronic Word-of-Mouth (eWOM) strategies to magnify brand messages via influential figures, a practice commonly referred to as influencer marketing.

Instagram influencers frequently gather substantial followings by sharing aspirational photos, utilizing hashtags, and actively interacting with their followers. This engagement allows travelers to access comprehensive travel information, gain product insights, and develop a better understanding of various travel destinations (Evans et al., 2017).

According to existing literature in understanding consumer decision making process, the process where a marketer encourages a consumer to make the purchasing decision has been studied where the Hierarchy of Effects Model has been firstly developed by St. Elmo Lewis in 1898. It aids marketers in comprehending the psychological journey consumers undertake, progressing from product unawareness to becoming devoted customers. This model steers advertising and promotional tactics by customizing messages and content for each phase of the hierarchy, ensuring a skillful navigation of consumers through the decision-making process.

Due to the escalating significance of influencer marketing and the widespread popularity of social media influencers, numerous brands have initiated campaigns collaborating with these influencers (Joshi et al., 2023). According to the same study conducted by Joshi et al., (2023), the aim of social media influencers is to sway consumer behavior towards desired outcomes such as fostering positive brand attitudes and stimulating product purchases.

Influencer marketing has been identified as a novel type of social media marketing in the contemporary context (Sproutsocial, 2023). According to the study conducted by (Ganguly, 2021), the concept of influencer marketing is rooted in the traditional marketing approach of word-of-mouth, which has now transitioned into the digital age,

particularly in a globally connected world shaped by social media. Due to the intense competition in eWOM marketing becoming fierce, social media marketing has now become the most significant marketing channel for communicating with consumers where social media influencers are identified as prominent in increasing the efficiency of social media marketing.

Furthermore, according to studies conducted, study conducted by (Nzeku & Duffett, 2021), the study found that tourists' cognitive attitudes resulted in a favorable effect on affective attitudes, and affective attitudes had a favorable effect on behavioural attitudes due to social media used as a marketing tool where the study measurements were adapted from the hierarchy of effects model developed by St. Elmo Lewis in 1898. And as cited in (Nzeku & Duffett, 2021), according to Jacobson, Gruzd, and Hernández-García (2020), it was discovered that individuals exhibited positive feelings toward information shared through social media and demonstrated favorable sentiments in response to social advertising. Considering influencer marketing is a novel trending social media marketing strategy. In light of this, the author suggests investigating the following research questions built upon the hierarchy of effects model.

RQ1 – How do social media influencer marketing communications impact the cognitive responses on affective responses of millennial travellers?

According to Cohen (2018) as cited in (Nzeku & Duffett, 2021), it was identified that the strength of technologies in storytelling performances led to favorable affective and behavioural responses in Denmark. The aforementioned inquiry ascertained that Facebook has a favorable effect on affective attitudinal responses relating to travel patterns. Moreover, A study uncovered that stimuli, enjoyment, and affinity led to positive perceptions regarding brand relationships with social media influencers in the United States (Cuevas et al., 2020). As justified earlier, Instagram being the prominent social media platform among Millennials as well as most widely used by social media influencers, it is significant to measure the impact of such travel influencers on the behavioural attitudes of travellers. Hence, the author suggests investigating the following research questions built grounding on the hierarchy of effects model.

RQ2 – How can stimuli and affective responses influence the behavioral attitudes of young consumers toward social media marketing communications?

3. METHODOLOGY

Within the realm of epistemology, this study adheres to the positivist philosophy, grounding its empirical framework in established hypotheses

derived from current research knowledge, theoretical constructs, and models. The study considers potential data sources, delves into the nature of the research, and outlines its scope accordingly. Considering existing literature as discussed above, the author proposes the below model that can be utilized for future research based on the identified empirical gaps.
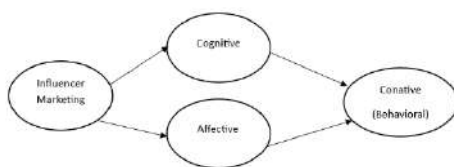
Figure 1. Author Proposed Model

Furthermore, as a descriptive study under the conclusive research design, a deductive reasoning approach can be followed when proceeding for data collection, analysis and discussion. The population that needs to be considered should be consisting of travellers who are following travel influencers on the Instagram platform specially falling in the age range of millennials aged between 22 to 37 years (Lin et al., 2019).

In terms of the statistical modelling, the methodology of Partial Least Square-Structural Equation Modelling (PLS-SEM), has been identified as an established, widely employed statistical modelling technique in the fields of marketing, tourism, and hospitality. Hence, the author recommends utilizing

PLS-SEM for further studying of this phenomenon.

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Coping Orientations as Antecedents of Life Insurance Purchase Intention: A Conceptual Exploration

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Abstract

Considering extensive literature highlighting the significance of life insurance, it remains a concern that a considerable portion of the insurable population lacks coverage, leaving them vulnerable to financial adversities. Extant literature underscores the potential influence of sociodemographic and psychological antecedents, as well as coping skills and orientations of individuals, in shaping insurance decisions, however, there is a paucity of research emphasizing the role of psychological factors in insurance decisions. In this light, this paper aims to extend its focus on life insurance purchase behaviour, drawing upon the theoretical bases of the Proactive Coping Theory and the Theory of Reasoned Action (TRA) thereby providing a theoretical explanation of the link between the coping orientations and the intention to purchase life insurance, with an emphasis on the role of attitude towards such purchases. This paper claims that the TPB fails to adequately explain and capture the complex purchase behaviour of life insurance prospects with its limited consideration of antecedents of individual behaviour thereby suggesting that life insurance purchase behaviour must be explored in the light of coping orientations of individuals. This paper further suggests that attitudes towards behaviour tend to mediate the relationship between coping orientations and purchase intention. From a practical standpoint, this paper emphasizes the need to consider the coping orientation of insurance prospects when formulating policies and crafting life insurance products and marketing tools.

Keywords - Proactive Coping Theory, Theory of Reasoned Action, Preventive Coping, Proactive Coping, Life Insurance Purchase Intention, Attitude Towards Life Insurance Purchase

1. INTRODUCTION

People face numerous risks and uncertainties in their daily lives, which can have a devastating impact on their financial

well-being. Such risks, if left uninsured could drag households to poverty if materialized. Apart from being a means of protection, life insurance also serves as a means of saving and thereby mobilizing savings leading to financial intermediation which in turn impacts the economic growth of a nation (Churchill & Matul, 2012; Arena, 2006; Ćurak et al., 2009). In this context, life insurance is deemed to serve as a precautionary tool and a means of future-oriented coping, providing financial support to dependents in the event of a tragedy (Dercon, 2006; Sanjeewa, 2021). Despite the significance and evident benefits of owning life insurance, it is noted that the life insurance penetration rates of several developed and developing countries remain at remarkably low levels. Furthermore, life insurance is considered an unsought product in the marketing literature (Kotler et al., 2005).

In terms of life insurance penetration, despite being two major economies, in the USA and Canada, life insurance penetration remains low compared to other countries in Europe and Asia (Bhatia et al., 2021). In Sri Lanka, life insurance remained at 0.69% in 2020 and has not achieved notable growth thereafter (KPMG, 2021). This contradictory behaviour leads to the question of what factors drive the purchase decision and makes it worth exploring how individuals make the decision to purchase life insurance.

In the context of life insurance purchase behaviour, the majority of studies have focused on macro-environmental factors and individual factors (Bhatia et al., 2021). There is a paucity of studies focusing on

psychological factors such as motivational orientations although such factors are deemed significant potential determinants of life insurance purchase behaviour (Buzatu, 2013). Furthermore, Bhatia et al., (2021) highlighted that decision variables such as intention to purchase and ownership of life insurance are less explored areas in the life insurance research domain.

In the consumer behaviour domain, it is considered that individual purchase behaviour and behavioural intentions flow from their behavioural beliefs about performing the act which in turn are influenced by a wide variety of background factors including coping orientations (Fishbein, 2005). According to the coping theory, an individual is motivated by one of the two motivational forces (proactive coping and preventive coping), whichever is situationally dominant at the moment under consideration (Aspinwall and Taylor,1997; Higgins, 1997;2002). Life insurance, being a means of saving and protection reflects both preventive coping and proactive coping. The extent of individuals' orientation towards preventive and proactive coping orientations should shape their attitudes towards life insurance purchase intention (Fishbein, 2005). However, this view of life insurance as a means of proactive and preventive coping has been scarcely studied as per the extant literature.

Thus, the main purpose of this paper is to provide a new theoretical perspective on life insurance purchase behaviour by exploring the theoretical bases of proactive coping orientation and preventive coping orientation. The theoretical insights of this

paper would further provide a perspective on the behavioural beliefs and thinking patterns of insurance prospects and how best life insurance companies and policymakers could influence them to purchase more life insurance.

2. LITERATURE REVIEW

The domain of consumer financial behaviour encompasses a range of sub-domains such as borrowing, spending, saving, insuring, retirement planning, financial planning, everyday money management, investing and tax compliance (OECD, 2005). In this context, responsible financial behaviour has been highlighted as a vital prerequisite for well-being, happiness and reaching individual life goals (Fred van Raaij, 2016).

2.1 Coping Behaviour

Coping behaviours are considered as actions taken in reaction to difficult situations (Shi et al., 2021). Accordingly, researchers have identified three types of coping, namely reactive coping, preventive coping, and proactive coping. Reactive coping involves dealing with current issues whereas preventive coping involves avoiding potential future issues and proactive coping deals with efforts to achieve future goals issues (Schwarzer & Knoll, 2004; Greenglass & Fiksenbaum, 2009). Accordingly, researchers claim that the same coping behaviors can be applied to personal finance behaviors such as saving, sticking to budgets, investing, cutting expenses etc. (Serido et al., 2010).

2.2 Proactive Coping Theory, Preventive and Proactive Coping

Schwarzer and Taubert (2002) suggested that proactive coping involves evaluating future goals and establishing a foundation for the successful achievement of those goals (Schwarzer et al., 2008). In proactive coping, individuals engage in organized and intentional behaviour (Greenglass et al., 1999). Aspinwall and Taylor (1997) describe proactive coping as a process whereby individuals prepare themselves for potential future stressors which could also possibly help them to avert them altogether. Further, proactive coping involves the possession of and use of skills associated with planning, goal setting, organization and mental stimulation. Schwarzer and Taubert (2002) define proactive coping as a means of assessing one's future goals and preparing to achieve them successfully. Accordingly, proactive coping would be considered self-determined and autonomous setting of goals and achievement of goals. Proactive coping thus explains what motivates people to strive for goals by committing themselves to personal quality management (Schwarzer and Taubert, 2002).

In contrast, preventive measures involve defensive and comprehensive strategies aimed at saving resources for future needs (Schwarzer et al., 2008). Furthermore, preventive coping is described as an effort to accumulate resistance resources which could be used in general for potential future uncertainties that could cause distress. Such general resistance resources would help individuals to minimize the severity of the impact of potential future distress and to

reduce the risk of potentially stressful events (Schwarzer et al., 2008).

Although preventive and proactive coping are often discussed as distinct concepts, they are believed to have commonly observed actions and are partly manifested in similar behaviours such as accumulating resources, developing skills, planning for the long term etc (Schwarzer et al., 2008).

However, it could also be noted that the motivations for proactive coping could be distinguished from the same for preventive coping based on how an individual appraises a potential stress factor. While a proactive coper would appraise a stress factor as a challenge a preventive coper might appraise the same as a threat (Schwarzer et al., 2008). Also, it is found that people take intentional and more organized actions in proactive coping (Greenglass et al., 1999).

2.3 Theory of Reasoned Action (TRA)

Life insurance purchase behavior has also been studied using Theory of Reasoned Action (TRA), Prospect Theory and Theory of Planned Behavior (TBP). In TRA, it is believed that reasoned actions are a result of information acquisition and processing, deliberation, and well-informed decisions (Fred van Raaij, 2016). Accordingly, Ajzen and Fishbein (1975) claim that an individual's intentions to perform a specific act, with respect to a given stimulus object, in a given situation, is a product of attitude towards the act and subjective norm. Fishbein (1967) elaborates that such attitudes and subjective norms are in turn influenced by different behavioral, and normative beliefs. Further, such beliefs are

expected to be in turn influenced by a wide variety of cultural, personal, and situational factors (Fishbein, 2005;1967). However, it has been acknowledged that TRA does not capture how such potential factors would translate to behavioral intentions.

3. METHODOLOGY

This concept paper is based on an extensive literature search conducted through academic databases including Google Scholar and Scopus. The literature search was refined using keywords such as "coping theory," "proactive coping theory," "theory of reasoned action," "insurance purchase behaviour," "financial decision-making," "financial behaviour," "preventive coping," and "proactive coping," along with various combinations of these terms.

The author focused on peer-reviewed journal articles, books, seminal papers, and influential papers that provide theoretical insights into coping orientations and insurance purchase behaviour. The literature was evaluated meticulously for relevance and rigour. The evaluation process also involved identifying gaps in the current literature, which the author's conceptual exploration aims to address.

3.1 Coping Orientation and Purchase Intention

Fishbein and Ajzen (1975) state that variables which are external to the theory of reasoned action model would only influence behavioural intention through attitudes or subjective norms, indicating the openness of the theory to include predecessors. In this context, coping skills

are considered as a potential background factor that could influence the behaviour of individuals. However, the theory fails to capture the holistic and complete picture of how coping skills or orientations would translate into behavioural intentions and ultimately individual behaviour (Fishbein, 2005).

In terms of life insurance, prior studies state that one of the primary motivations for purchasing insurance is to obtain financial relief or compensation in the event of the occurrence of an uncertain future event with unfavorable consequences. The main goal in such a situation would be to protect oneself and dependents from negative financial consequences while also making oneself and dependents less financially vulnerable to such uncertainties. As a result, it could be argued that purchasing insurance in general is frequently motivated by a desire to avoid loss or risk. Furthermore, when people's reactions to losses are compared to their reactions to gains, it has been discovered that people are more affected by losses than by gains, implying that the brain reacts stronger to losses when compared to gains (Tom et al., 2007). Thus, according to Kahneman and Tversky (1979), people devote significantly more effort to avoid risk than to gain. Loss aversion is regarded as a dominant and prominent motivator of behavior in this context. Hence, a person with a prevention coping orientation is deemed to be motivated to 'feel secure' and avoid negative consequences related to uncertain events (Higgins, 1998), hence, they are likely to involve in behaviors such as saving and purchasing insurance with the motive of ensuring financial safety (Sekścińska et al., 2016). Based on the above discussion, the author proposes;

H1: Preventive coping orientation impacts life insurance purchase intention.

In addition to being a means of protection, insurance is deemed to promote growth and personal development as it is considered as a means of long-term saving (Deb et al., 2021). According to Fred van Raaij, (2016), although the concept of 'insurance' originated as a system of solidarity among people, at present, individuals are more likely to focus on the potential benefits for themselves rather than for other people. Further, insurance is often perceived as an investment made by people in their future to make it more certain and financially secure (Higgins, 2005; Zhou and Pham, 2004). In line with this argument, Norman and Conner (1996) also found that insurance is generally viewed as an investment to make positive gains from a loss or a negative event. In this light, life insurance is preferred as a saving avenue for yielding satisficing returns, and to enjoy attached tax incentives rather than merely using it as a protection tool (Deb et al., 2021). Therefore, the author proposes;

H2: Proactive coping orientation impacts life insurance purchase intention.

3.2 Coping Orientation, Attitude towards Life Insurance Purchase and Behavioural Intention

As per the TRA, attitude towards an act is influenced by behavioral beliefs an individual hold about performing a given act and these behavioral beliefs are believed

to be influenced by a wide variety of factors – cultural, personal and situational. In terms of attitude towards the act, it has been found that developing attitudes towards performing a behavior would be a result of an individual being sufficiently motivated to do so and possessing the required cognitive capacity for the same. Lack of motivation or cognitive ability could make activation of attitudes towards an object or a behavior more problematic (Ajzen & Fishbein, 2004; Fishbein, 2005).

In the context of consumer financial behaviour subscribing to life insurance is considered responsible financial behaviour as life insurance fulfils two key objectives – income protection in the event of the untimely death or disability of the breadwinner and future income growth through long-term saving and return on investment (Beck & Webb, 2003). Deb et al. (2021) revealed that certain young respondents perceived life insurance only as a protection tool, and thus preferred life insurance as a means of protecting the dependents or beneficiaries. However, in a study conducted by Fletcher & Hastings (1984), it was revealed that the respondents scored relatively high interest in terms of using life insurance as a means of saving compared to the notion of using life insurance as a means of protection for dependents. Accordingly, the majority found the savings aspect of life insurance and enjoying benefits during their life more appealing than using life insurance to protect the income source of dependents in case of untimely death or disability of the breadwinner. Fred van Raaij (2016) identifies life insurance as "an investment

that guarantees recovery of a possible loss caused by an uncertain hazard" (p. 65). Thus, life insurance acts as a means of safeguarding individuals and dependents from or buffering future losses and promoting future growth through savings. Hence, it is evident that life insurance purchase behaviour reflects both the preventive coping orientation and proactive coping orientation of individuals. Based on the above the author proposes;

H3: Preventive coping orientation impacts attitude towards life insurance purchase.

H4: Proactive coping orientation impacts attitude towards life insurance purchase.

H5: The impact of preventive coping orientation on life insurance purchase intention is mediated by attitude towards life insurance purchase.

H6: The impact of proactive coping orientation on life insurance purchase intention is mediated by attitude towards life insurance purchase.

3.3 Attitude and Behavioral Intention

In the TRA, attitude towards a behaviour is understood as favourable or unfavourable feelings regarding performing a particular behaviour (Fishbein and Ajzen, 1975).

Behavioural intention is understood as the motivation of an individual to perform a certain behaviour. Intention is considered the most influential determinant of eventual actual behaviour (Ajzen, 1991). As per the TRA, attitudes towards a behaviour are significant and vital determinants of the intention to behave in a certain manner ultimately leading to the actual behaviour

(Fisbein and Ajzen, 1975). Furthermore, several empirical studies conducted in different contexts also revealed that attitudes are significant predictors of life insurance purchase behaviour (Nomi & Sabbir, 2020 Outreville, 2013; Tsai, 2010; Huang and Chuang, 2007). The following hypotheses can be proposed.

H7: Attitude towards life insurance purchase impacts life insurance purchase intention.

In summary, this concept paper emphasizes that the theory of reasoned action which is popularly used to understand and explain life insurance purchase behaviour and consumer behaviour in general (Bhatia et al., 2021), fails to capture how certain background factors such as individual coping orientations would translate into behaviours through attitudes (Fishbein, 2005). To address this gap, the author borrows constructs from the Proactive coping theory where Proactive coping orientation and preventive coping orientations have been suggested as background factors shaping attitudes towards a particular behaviour. Preventive coping orientation and proactive coping orientation are deemed to influence decisions involving financial conservation, investments, insurance purchase etc. (Schwarzer et al., 2008). The following conceptual framework has been derived based on the literature review.
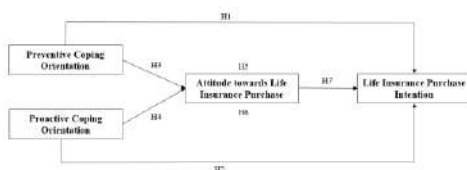
Figure 1. Conceptual Framework

4. THEORETICAL IMPLICATIONS

This concept paper contributes to the theory by extending the TRA with the theoretical support of the Proactive Coping Theory in an attempt to explain the complex life insurance purchase behaviour of individuals. Studies in the financial psychology domain have mentioned that sociodemographic and psychological variables are key variables that could explain insurance decisions (Kunreuther et al., 2013). Coping skills have been identified as potential factors that could influence the attitudes of individuals (Fishbein, 2005). However, there is a paucity of research which studies the influence of psychological factors on behavioural intentions through attitudes towards behaviour. According to Fishbein and Ajzen (1975), variables which are external to the theory of reasoned action model would only influence behavioural intention through attitudes or subjective norms, hence, the current study borrows two constructs from proactive coping theory – proactive coping orientation and preventive coping orientation – to explain how coping orientations would impact an individual's attitudes which would in turn convert to a behavioural intention. This study predominantly stresses on uncovering the possible mediating impact of attitude towards a behaviour on the relationship between coping orientations and behavioural intention which has not been adequately addressed in prior literature (Bhatia et al., 2021).

5. MANAGERIAL IMPLICATIONS

Uncovering the strength of the mediating impact of attitude on the relationship between proactive coping orientation and life insurance purchase intention; and the relationship between preventive coping orientation and life insurance purchase intention could inform the life insurance companies on the significance of understanding the psychological orientations of their life insurance prospects and which aspects or benefits of life insurance to emphasize when designing, developing and promoting their life insurance products.

Furthermore, insights generated from this study will be extremely useful to insurance professionals in designing and executing their insurance-agent training programmes focusing on relational selling efforts. Insights from this study would inform the insurance industry with critical information on consumer expectations and how their coping orientations shape attitudes towards the product. Such insights would help insurance agents identify the coping orientation of their insurance prospects and use their relational selling skills to change unfavourable attitudes towards life insurance.

6. CONCLUSIONS AND FUTURE RESEARCH DIRECTIONS

Life insurance being a product that serves dual purposes – income protection and investment – is considered a vital product for any individual, yet only a handful of insurable individuals own sufficient life insurance covers. Life insurance also contributes to economic growth and development by alleviating poverty and by mobilizing savings through financial intermediation. However, life insurance is still categorized as an unsought product in the marketing literature. This study aims to uncover complex life insurance purchase behaviour of insurance prospects by uncovering the intricate and complex relationships between coping orientations, attitudes towards life insurance purchase and life insurance purchase behaviour. This concept paper aimed to understand and decode the complex life insurance purchase behaviour by theoretically leaning on the theory of reasoned action and proactive coping theory. In doing so, this paper emphasized the potential mediating role of attitude towards life insurance on the relationship between coping orientations and the intention to purchase life insurance.

Although this paper provides a new theoretical basis and a perspective on decoding the life insurance purchase behaviour, it emphasizes the need for empirical investigation of the same. Further research can be conducted by incorporating a broader set of psychological antecedents such as regulatory foci, self-efficacy, subjective norms, religiosity, and locus of control to deepen the understanding of the life insurance purchase behaviour of individuals. Further, longitudinal studies can be conducted to uncover how life insurance purchase behaviour would evolve or change over the course of the lifecycle of individuals.

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The Impact of Celebrity Influencer Marketing on Hospitality Product in Sri Lanka

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ABSTRACT

The credibility of influencers and internet advertising are major marketing trends in Sri Lanka. The study focuses on the shift from celebrity endorsements to online platforms and the use of micro-influencers in promoting hospitality products to reach a wider customer base and influence their purchasing decisions. Specifically, the project investigates the impact of celebrity influencers on customer purchase intentions for Sri Lankan hospitality items, considering the celebrity influencer type as a moderator variable. In this research project, the primary objective is to explore the relationship between celebrity endorsements in social media advertising and customer purchase intentions. As this research basically focuses on teenagers, to accomplish this objective, a questionnaire will be shared among the undergraduate students. As they are the people who majorly use social media and digital marketing for their daily purpose, they usually get intent on these trends. The study will employ the PROCESS method and an independent sample t-test in regression analysis using SPSS to test the set hypotheses. The results indicate that stated advertising status enhances influencers' credibility, while influencer type does not have a significant effect on this relationship. In summary, this research project confirms that using celebrities in social media marketing for hospitality products effectively increases customers' purchase intentions. However, compared to other industries, the study suggests that celebrity reputation and attractiveness may have a more limited impact on promoting hospitality products.

Keywords - **credibility, influencers, celebrity endorsements.**

1. INTRODUCTION

The rapid growth of interactive digital technology has impacted almost every aspect of Generation Z's (Gen Z) daily lives. Gen Z is considered the first global generation because they were born in the digital era from 1995 to 2010 and are digital natives, highly educated, creative, innovative, and technology savvy (Priporas C. V.) The current technological environment is a result of globalization, and all organizations and services are trending towards digital communication or digitalization. The reason for this is that everyone nowadays utilizes the internet and other forms of digital media. As a result, digital technology is used by all enterprises. It oversees locating, storing, and preserving the information required for that procedure, as well as ensuring that all social media platforms are reliable and easily accessible. It is crucial to evoke that a digital marketing strategy is both

an idea as well as a real product, and that it needs to ultimately result in the development of a compacted plan or planning process.

Restaurants and Hotels are always seeking to improve the quality of their items and reputation to attract and retain customers. This necessitates a more focused marketing strategy. Customers don't care about the outcomes of marketing, as evidenced by their constant channel hopping on TV or skipping social media commercials. Businesses have long recognized the importance of crafting a strategy that causes people to pause, pay attention, and possibly even be inspired by ads.

Celebrity Endorsement

Celebrity endorsement is the promotion of a brand by a celebrity" (Hashaw, 2019) One method mentioned in marketing literature is celebrity endorsement. It encourages the use of renowned people in advertisements. Celebrities seem to be well-known people both locally and globally. Their celebrity stems from their life in real life, films, entertainment, and business. Celebrity endorsement as a hook to pique the customer's interest in the commercial. Celebrities are considered to encourage consumer involvement since they are attractive, inspirational, and hence have impact on others. People regard celebrities as role models on social media. Consumers' buying intentions are influenced by celebrity lifestyles. Celebrity endorsement, according to, increases buyers and raises awareness. They also assist the client in recalling the advertisement and, ideally, the products. As an example, if we take any luxury

five-star hotel, we can advertise a mini blog using a famous celebrity in social media like Instagram.

A celebrity endorsement elevates a commercial to a new level, increasing the product's visibility and using that we can make trustworthiness among the consumers. Because in a country like Sri Lankan people usually trust each other with the humanity and the cultural behavior of the country. So, celebrity endorsement is a more primitive way to make intentions to purchase hospitality products. As we know, after the pandemic situation Sri Lanka's tourism industry has fallen. So, to rise this industry the most common technique we usually use is conducting campaigns with famous people in the country. Because there is a high impact on that. Marketers must create strategies to attract consumers' attention to communicate their message. As we know traditional methods of garnering customer attention to commercials include celebrity endorsement, it is still validated for the presence also. There is a surge in interest in studies on customer purchase intent on social networking platforms. We must comprehend the significance of influencer marketing and the way it influences social media marketing and online purchase intent. The primary goal of this research is to determine the link between influencer marketing on social media and consumer purchase intent.

2. METHODOLOGY

Social media marketing is an account-based marketing approach to get the attraction of the customers and learn more about things that their attracted. We need to share the details into a digital marketing base. When promoting a

hospitality product in a hotel or restaurant content creating is a very first basic attractive method to get customers. In social media marketing through this we can promote company promotions on like in Facebook, Instagram, YouTube etc.

When making advertising a product using a social media influencer First step is we need to identify the high value target celebrity accounts which are mostly trending in social media platforms recently. When identifying those accounts, we need to be concerned about a few key features like followers count, age, and gender of the celebrities. The second step is doing research on those accounts. Having an idea about the account which are focusing on is a good advantage for us because from that basically we can adjust our campaign which is used to develop for our business. The third step is to develop and customize a campaign which is suitable for the company. Most companies utilize customized campaigns in data gathering and digital technologies to provide customized information and product offerings to current and future customers using celebrities nowadays. And the fourth step is to establish that campaign and promote that using various online platforms like Instagram, TikTok and Facebook. By choosing the end goal of the campaign we can start the campaign and choose celebrity influencers and customer base who are targeting. And run the customized marketing campaign to make purchasing intention in products.

And Final step is to get the result of the campaign we have already done and responses we got for that. Impression, viewers, comments, click through rate are some methods to analyze the final outcome of the campaign. By analyzing this we can conclude that the consumers are interested in the products we offer or not

So, in this research we have observed the level of capacity which is affected by the celebrities to purchase any product to the customers.

2.1 Mode of research execution

Before determining the response to the study issue, there are numerous approaches for doing research. Method of collecting qualitative data. Knowledge that cannot be measured or tallied is classified as qualitative data. The aim of qualitative data analysis is to identify whether the behaviors that people engage in are suitable, as well as what motivates people to do suit may take some time to collect and engage with this type of data since it requires the analyst's observation. A qualitative approach is someone who regularly works with qualitative data.

2.2 Data collection methodology

Data collection is the process of gathering information from all relevant sources to answer research problems, examine the hypothesis, and evaluate the results. There are two types of data collection methods: secondary data collection methods and primary data

collection methods. As a result, the study employed a qualitative data gathering strategy. Survey questions, surveys, paperwork, and records are examples of quantitative tools, whereas interviews, observation methods, observations, and historical accounts are examples of qualitative tools. There may be some crossover between the two techniques as well.

The sole technique we discovered for gathering data for this research project was to perform a questionnaire among persons who predominantly use social media and engage with hospitality products. So, I primarily target inquiry to young individuals attending both public and private universities. To collect data, only received replies from NSBM Green University undergraduate students. As a result, the data gathering procedure began with the distribution of a Google form. The data gathering procedure began with a questionnaire.

Because of the large volume that required to be collected, this method was utilized.

This strategy was mostly adopted because of the requirement to contact many people in a short period of time. An advantage that comes with using questionnaires is that it executes the data collection process in a less expensive manner. The interview questionnaire consisted of twenty-two questions.

A non-probability convenience sampling technique was used on a population of university students at the NSBM Green University. we suggested that the sample size should be above 150 and more ideally around 200 to 300 respondents. Because having more responses means that we can get more opinions on the conclusion. Most importantly whether the impact of celebrities will work or not. As we know with the age limits this probability becomes different. So, getting responses mostly among variation of genders will mostly be helpful to clear out the doubts about this topic.

This study's sample size was 110 undergraduate students from the NSBM Green University. The subjects were contacted immediately and requested to complete the questionnaires freely.

3. EXPERIMENTAL DESIGN

Cronbach's alpha was utilized as the measure of internal consistency in the study to measure the dependability of the replies. The data gathered from the survey was analyzed using the statistical software package SPSS version .A descriptive study was conducted on the respondents first, followed by a correlation test to portray the effect and direction of the link between the variables. Lastly, a logistic analysis was used to establish the relative impact of the endorser variables on the respondents' opinions regarding purchase intention.

According to the independent variable that mostly affects purchasing products due to celebrities will clearly to be identify before making a questionnaire.

Then according to those variable, we should create a questionnaire that mostly suit for the requirement of this research project.

4. DISCUSSION

When considering about the impact of having celebrity influencers the analysis began by investigating the impact of endorser versus non-endorser advertisements on consumers' attitudes and purchase intentions. The expectation was that advertisements with endorsers would have a more positive influence on consumers' attitudes towards the ad, brand attitudes, and purchase intentions compared to advertisements without endorsers. Surprisingly, the results revealed a significant effect of endorser

Total Responses	110
Male	48
Female	62

versus non-endorser advertisements on consumers' ad attitudes, contrary to expectations. The non-endorser advertisement had a greater impact on ad attitudes than the endorser advertisements.

All the 110 responses were regarded as valid. Apart from the screening questions section 1 of the questionnaire included the personal details of the respondents. There was a total of 110 responses male (44.5%) and female (54.5%) each. Almost half of the respondents were from the 21-25 age groups.

And when considering the educational level of the people who mostly get attracted to purchase hospitality product are well educated. According to our survey results 75.5% of people are educated ones who are following bachelor's degree or higher education the average responses to the attitude statements revealed that celebrity credibility is an important dimension of

Figure 1 Correlation analysis

celebrity endorsement when considering purchasing and trust is slightly more important to them than expertise.

SSPS is mostly used by market researchers to analyze survey data. As in this research we after collecting data we applied SSPS method analyze about the results we got.

After collecting whole data in to excel sheet we import our excel sheet into IBM SPSS.As a summary total no. of responses and the gender as follows,

For that we use techniques such as correlation analysis and regression analysis techniques which are used in qualitative variables' we collect data as string variables we have convert them into numeric variable to get the analysis process.

Correlation analysis estimates the relationship strength between two variables.

Correlations

Correlations

		Marital Status	Your Gender
Marital Status	Pearson Correlation	1	-.285**
	Sig. (2-tailed)		.003
	N	110	110
Your Gender	Pearson Correlation	-.285**	1
	Sig. (2-tailed)	.003	
	N	110	110

**. Correlation is significant at the 0.01 level (2-tailed).

In here we have used marital status and the gender as the sample variables.

And in regression analysis it is used primarily to get immediate decision about the analysis.

Below diagram shows the regression analysis of the above mentioned two variables.
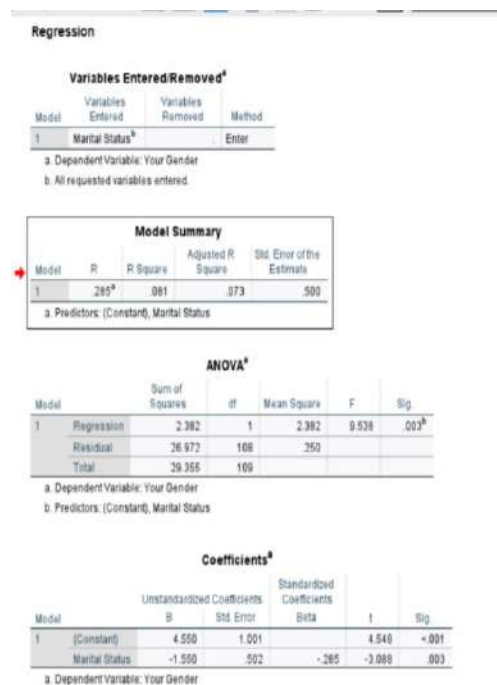
Figure 2. Regression Analysis

In reliability analysis we study the properties of the measurement scale and the items which are added to the scale.

Reliability analysis is determined by obtaining the proportion of systematic variation in a scale, which can be done by determining the association between the scores obtained from different administrations of the scale. Thus, if the association in reliability analysis is high, the scale yields consistent results and is therefore reliable (Placeholder3).

By use of digital technology in marketing strategies to develop new distinct company capabilities is referred to as

Figure 3. Reliability Analysis
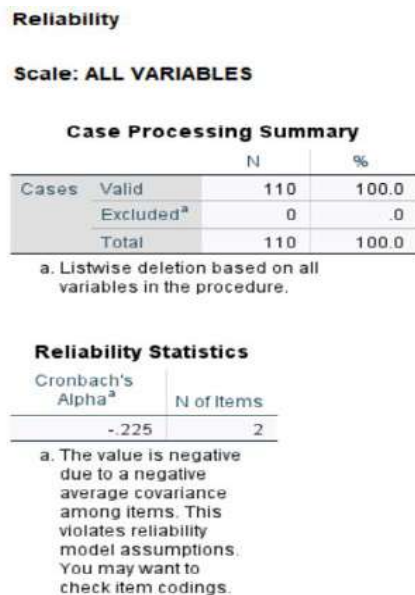
digital strategy. All firm strategies will be digital in the future.

Today's businesses are using technology to be more than just equipment or software. The digital strategy that focuses on using technology to improve business performance in order to implement these changes. As new technology enables

imaginative businesses to deliver services that have been previously impossible, this usually necessitates modifications in corporate structures. A digital marketing strategy is also a concept and a reality, and that should probably result to or build a plan or roadmap.

5. CONCLUSION

This study looked at the impact of using celebrities in internet advertising on purchase intent. According to the study, celebrity credibility, celebrity gender, kind of endorsement, single or numerous endorsements, and celebrity beauty all influence customer buy intention. Most importantly the gender of the celebrity and Single/multiple aspects had a substantial impact on purchase intention. The study highlighted the significance of celebrity endorsements in internet advertising. Even while respondents expressed skepticism when asked whether celebrities utilized the things they advocate in real life, most respondents believed that celebrity-endorsed advertising captured their attention and aid fast recall of products. Companies must thus consider famous celebrities when looking for methods to differentiate their products and increase customer awareness. Celebrity-endorsed advertising had a significant influence on responders.

Respondents indicated that people favor celebrity-endorsed commercials and are more inclined to buy after being exposed to celebrity-endorsed advertising than those without. The research would like to make a scientific contribution by pointing out that, despite respondents' favorable attitude toward celebrity-endorsed commercials, the results indicated an almost apathetic reaction when asked whether the celebrities utilize the things they support in real life. Respondents are becoming more aware that endorsements are all about business and that not everyone celebrities do applies in real life.

As I get the responses from the responses most of them are under their teenage and most probably, they are more familiar with the social media platforms.

While counting the responses I have gone through the instances which celebrity endorsement was not used in promotions. With the Comparison between advertisements featuring endorsers and those without endorsers, the type of endorser, and the degree of congruency were examined, along with the mediating effects of dependent variables on each other.

The respondents understand that celebrities lend significance to items, and they value the link between celebrity and product. This must be taken into consideration when considering celebrities for use in commercials, to ensure that the brand does not suffer the repercussions of unfavorable connotations. The assumption that many celebrity sponsorships and single celebrity both favorably effect consumer

purchasing intention was supported. The respondents indicated that this has an effect on their memory process, but they only minimally agreed that it causes them to lose all credibility in the celebrities and changes their opinion toward the commercial. A variety of celebrity endorsements were discovered to be vibrant and enticing. It is also critical that a corporation employs a large number of celebrities in order to make a dramatic impression and appeal to people.

To summarize, sponsorships are an effective promotional strategy, and marketers should make use of them, as well as the increasing popularity of social media platforms, to reach a larger audience. They appeal to a larger audience and reduce the numbing effect of the different advertising that consumers are confronted with on a regular basis. Advertisers, on the other hand, should not overlook the drawbacks of celebrity endorsements. They must thus perform detailed evaluations of celebrities, remain current on developments, and arm themselves with appropriate knowledge to limit any losses to brands and organizations' reputations as a result of engaging celebrities. Influencers should be encouraged since they have a favorable impact on consumer purchasing intentions.

In comparison to prior works in the area, this paper obtained differing results on the concepts that celebrity credibility and beauty were beneficial on online customer purchase intention. This differentiation cannot be addressed by sample size and features because this study used a comparable sample strategy. The answer is thought to be the impact of the "Trust" idea on online customer behaviors. Customers are more inclined to believe peer reviews of internet advertising. Previous study on celebrity endorsement has been conducted through conventional media. The study on social media is still in its early stages, and more research is required to comprehend its implications on purchase intent as well as other consumer behavior. So finally we conclude that according to the research we have done so far university students who are in age range of 21-25 mostly intended to buy hospitality products due to the influence of the celebrities.

6. LIMITATIONS

Due to limited allocation of time this research was only conducted inside the NSBM Green University only. We also employed a questionnaire to collect data. It also utilized a nonprobability sample approach called convenience sampling, which does not allow for generalization of results over the whole Sri Lankan population. A quantitative technique was also used in this investigation. Future investigations can be undertaken with these constraints in mind. Future research should concentrate on a larger population using a research model that incorporates modifiers such as gender and age. The organization's viewpoint should also be considered when assessing the impact of

influencer marketing on the organization's aims. Finally, an additional study on the potential negative impacts of influencer marketing and how to prevent them is required.

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Impact of Digital Technologies on Operational Performance of Banking Industry in South Asia

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ABSTRACT

Digital technology has been revolutionizing many industries and the banking industry too has been transformed within this process. However, the impact of digital technologies has been varied, especially among different operational measures, in varied sectors. Hence, this study attempts to explore on the impact of digital technologies in the banking sector, especially in the context of South Asia: India, Pakistan, and Sri Lanka. The study followed a qualitative and systematic review approach to explore the objectives. Accordingly, the study revealed that in the South Asian banking sector majority of the banks implement Fin-tech in the industry and both positive and negative impacts could be revealed among different operational measures, especially in the employee and customer segment.

Keywords - Digital technology, South Asia, Banking industry, Operational Measures.

1. INTRODUCTION

Digital technology has been rapidly evolving and has been transforming the businesses all around the world in every dimension. This study will analyse in-depth on the impact of digital technology on the operational performances of the banking industry to broaden the understanding on this domain.

1.1 Background of the study

During the current hypercompetitive techno-oriented era, digital technologies have been significantly influencing and inducing changes in the business environment, transforming businesses all around the world and reshaping traditional business models, relationships, participants etc. (Freitas Junior et al., 2016; Litvishko et al., 2020). Towards the transition of becoming a digital economy and society, banking industry, a major contributor to any economy, has been transmogrified incorporating developments of technology

in the industry, bringing about paradigm shift in banking operations (Khandelwal, 2012). Advancements of technology has revolutionised the industry leading to varied improvements: streamlining of operations, improved customer satisfaction and reshaped business models etc. (Fitzgerald, 2014) and now, Digital technologies or technological improvements are no longer novel concept but rather deemed fundamental, a prerequisite to sustain, compete and outshine in the market.

Banking industry, one of the pioneers in implementation of digital technologies, in the current context presents the taste of technology in every dimension of its operations. That is the entirety of the banking has become digitalised, from offering techno based financial products and services: Digital financial services (Abbasi and Weigand, 2017) to developing establishments (branches) and infrastructure aided through technology (Riyanto et al., 2019). This penetrating and advancing technological development in the industry has created a surge, impacting the overall operational performances of the sector, and the banking industry in South Asia is too no exception and has witnessed dramatic changes over the past years upon increasing digitalisation of banking operations. South Asian banking industry, specifically with regards to countries such as India, Pakistan and Sri Lanka, plays a pivotal role in the country's financial sector and the economy as a whole and has increasingly been adopting digital technologies in its operations and thereby can be considered a

suitable research context for the study for its influential, dynamic sector and greater potential (Perera, 2006).

1.2 Background to the context

1.2.1 Banking Industry

Banking industry is one of the central and vital industry for the efficiency and stability of any economy (Omarini, 2017). Banks have been identified for its major contribution to the GDP of an economy and for its financial based output for the effective functioning of an economy. However over the span of years banking industry has been constantly exposed to major changes due to some major influential factors: Regulatory changes, creating an integrated global banking market; structural changes, allowing banking to expand its service activities to compete with non-banking financial markets; technological changes, redesigning the banking model etc. (Casolaro & Gobbi, 2007; Angur, Nataraajan & Jahera, 1999). Consequently, the banking industry witnessed series of changes such as: increased consolidation or concentration of banks through mergers and acquisitions thereby reducing the number of banking organisations (Refer Figure 1); significant growth in digital technologies proliferating in the industry namely Internet Banking, Electronic Payment technologies, etc.; increased provision of varied services due to the increased competition of non-banking sector providing financial services etc. (Berger, 2003).

Year	Number of Banking Organizations	Number of Banks	Gross Total Assets (GTA) ($ trillions)	Local Market Herfindahl Index	Number of Physical Banking Offices (thousands)	Number of ATMs (thousands)
1984	11,433	14,392	3.44	0.1711	50	58
1985	11,094	14,272	3.62	0.1685	51	61
1986	10,587	14,058	3.80	0.1673	51	64
1987	10,196	13,561	3.78	0.1693	53	68
1988	9,807	12,984	3.78	0.1737	54	72
1989	9,525	12,563	3.84	0.1762	54	76
1990	9,284	12,202	3.77	0.1814	56	80
1991	9,073	11,821	3.69	0.1879	57	84
1992	8,780	11,359	3.67	0.1928	58	87
1993	8,366	10,874	3.78	0.1990	58	95
1994	7,932	10,362	3.99	0.2013	59	109
1995	7,602	9,857	4.18	0.2023	60	123
1996	7,335	9,448	4.35	0.2061	61	139
1997	7,144	9,066	4.70	0.2079	62	165
1998	6,869	8,711	5.04	0.2080	64	187
1999	6,747	8,510	5.20	0.2073	65	227
2000	6,674	8,238	5.55	0.2053	67	273
2001	6,578	8,016	5.69	0.2050	72	324
Average Growth Rate	-0.033	-0.034	0.030	0.011	0.021	0.101

Figure 1: The Structure of the Banking Industry and the Use of Selected Technologies, 1984-2001

Source: Berger (2003)

1.2.2 South Asian Banking Industry

South Asian Banking industry, the context of the study, is one of the pivotal industries in the South Asia's economy playing a major role for its respective economies, performing the important intermediate function to all economic agents of the economy as highlighted in Figure 2. (Perera, Skully & Wickramanayake, 2006). The total composition of commercial banks in the industry with specific to India, Sri Lankan and Pakistan as at 2002 was 150 (Refer Figure 2) inclusive of both domestic and foreign banks.

Table 2. Statistics on South Asian banking markets 2002

	Bangladesh	India	Pakistan	Sri Lanka
Total bank assets to GDP (%)	63	61	57	56
Loans to private sector to GDP (%)	29	34	26	27
Loans to government to GDP (%)	07	22	16	10
Total deposits to GDP (%)	34	55	39	33
No. of Licensed Commercial Banks	44	88	37	25
-Foreign	10	31	17	14
-Domestic	34	57	20	11
Government Control	4	27	5	2
Private Owned	30	30	15	9

Source: Perera, Skully & Wickramanayake (2006)

The banking industry market in South Asia too has been exposed to global changes: Regulatory, technological, structural changes and contemporarily Covid 19 pandemic. South Asia' market has been increasingly concentrated with increased

mergers and acquisitions to compete the rising foreign players and non- banking institutions providing financial services to the economy (Kabir, 2021). In addition, the banking industry has also been promoting Financial Innovation (i.e. digital technologies) to accelerate financial inclusion in South Asia though the usage of digital technologies though the usage of digital technology is yet lower in comparison to many other continents especially with regards to online banking or internet banking (Kabir, 2021). Moreover, with increased competition as highlighted earlier, banks have also undergone major structural changes in the banking industry by incorporating new business models, adopting technology etc. (Kabir, 2021). Finally with regards to the current phenomena of Covid pandemic every economy and every sector has been disrupted and severely affected and banking industry is too no exception (Islam et al., 2020).

1.3 Rationale for the Selected Research

Impact of digital technology on the operational performance of diverse sectors have been evaluated in the previous literatures especially in the banking industry in different contexts and the studies revealed mixed results on the impact of digital technology on the operational performances of the banking industry: Positive (Akhisar et al., 2015; Tunay et al., 2015; etc.) and Negative (Delgado et al., 2007; Al-Smadi & Al-Wabel, n.d. etc.).

Assessing the findings of many diverse studies in this domain have revealed the existence of uncertainties, fragmentations, ambiguity and mixed opinions or results on the impact of digital technology on the operational performances of the banking industry and no generalised or common consensus have been arrived with regards to the above discussion. Henceforth due to no or maybe few studies undertaken to resolve the fragmentations, uncertainties and ambiguities in the studies and since no unified or common generalised findings haven't been concluded, at least in the context of South Asia, the current study will attempt to fill this gap by reviewing and synthesising adequate and reasonable number of published online research journals over the last decade to resolve the fragmentations, uncertainties and ambiguities and enable obtaining comprehensive understanding on the impact of digital technology on the operational performance of banking industries in South Asian Countries: India, Pakistan & Sri Lanka.

1.4 Research Scope

The study will be concentrated on South Asian countries: India, Pakistan & Sri Lanka, to critically appraise the impact of digital technologies on the operational performance of banking industry in South Asia. The study will analyse on different types of technologies and operational performance measures used in the industry to critically evaluate the impact of digital technologies on operational performance of banking industry in South Asia and thereby develop and recommend suitable and fitting digital technologies to improve and strengthen banking industry performance.

1.5 Aims and Objectivities of this Research

The research aims to critically evaluate the Impact of digital technologies on the operational performance of banking industry in South Asia and to accomplish the aforementioned aim objectives have been formulated;

To evaluate different type of technologies utilised by banking industry in South Asia.

To evaluate operational performance measures practiced in the banking industry in South Asia.

Critically evaluate the impact of digital technologies on operational performance of banking industry in South Asia.

To develop digital technologies that could improve and strengthen banking industry performance.

1.6 Significance of the study

Digital technology is of paramount importance to any individual, business, economy and world at large and has been revolutionising every aspect it's involved and especially digital technology has become influential in the banking industry transforming the relationships, structure of the business, the business model etc. and has been reaping greater benefits to organisations. However, amidst the benefits presented to the market it's also noteworthy that implementation of Digital technology could along bring many negative or adverse consequences to the operational performances of the industry as highlighted in many literatures. Thereby, reaching common grounds, consensus and conclusion on the impact of Digital technology on the operational performances

of the banking industry is very important due to mixed findings of many authors, which will aid many participants such as change agents, policy makers, banking industry as a whole to effectively identify the impact and possible outcomes through the implementation of such a change in the organisation and to make effective decisions on what could go wrong and to ensure that potential benefits are far greater than potential costs (Quantitative and Qualitative) involved.

In addition, apart from practical implications, the study also contributes to the theory, since no or few studies have been conducted to synthesise and reach generalised conclusions among the mixed, fragmented findings of different studies on the impact of digital technology on the operational performances of the Banking industry, especially in the South Asian context.

2. LITERATURE REVIEW

2.1 Digital Transformation in Banking industry

2.1.1 Digital Transformation

Digital transformation is the process of using technology to radically improve the performances of organisations (Westerman, Bonnet & McAfee, 2014) or in other words it is the integration of digital technologies in all aspects of the business, thereby changing the fundamentals of business operation itself (Schwertner, 2017). Thereby, it involves many changes and transformations: business thinking; reshaping traditional business strategy (to a cross functional, distributed and global

business process); leadership; the structure of social relationships; developing new innovations etc. (Karagiannaki, Vergados & Fouskas, 2017; Freitas Junior, 2016) and such transformations are facilitated with the aid of digital technologies or solutions such as cloud based technologies, mobile, social platforms, data analytics, Internet of Things etc (Karagiannaki, Vergados & Fouskas, 2017).

2.1.2 Digital Technology in Banking industry

Banking industry, one of the critical industries for any economy plays a major role in the provision of financial services and in the assurance of financial stability of the economy (Omarini, 2017). However, in the today's market, intensified by rapid technological advancements, globalization and increased competition the role of digital technologies have been strengthened in the industry and many banks have been increasingly incorporating and developing techno based solutions to the industry to adapt to the ever changing environment, to compete and sustain in the market (Chen, 1999). Henceforth, the incorporation of digital technologies into the banking industry has revolutionised the industry and has brought in a paradigm shift also referred to as digital banking in the contemporary terms (Sardana & Singhania, 2018). Digital banking is a modern banking model, which digitalises all the traditional operations and services of the bank including the Human Resource Management, Operations of the business, Organisational structure, Administration etc. and provides Digital Financial services to its customers (Nguyen & Dang, 2018). It

is also highlighted by previous literatures that Banking industry has been at the forefront in the implementation in many of digital technologies to the businesses (Ankit, 2011).

Moreover, the demand and reach for digital banking has also been expanding in greater numbers. It was recorded that 46% of the global population are using internet and henceforth the demand for digital products such as mobile banking, internet banking and social platform to conduct banking transactions have increased consistently and the usage of bank branches have reduced in parallel and by 2016 the percentage of customers using above services increased to 33%, 59.4% and 11% respectively and physical branch usage decreased to 13% around the world, according to the World Bank Open Data in Financial Sector (Nguyen & Dang, 2018). It was also revealed through the study of Mckinsey (2014) that the digital technologies have significant impact over the profitability of the banking industry ranging from 43% - 48%. All the above series of developments and benefits gained from digital technology adoption highlights the growing trend and increasing importance of Digital baking for the industry at large.

2.1.3 Digital technologies implemented in the Banking industry

Digital technologies have increasingly been adopted in the banking industry through various means and adoption of different types of technologies as highlighted in Table 1 (Refer 3 for other digital technologies implemented in the banking industry).

Table 1

Digital Technology	Description	Authors
Internet Banking/ E-banking/ PC banking/ Online banking	Enabling banking transactions through online facility	(Sardana & Singhania, 2018; Ankit, 2011).
Mobile/Phone banking	Enabling banking transactions through mobile platforms	(Sardana & Singhania, 2018; Abbasi &Weigand, 2017)
Digital Branch	Aids in customers performing transactions without visiting physical branches	(Riyanto et al., 2019)
Plastic Cards	Introduction of Credit, Debit, and other Smart cards	(Sardana & Singhania, 2018)
Automated Teller Machines (ATMs)	Machines that provide electronic access for customers to do banking transactions.	(Githuku & Kinyuru, 2018; Sardana & Singhania, 2018)
Social media platforms	Usage of social media to perform banking transactions and to obtain information	Abbasi and Weigand (2017)
Electronic fund transfer	Transfer of funds from the financial institution to different institutions through an online facility without the intermediation of a bank employee	(Sardana & Singhania, 2018)
Artificial Intelligence, Automation, Chabot & etc.	Most recent and highly sophisticated new innovations in the field to ease banking and increase efficiency	(Riyanto et al., 2019)
Cloud computing	Use of cloud to store and transmission of bank data	(Dermine, 2016)

Source: Developed by Author

2.1.4 Key Terms

1. Internet Banking/ E-banking/ PC banking/ Online banking – Enabling banking transactions through internet (Sardana & Singhania, 2018)

2. Mobile/Phone banking – allowing customers to perform basic banking transactions through mobile platforms (Sardana & Singhania, 2018)

3. Digital Branch (Sardana & Singhania, 2018)

4. Plastic Cards – plastic cards issued by the banks such as debit cards, credit cards etc. to perform point of sale transactions and etc. (Sardana & Singhania, 2018)

5. Automated Teller Machines (ATMs) – machines that allows customers electronic access to perform cash withdrawals, cash

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deposits, balance inquiries etc. (Sardana & Singhania, 2018)

6. Social media platforms - Usage of social media to perform banking transactions and to obtain information (Abbasi and Weigand, 2017)

7. Electronic fund transfer - facilitating fund transfers among institutions over a computerised network (Sardana & Singhania, 2018)

8. Artificial Intelligence, Automation, Chabot & etc. - highly sophisticated new innovations, a combination of three advanced technologies namely cognitive computing, machine learning and natural language processing (Mallawaarachchi, 2019; Roy and Viswanathan, 2018)

9. Cloud computing - provision of computing services over the internet: software, servers, analytics, storage, networking, databases etc. (Roy and Viswanathan, 2018).

2.2 Operational performance measures of the banking industry

2.2.1 Operational performance measures

Performance measurement systems is defined as the use of different sets of performance measures covering multi-dimensional aspects of the business for the effective management of the organisation which facilitates in evaluating the organisation's performances and to translate the performances and strategies into deliverable results (Franco-Santos, 2007) and Operational performance measures is the evaluation and measurement of operational processes of the organisation which in turn affects the overall organisational performance measures of the business (Voss, Åhlström & Blackmon, 1997). Established performance measurement systems is critical for any organisation to monitor internal and external performances of the business, to induce continuous change and

improvements, to account for or monitor changes in organisations, etc. and overall in leading to the effective achievement of organisational goal and objectives (Sharma and Bhagwat, 2006).

2.2.2 Operational performance measures implemented by the banking industry

Any organisations could attain heighted profitability and increased competitive edge if all the aspects/ dimensions with regards to a firm's organisation is constantly monitored, evaluated and acted upon for improvements. The Banking industry too implements different operational performance measures to evaluate the organisation's performances. Moreover, the operations or the operational performance measures of the businesses directly affect and influence other facets of organisations and thereby the study will analyse the operational performance of the banking industry in terms of overall performance that is covering multi dimensions for the direct impact of operations on different facets of the organisation which will rightfully incorporate the real and practical implications, which has been illustrated through Table 2. (Refer 1 for other critical success factors or performance measures affecting banking industry).

2.3 Empirical evidence on the impact of digital technologies on operational performance of banking industry

Digital technologies have been transforming the entire banking industry and are also identified for significantly impacting the operational performances of the business. Many literatures on different context have analysed on the impact of digital technologies on operational

performance of banking industry and have revealed varied results.

Firstly, overall, the digital technology is expected to deliver a brighter future and huge potential and prospects to the banking industry (Khanboubi, Boulmakoul & Tabaa, 2019). According to the study of Meepadung, Tang & Khang (2009) conducted in Thailand it was revealed that implementation of digital technologies would improve operating and profit efficiency by generating major cost reductions in operations and would also aid in the achievement of greater efficiency in

terms of business operations for incorporating branch technology to support the service delivery and in improving the overall internal and external service quality

of the organisations. The improvement in organisational profitability and improved financial performance was also supported by the findings of Dandapani et al. (2008), through the yield of high asset growth rates, reduction in operational costs etc. In addition according to the research report by Fitzgerald et al. 2014, improvements

Table 2. Operational Performance Measures implemented by the banking industry

Critical Dimension	Items/ Measures/ Key Indicators	Author
Customer Engagement	- Customer Retention Rate - No. of complaints - No of Visits - No. of customers - Customer satisfaction - Reluctance, fear of use etc.	Puriwat & Tripopsakul (2017); (Riyanto et al. 2019) etc.
Employee Engagement	- Employee Retention Rate - Employee Turnover - Employee Productivity - No. of skilled employees - Employee satisfaction and acceptance levels	Winasis et al. (2020); Del Giudice et al. (2016) etc.
Operation/ Production	- No. of branches - Bottlenecks	Al-Hawari, & Ward (2006) etc.

	- Waiting time	
	- Reduction in errors	
	- Productivity	
Financial perspective	- Increased profitability	Malhotra and Singh, (2009); Meepadung, Tang & Khang (2009) etc.
	- Net profit/ Gross profit margin	
	- Return on assets and Equity	
	- Costs of services	
Digital products	- Adoption rate	Abbasi and Weigand (2017); Al-Hawari, & Ward (2006) etc.
	- Reliability	
	- Accuracy	
	- Convenience	
	- Costs	
	- Features	
	- No of products and locations	
	- Errors	
Innovations and New developments	- No. of new innovations	Abbasi and Weigand (2017) etc.
	- Allocation for R&D and investment	
	- Return on investment	
	- Adoption Rate	
Pricing	- Sufficient?	Al-Hawari, & Ward (2006) etc.
	- Affordable?	
	- Attractiveness	
Quality	- External service quality	Puriwat & Tripopsakul

- Internal Service quality		(2017) etc.

Source: Developed by Author

in overall operational performances of the can be identified through 3 major dimensions: 1. Customer experience – that is increasing customer experience, by launching new products or improving the existing products of the industry etc. 2. Production/ operational improvements – through the automation of existing processes to streamline the operations, to improve the overall productivity of employees, and to enhance internal communication 3. Driving a business model change – expanding the reach to new markets and customers, transitioning in products, new models etc. Moreover in any banking organisations human factor is one of the most critical factors deciding the performances of the organisation and thereby it was revealed through the study of Puriwat & Tripopsakul (2017), the customer perceived service quality enabled through the adoption of digital technologies increase the overall customer engagement with the banks. Thereby the banks should focus on 2 aspects in the provision of digital banking services that are firstly, the five attributes concerning adoption of digital products by customers: security, user friendliness, understandability, etc. and secondly, a well-developed and design applications such as layout, appearance etc. which will effectively aid in the increased adoption of digital banking solutions by customers to improve the organisational performance (Puriwat & Tripopsakul, 2017). In addition, other than customers, it was also identified that digital technologies

can have positive influences on employees and thereby improve the overall productivity and performances of employees (Del Giudice et al., 2016). Furthermore, with the introduction of digital branches to the industry the physical branches have reduced and the costs proportionally to invest in physical branches too have reduced, thereby improving the financial performances of the industry (Riyanto et al. 2019). In addition, according to some thoeries and models such as, Six Dimensional Service Innovation Model by den Hertog, van der Aa and de Jong (2010) (Hong, 2016) and Resource Based View (RBV) (Barney, 2001), technologies aid in the improvement of the organisational performance and in obtaining competitive advantage for an organisation. Overall, it is identified that the adoption of digital technologies could improve the operations and productivity and quality of delivery of services of the banking industry (Oluwatolani, Joshua & Philip, 2011).

However, though many literatures and past studies have highlighted the favourable implications of digital technologies to the operational performance of the banking industry it is also witnessed that there are unfavourable consequences as a result of digital technology adoption in banking. The study of Delgado et al. (2007) revealed that unlike previous literatures adoption digital banking specifically with regards to internet banking led to negative consequences in European Union market and also a

reduction in profitability. Moreover the negative consequences of the digital banking was further strengthened by the study of Al-Smadi & Al-Wabel (n.d) for it significant negative impact on the bank's own performances. Moreover the digital banking adoption comes along with its own types of risks and it sis noted that such risks have comparatively risen higher than the general profile of risks involved in the traditional banking model, which will cause a lot of uncertainties and eventually may also lead to varied negative consequences such as loss of customers, decline in profitability etc. ((Dermine, 2016; Pennathur, 2001) on the contrary the study of Malhotra and Singh (2009 and Ciciretti et al. (2009) have highlighted that there is a negative association between digital technology adoption and the bank risks.

In addition, as mentioned earlier one of the most critical factors for banking industry is the human factor. With regards to the drastic change in banking model and adoption of series of new technological advancements into the industry, the most affected stakeholders in the organisations are employees and customers. The emotions, responses etc. of the parties towards such a dramatic change has been varied leading to mixed results in the engagement of both customers and employees thereby affecting the operational performances of the industry which was highlighted by different studies. According to the study of Winasis et al. (2020), digital technology resulted has significantly affected the employees posing mixed consequences and emotions among employees, who were in common

accustomed to traditional banking models, and such a change when negatively perceived by employees or if not addressed by the organisation would lead to many unfavourable consequences for the organisation's performance due to employees negative response towards change. On the other hand, with regards to customers, many customers in the current market still prefer traditional banking over digital banking and are still not accustomed to the new model of banking, especially in developing economies, and hence show dissatisfaction, unwillingness and reluctance towards digital banking for which many banking industries have piled up money and resources and if the industries are unable to recover sufficient return on investment will be end up in losses and resultantly face other negative organisational consequences (Ameme & Wireko, 2016; Sohail & Shanmugham, 2003). Moreover, many traditional economies and its customers require a physical association when undertaking transactions and assume for high risks and lack of security when performing digital banking and hence also show low engagement with regards to digital banking which eventually will also lead to negative effects on the operational performances of the business (Riyanto et al. 2019).

Therefore, with the analysis of different literatures and studies it is revealed that the implications and impact of digital technology on the banking industry poses a mixed result: favourable and unfavourable, hence synthesising different literature on different contexts is important to reach conclusions.

3. METHODOLOGY

3.1 Theoretical Framework

Digital technologies have had varied influences and impacts on the operational performances of the banking sector through multiple dimensions and to critically evaluate the different technological innovations impacting the banking sector, Six Dimensional Service Innovation Model by den Hertog, van der Aa and de Jong (2010) has been laid for the study. According to this model techno based solutions or services can be identified in six different dimensions: new value system, new revenue model, new service concept, new delivery system, new customer interaction and technological and banks have been providing or aiding digital solutions in such dimensions to improve the overall operational performances of the sector (Hong, 2016). Moreover, many literatures have highlighted that such digital technology enabled businesses have influenced and facilitated in obtaining improved performance and competitive advantage which is also supported by the theory of Resource Based View (RBV). RBV, the theory widely or mainly used in the domain of innovation and technology based studies and literature, suggests that the possession of unique or scare or organisation specific resources can aid in generating sustained competitive advantage for an organisation (Barney, 2001).

Hence, the study will critically evaluate different technologies implemented by the banking industry and the impact of digital technologies on the banking industry by laying Six Dimensional Service Innovation Model and Resource Based View (RBV) respectively as the theoretical underpinnings for the study.

3.2 Research Methodology

Research methodology is the systematic process of solving the research problem, or a science of studying on how research can be done scientifically; reasoning the logic and relevancy of different techniques, methods etc. applied to conduct in the context of the specific study, evaluating the researcher's selection of different techniques, methods etc. and stating specifically the rationale behind the research decisions and having sound understanding on the assumptions underlying varied methods, techniques etc. (Kothari, 2004).

3.2.1 Research Approach

Research studies can adopt two approaches namely inductive and deductive approach to derive the findings of the study that is either to test theory or to build theory respectively (Azungah, 2018). The study will use deductive approach, which will base and analyse its findings using the pre-existing theory due to the research strategy which will be a systematic review conducted on established literatures (Azungah, 2018).

3.2.2 Research Method

In general, there are two major research methods namely: qualitative and quantitative. Quantitative research method is one that tries to quantify the research problem, deals with numerical figures, causal relationships, statistical analysis etc. (Rao and Woolcock, 2003) and Qualitative research method, is descriptive in nature,

tries to obtain perceptions, experiences, reasoning and facilitates in reaching the meaning and defining the situation etc. (Silverman, 2013). (Refer Table 1 for differences between qualitative and quantitative Research method) and hence Qualitative research will be the most suitable for this study.

Table 1. Differences between Qualitative and Quantitative Research method

Quantitative	Qualitative
Numerical	Non- numerical
Examines causal relationships	Aims to obtain perceptions, experiences, opinions etc.
Subjective	Objective
Descriptive/ Exploratory etc.	Conclusive etc.
Quantifies the research problem	facilitates in reaching the meaning and defining the situation

Source: Rao and Woolcock (2003); Silverman (2000)

3.2.3 Research Strategy

The study will be conducted by following systematic review as the method of analysis due to its appropriateness for the study. A systematic review also known as research synthesis is an unbiased and a comprehensive synthesis of multiple literatures on similar theme or domain attempting to uncover all of the evidences related to the research scope or questions in a summarised manner (Aromataris and Pearson, 2014). This study too will attempt to synthesis on the proposed research objectives by critically evaluating 10-15 research specific journal articles (secondary data sources) identified through clearly established inclusion and exclusion criteria (Refer Table 1) and with the aid of PRISMA Statement for reporting, that are in the field of Digital technology, operational performance measures and on the impact of digital technologies on the operational performance of banking industry in South Asia focusing mainly on India, Pakistan & Sri Lanka contexts. Thereby the study will follow deductive approach to reach its findings and qualitative methodology to collect and analyse data. Finally, upon the identification of the suitable review articles, thematic analysis will be conducted to establish themes and patterns systematically to obtain useful insights from data and to derive findings for the study.

3.2.4 Sampling Strategy

The study will analyse and synthesise by selecting nine recently published journal articles following the PRISMA approach on the proposed rationale to achieve the aims & objectives of the study due to the numerous articles on the domain especially in the context of South Asia: India, Pakistan and Sri Lanka.

3.2.5 Research Design

Research design is the plan to effectively address the research problem, which facilitates in the collection, evaluation, analysis etc. of data (Burghate, 2020).

3.2.6 Data Collection and Search Criteria

The major source of data for the study will be secondary analysis of qualitative data. Secondary analysis is the use of pre-existing qualitative data obtained from the past literatures (Heaton, 2008) and since the research of the current study approaches a systematic review, a secondary analysis of qualitative data will be appropriate and suitable.

Table 2. Search Criteria

Search Criteria / Inclusion Criteria	Description
Geographical area	• India • Pakistan • Sri Lanka
Search services - Database	• Emerald insight database • Elsevier Research • Web of Science • Business Source Premier • Research Gate
Research Data	•
Sector/ Industry	• Banking Industry
Source Type	• Online Published Journal Articles
Search Keywords	• Digital Technology • Digital Technology Types • Operational Performances • Operational Performance Measure Indicators • Banking Industry • Banking Industry of South Asia • India, Pakistan, and Sri Lanka • Impact of Digital Technology • Impact of Digital Technology on Operational Performance

Period	• Period – 2010 - 2021
Articles	• Peer Reviewed Articles
	• 9 articles aided thorough PRISMA Statement

3.2.7 PRISMA Statement for reporting systematic reviews

PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) is a statement that incorporates a checklist to attain transparency in the reporting for systematic review. It acts as a guidance to identify, select, appraise, and synthesise studies (Page et al., 2021)

3.2.8 Evidence
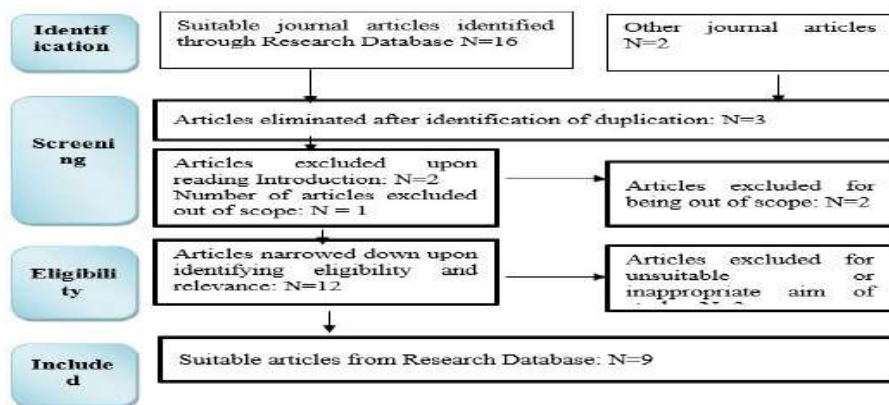
Table 3. Evidence from existing literature

No	Author(s)	Year	Theme / Topic	Key findings
1	Roy and Viswanathan	2018	Impact of Technological Disruption on Workforce Challenges of Indian Banks-Identification, Assessment & Mitigation	Technical disruptions caused by digital technology adoption in the banking industry has significantly impacted the banks, which eventually led to diverse impact on the working force of the banking industry (Roy and Viswanathan, 2018)
2	Renu Singh & Garima Malik	2019	Impact of IT on Indian commercial banking industry: DEA analysis	Impact of digital technologies impact on the customer

				dimension (Renu & Malik, 2019
3	Rajput and Gupta	2011	Impact of Digital Banking in Indian Banking Sector	the performances of the Indian banks due to the implementation of Information Technology (IT) Innovation resulted in an increasing trend in both profitability and efficiency levels (Rajput and Gupta, 2011)
4	Kashif Mehmood Kamboh Muhammad Ehsan Javaid Leghari	2016	Impact of cashless banking on profitability: a case study of banking industry of Pakistan	Point of Sales Transactions and Mobile Banking Transactions are positively significantly related to ROE however Call Centre Banking Transaction and Automated Teller Machines Transaction are negatively significantly associated with profitability (Kamboh and Leghari, 2016)
5	Muhammad Zahid, Muhammad Jehangir & Naveed Shahzad	2012	Towards Digital Economy: The Impact of Electronic Banking on Customer Satisfaction among the Pakistan Banking Industry	Customers support the view of digital banking however they highly emphasize should be customer friendly: user friendly, understandable etc. (Zahid, Jehangir, and Shahzad, 20120
6	Muhammad Mustafa, Hassan Daud Butt, Md Nazirul Islam Sarker & Maria Ghani	2021	Assessment of Bank Customer's Attitude Toward Financial Technology in Pakistan	Customers have a positive towards financial technology however the banks must be concerned about the risks and other factor affecting customer (MUSTAFA et al., 2021)

7	Buddhika, H.K.T.,	2021	The Impact of ATM, Internet Banking and Mobile Banking on Customer Satisfaction	significant and positive impact on customer satisfaction in the use of ATMs in Sri Lanka, while internet banking remains neutral and illustrates than it's insignificant to customer satisfaction and mobile banking depicts negative relationship (Buddhika, 2021)
8	Mallawaarachchi, 2019	2019	The Application of Artificial Intelligence and the Interactive Voice Recognition in the Banking Industry in Sri Lanka.	Customers are highly sceptical about AI and interactive voice recognition (IVR), and are willing to adopt or adjust to new technologies (Mallawaarachchi, 2019)
9	Premarathne, J.W. and Wijesekara, N.	2013	Demand for Electronic Banking in Sri Lanka: Analysis of Demographic Factors	In the Sri Lankan context digital technology adoption is low among consumers, especially e-banking. But e-banking has been generating broader benefits such as quicker, speedier, and reliable services to the customers and reduces the operational costs for the banking sector and saves time (Premarathne and Wijesekara, 2013)

3.2.9 Data Analysis

The study follows qualitative method and thereby will analyse the data of the existing literature using the thematic analysis approach. Thematic analysis is the process of systematically identifying, organising and analysing the data and provides insights into the data set in patterns of meanings (themes) (Braun and Clarke, 2012). It allows researchers to describe and interpret the data (Kiger and Varpio, 2020) and reach to a sense of collective or share meanings or experiences (Braun and Clarke, 2012). This will aid in deriving common patterns and themes in data set and to effectively reach conclusions for the study.

4. DISCUSSION

Digital technology is revolutionising the banking industry all over the world. Many economies increasingly have been adopting digital technologies in the banking industry. Emergence of new technologies every now and then has constantly been reshaping the banking business models. Banking industry has transformed from a traditional and regulated banking era to technology-oriented era. However, the impact of the digital technologies on the operational performances of the industry, according to the past literatures has been varied highlighting both positive and negative impacts.

The South Asia's banking industry too has been exposed to varied changes caused by the implementation of digital technologies and based on the systematic review conducted on the literatures on impact of digital technology on the operational performances of the South Asia's banking industry: India, Pakistan and Sri Lanka, mixed findings have been revealed. Hence, this section will discuss on the diverse results or findings of varied existing literature to arrive a generalised findings and conclusion in order to attain the proposed aims & objectives.

4.1 Different type of technologies adopted by banking industry in South Asia

The review conducted on the existing literature revealed varied digital technologies adopted by the banking industry especially in the South Asia Banking industry. The digital technologies highlighted were, according to the classification put forward by Roy and Viswanathan (2018) (Refer 4): 1. Digital Payment Methods - Paytm, Master, Rupay, Visa, USSD, UPI, BHIM, Aadhaar Enabled payment system, etc. (with specific to Indian context) (Singh and Malik, 2019; Roy and Viswanathan, 2018); 2. Financial Technologies such as Mobile wallets - Airtel Money, ICICI Pockets, Paytm, Axis Bank Lime, Freecharge, Mobikwik, Vodafone M-Pesa, Itz Cash, Oxygen, mRuppee, Jio Money, SBI Buddy, SpeedPay, Citrus Pay etc.; Internet banking; Point of Sales (POS); Mobile banking; ATM; Call Centre (IVR) Phone Banking etc. (Buddhika, 2021; MUSTAFA ET AL., 2021; Roy and Viswanathan, 2018; Kamboh, and Leghari, 2016; Premarathne and Wijesekara, 2013; Zahid, Jehangir and Shahzad, 2012; Rajput and Gupta, 2011); 3. Data Analytics (Roy and Viswanathan, 2018); 4. Cloud Computing – online software, servers, analytics, storage, networking, databases etc. (Roy and Viswanathan, 2018); 5. Block Chain Technology - e.g.: Cryptocurrency (Roy and Viswanathan, 2018); 6. Artificial Intelligence (AI) - AI is the combination of three advanced technologies namely cognitive computing, machine learning and natural language processing e.g.: Chatbots (Mallawaarachchi, 2019; Roy and Viswanathan, 2018); 7. Cyber Security (Roy and Viswanathan, 2018); 8. Payment system (Central Financial Authority) - Indian Financial Network (INFINET), Centralized Funds Management System (CFMS), Electronic Payment Systems with the 'Vision Document', Electronic Funds Transfer (EFT), the Structured Financial Messaging System (SFMS); Negotiated Dealing System (NDS), Electronic Clearing Services (ECS), Real-Time Gross

Settlement (RTGS) System and India Card (Specifically with reference to Indian context) (Rajput and Gupta, 2011); Real Time Online Branches (RTOB) (Zahid, Jehangir and Shahzad, 2012)

Based on the systematic review conducted, majority of the studies highlighted the use of financial technologies (Roy and Viswanathan, 2018) as one of the major digital technologies adopted in the banking companies at least in the context of the study (Buddhika, 2021; MUSTAFA ET AL., 2021; Roy and Viswanathan, 2018; Kamboh, and Leghari, 2016; Premarathne and Wijesekara, 2013; Zahid, Jehangir and Shahzad, 2012; Rajput and Gupta, 2011). Among the different financial technologies too, Automated Teller Machines (ATM), Internet banking, Mobile banking etc. were frequently mentioned in the studies of different authors.

4.2 Operational performance measures used in the banking industry in South Asia

The review conducted on the existing literature revealed varied Operational performance measures adopted by the banking industry especially in the South Asia Banking industry. Operational performance measures highlighted were: 1. Customer Engagement and Satisfaction (Buddhika, 2021; MUSTAFA ET AL., 2021; Mallawaarachchi, 2019; Singh and Malik, 2019; Kamboh, and Leghari, 2016; Premarathne and Wijesekara, 2013; Zahid, Jehangir and Shahzad, 2012) 2. Workforce/ Employee - Employee Productivity and satisfaction (Roy and Viswanathan, 2018); 3. Financial Measures such as Business Per Employee (BPE), Net Profit (NP) and

Profit Per Employee (PPE), Return on Equity (ROE) etc. (Kamboh, and Leghari, 2016; Rajput and Gupta, 2011); 4. Operational/ Efficiency/ Productivity measure - Data Envelopment Analysis (DAE), a method of statistically or rather mathematically analysing and measuring the outputs achieved from the inputs and thereby will enable in comparing different decision-making units' (DMUs) productivity based on multiple inputs and outputs, which will also enable in identifying the efficient and inefficient DMUs (Rajput and Gupta, 2011).

The studies highlighted four major dimensions or perspectives of operational performances in the banking industry of South Asia, namely: Customer, Employee, Financial and Operational. Among the varied operational performance measurements, many major studies frequently emphasised Customer dimension (Buddhika, 2021; MUSTAFA ET AL., 2021; Mallawaarachchi, 2019; Singh and Malik, 2019; Kamboh, and Leghari, 2016; Premarathne and Wijesekara, 2013; Zahid, Jehangir and Shahzad, 2012) for being one of the critical elements of the banking industry.

4.3 The impact of digital technologies on operational performance of banking industry in South Asia

Theoretical Frameworks and Empirical literature have identified and discussed the impact of technologies on operational performances of the banking industry.

4.3.1 Theoretical Frameworks

a. Six Dimensional Service Innovation Model by den Hertog, van der Aa and de Jong (2010)

Digital technologies influences and impacts the operational performances of the banking industry through multiple dimensions and to evaluate the different technological innovations impacting the banking sector, Six Dimensional Service Innovation Model by den Hertog, van der Aa and de Jong (2010) has been laid for the study. According to this model techno based solutions or services can be identified in six different dimensions: new value system, new revenue model, new service concept, new delivery system, new customer interaction and new technologies and banks have been providing or aiding digital solutions in such dimensions to improve the overall operational performances of the sector (Hong, 2016). In the systematic review conducted the following techno based solutions or services can be identified in different dimensions to positively impact the operational performances and improve the overall performances of the industry:

Table 3

Dimensions of Innovation	Techno based solutions or services
New Customer Interaction	Internet banking; Mobile banking; Point of Sales; Call Centre etc.
New Value System	Digital Banking is a value addition
New Revenue Model	Digital Banking model
New Service Concept	Self Service/ Banking
New Delivery System	Digital Payment Methods Digital Delivery
New Technologies	Digital Payment Methods; Financial Technologies (FIN-TECH); Data Analytics; Cloud Computing; Block Chain Technology; Artificial Intelligence (AI); Cyber Security; Payment system (Central Financial Authority); Real Time Online Branches (RTOB)

Source: Developed by Author

b. Theory of Resource Based View (RBV)

According to the Resource Based View (RBV) theory, possession of unique or scarce or organisation specific resources can aid in generating sustained competitive advantage for an organisation (Barney, 2001), hence, Digital technology, one of the emerging trend in the industry, enables businesses in obtaining improved performance and competitive advantage. Moreover, new advanced digital technologies such as AI, Digital branches, payments systems are still in the infant stages and many banks especially in the South Asian banking industry have not adopted and hence introducing them will provide greater competitive advantage.

4.3.2 Empirical Literature

The systematic review conducted on the impact of operational performances of the banking industry in the South Asia context revealed mixed findings.

According to Rajput and Gupta (2011), based on the analysis conducted on the 88 scheduled commercial banks (Public, Private and Foreign banks) in India in the year 2009-2010, the performances of the Indian banks due to the implementation of Information Technology (IT) Innovation (especially FIN-TECH technologies) resulted in an increasing trend in both profitability and efficiency levels of the banking units or the scheduled commercial banks as highlighted in the studies of Meepadung, Tang & Khang (2009).

However, Singh and Malik (2019) emphasised in his study that the impact of digital technologies had a contrasting impact on the customer dimension or rather could not effectively influence customers in the usage of digital technologies (Ameme & Wireko, 2016; Sohail & Shanmugham, 2003). The major reasons highlighted in his study were firstly, the digital technology programme led by the banking sector was not effectively supported by the infrastructure of India, due its inherent weaknesses posed, such as, backdated infrastructure, absence of internet in rural area, one of the basics required to facilitate digital banking. Secondly, Lack of awareness among the Indian population on digital banking, especially among the rural community, many of the Smartphone users lack knowledge in performing digital transactions through mobile phones and even ATMs and still rely on traditional banking instruments. In addition to customers one of the other major obstacles for banking industry is the management of employees or workforce during the process of digital technology adoption which

highlighted a negative impact on the operational performances of the banking industry, similar to the studies of Winasis et al. (2020). Roy and Viswanathan (2018) identified that the technical disruptions caused by digital technology adoption in the banking industry has significantly impacted and posed challenges for the business, which eventually led to diverse impact in many dimensions on the working force of the banking industry: Skill Deficiencies, Work Management, Employee Adaptability to changes, Career planning, Performance management Support (PMS) from Bank Management, Reward management, Training Exposure; Time for Skill Transformation, Employee Compensation and Competency Building Strategy. Among all, the most crucial workforce challenges identified for both public and private sector banks are employee's adaptability to change, compensation, skill incentives/compensation and career planning (Roy and Viswanathan, 2018).

Alike the Indian context, a similar trend was visible in the Pakistan banking industry as well, especially with regards to profitability and customer engagement. Firstly, profitability, when analysed on the impact of cashless banking and digital technology on the banking industry, a positive impact was apparent, especially, Point of Sales Transactions (POST) and Mobile Banking Transactions (MOBT) were identified to be positively significantly associated to Return on Equity. However, Call Center Banking Transactions (CCT) and Automated Teller Machines Transactions (ATMT) were negatively

significantly related with profitability (Kamboh, and Leghari, 2016). Next, Customer engagements, MUSTAFA ET AL. (2021), based on the authors' study, revealed that the customers and even people altogether are negatively responding to digital technologies and are reluctant to use the new technologies, especially financial technologies, since other advanced technologies are yet at the developing stage in the economy in parallel to the study, Riyanto et al. (2019). People are not using digital products frequently; even some of the basic Fin-Techs, such as ATMs remain uncommon among majority. Another reason for low usage of digital products is due to risk involved in FinTech products and services. Another aspect or opinion identified among the consumers was that they are not willing to pay anything extra for using financial technological products. However, the study concluded that the negative customers' attitude can be changed if the products are promoted to be useful and if provided with high security for usage of digital technologies and thereby if the customer's attitude change there will be a positive and significant relationship in the adoption of financial technology (MUSTAFA ET AL., 2021). This was further supported by the study of Zahid, Jehangir and Shahzad (2012), where, Ease of Use, Information Technology Usage, and Ease of Use in E-Banking have a significant positive impact on the Customer Satisfaction in the Pakistan Banking Industry and hence the management of the banking industry should focus on the usefulness factor and in promoting it. So, e-banking should be user friendly, simplified, easy to comprehend etc, to increase its

usefulness to highly engage the customers and to increase their satisfaction.

In the Sri Lankan context too a similar phenomenon is apparent, where the digital technology adoption is low among consumers, especially e-banking, many of the Sri Lankans rarely use this technology, the majority of the users are mainly private sector employees while the government sector employees still stick to traditional banking. But it was revealed that e-banking has been generating broader benefits such as quicker, speedier and reliable services to the customers and reduces the operational costs for the banking sector and saves time (Premarathne and Wijesekara, 2013). Amidst low adoption, some mixed emotions or perceptions too persists in the community. There has been significant and positive impact on customer satisfaction in the use of ATMs in Sri Lanka, while internet banking remains neutral and illustrates than it's insignificant to customer satisfaction and mobile banking depicts negative relationship based on the studies conducted by Buddhika (2021). In addition it was also highlighted that new advanced technologies are emerging in the banking sector and that the customers are highly skeptical about it especially AI and interactive voice recognition (IVR), and are willing to adopt or adjust to new technologies if it's more convenient and if adequate customer services are provided, since they believe AI will the change the way of doing things in the future, highlighting huge potential for advanced technologies especially in the Sri Lankan context (Mallawaarachchi, 2019).

4.4 Digital technologies that could enhance banking performance in the industry

Through the findings of the study, it was revealed that the impact of digital technologies on operational performances is mixed, both positive and negatives, sometimes even neutral. However, all the literatures highly emphasised that though there are negative impacts, banks must overcome them and take actions to go forward in this techno-oriented era, to compete and even to survive in the industry, since sooner digital technologies will no longer be merely an advantage but rather a necessity. Hence bank should adopt digital technologies in its business operations and also should incorporate technologies that are being invented newly as and when introduced to the market:

1. Digital Payment Methods – new payments methods can be introduced

2. Financial Technologies – highly used now, but can be redesigned with new features

3. Data Analytics – highly important in this information-based era

4. Cloud Computing – to support increasingly complex transactions, data etc.

5. Block Chain Technology – advanced technologies to bring more convenience and gain competitive advantage

6. Artificial Intelligence (AI) - advanced technologies to bring more convenience and gain competitive advantage

7. Cyber Security – must to increase security for customers and to increase customer satisfaction

8. Payment system (Central Financial Authority) – Central authorities can introduce digital technologies in payment system

9. Real Time Online Branches (RTOB) – Digital branches

5. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

Digital Technology is the new revolution for the banking industry all over the world. Its impact has been significant and has posed so many changes, challenges etc. to the banking environment. Nevertheless, Digital technology has become a necessary evil, paramount importance to the future of the industry and to attain competitive edge in the market.

The systematic review conducted revealed that the digital technologies have certainly been impacting the operational performances of the banking industry. However, the impact especially in the context of South Asia with specific reference to Indian, Pakistan and Sri Lankan banking industry, has been both mixed: positive and negative. The banking industries have been using various types of digital technologies, however, the most commonly used or highlighted digital technology is financial technologies, widely apparent in all three economies, while other technologies are either at the developing stage or adopted at a lesser rate. In addition, when analysing different operational measures, the most commonly highlighted, throughout different literatures were customer dimension and majority of the

literature emphasised the reluctance and low usage rate among customers mainly due to the preference over the traditional methods common to South Asians. However, the findings of different studies also revealed that the people are willing to adopt digital technologies if the banks could effectively take few measures: increase security; reduce transaction costs; increase awareness etc.

5.2 Recommendations

Digital Technologies have become part and parcel of the banking industry and banks too have been pioneers in the digital technology adoption. However, since some studies also present some issues in implementation of digital technologies, different measures can be undertaken by the industry to promote the new trend: 1. Banking institutions should take measures to improve workforce engagement – collaborating with other institutes to improve skill set of employees; outsourcing non critical jobs or tasks; improving training programmes; conducting professional development programmes; reinventing and allowing flexibility in recruitment process; mentoring etc. (Roy and Viswanathan, 2018); 2. Banking institutions should take measures to improve customer engagement – Improve digital literacy if the economy at least the customers by creating awareness programmes; increase the level of confidence among customers by conducting promotions; Introducing alternative delivery channels; enhancing on customer feedbacks; improve human contact even though if its online system; improve

security measures; introducing user friendly applications etc. (Buddhika, 2021; Singh and Malik, 2019; Kamboh, and Leghari, 2016; Zahid, Jehangir and Shahzad, 2012); 3. Improvement in IT infrastructure: (Singh and Malik, 2019); 4. Measures to revamp rural economy to benefit from rural population (Singh and Malik, 2019); 5. Continuous Improvement -(Zahid, Jehangir and Shahzad, 2012); 6. Other measures - Free Call Center Services; Alternate Delivery Channels; Effective Service Delivery; Risk Minimization; Speedy and Protected Media Line Involvement (Zahid, Jehangir and Shahzad, 2012).

5.3 Theoretical and Practical Implications

The study presents both theoretical and practical significances. Many banking companies, economies and even different sectors can generate a broader and an in-depth understanding on the impact of the digital technologies on the operational performances and can effectively use the implications garnered to put to use in practical scenarios and can take actions to mitigate and minimise possible drawbacks, negative consequences beforehand itself. In addition regulatory institutions and different institutions can effectively use to introduce new policies based on the circumstances created or posed by digital technologies in the environment. Moreover, the study also tries to fill the gap in the literature by trying to address the gap of no or maybe few studies undertaken to resolve the fragmentations, uncertainties and ambiguities in the studies on the impact of digital technology on the operational

performances of the banking industry and since no unified or common generalised findings haven't been concluded, at least in the context of South Asia, and hence will contribute to the literature.

5.5 Limitations & Directions for Future Research

The study was conducted in the context of South Asia and only with specific to three countries; India, Sri Lanka and Pakistan, therefore the scope can be expanded further to incorporate more countries or even to research on different contexts and to further widen the understanding on this domain. In addition, the study was conducted only with regards to the banking industry and thereby the impact of digital technologies can be approached in many other industries as well.

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Post-pandemic and the Way Forward of the Sri Lankan Tourism Industry: A Service Marketing Perspective

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Abstract

The Covid -19 pandemic turned out to be a substantial public health problem impacting companies and consumers at the national and international levels. This study aims to understand service marketing in the tourist industry better and how relevant it is for marketers to attract new tourists in the post-pandemic context. This study argues that the Covid-19 pandemic offers an excellent opportunity for the tourist sector to shift towards more genuine urgent global social and environmental challenges. It also explored possible ways for the Sri Lankan tourist sector to decide on its service marketing in the post-pandemic situation. Through a pilot single case study, we detailed how this pandemic is affecting service marketing and how we believe this will impact not only the sense of marketing but also how the tourist industry manages its strategic marketing efforts. We conclude the paper by identifying some possibly productive study topics and directions.

Keywords - the tourist industry, service marketing, post-pandemic, Sri Lanka

1. INTRODUCTION

Tourism as a service sector generates significant foreign exchange for developing countries. Sri Lanka is an

important destination for international tourists with its unique natural beauty, backwaters, mountains and beaches. The World Tourism Organization (WTO) has estimated that tourism is the most important economic sector, representing about 10 % of the world's gross domestic product (GDP).

Many countries' employment opportunities recognized the potential contribution to the economic growth of this sector. Besides, employment created by tourism and tourism

is distributed directly throughout the economy—in various aspects, including production —and in travel and tourism firms. The government encourages provincial governments to develop facilities, including mass transit networks and improved infrastructure. However, this will increase the standard of life and encourage tourism for locals. Besides, tourism contributes significantly to the GDP of a nation. A large percentage of gross receipts is foreign exchange earnings produced by tourism. Tourism is also one of the only viable growth opportunities in several fields. Therefore, the tourist industry will likely expand worldwide in short to medium term, including in Sri Lanka.

The effects of the second wave of the Covid -19 pandemic in the world have enhanced minor exports by December 2020. However, imports of non-essential have continued to decrease since the last year, with continuing limits on non-essential imports and relatively low global oil prices. Overall, the trade deficit has considerably decreased by 2.0 billion dollars by 2020 compared to 2019. In December 2020, employees' remittances continued to boost the external sector's stability recording the historically highest monthly inflow. In the economic environment, marginal net outflows were reported in December 2020 by foreign investment in the government securities market and the Colombo Stock Exchange (CSE). At year-end, USD 5.7 billion of gross official assets. Sri Lanka's rupee depreciated in 2020 by 2.6%. In December 2020 and up to 2021, the exchange rate faced critical volatility, adversely impacting the state economy.

The gross domestic product of Sri Lanka was downgraded in 2021 from a 5.3% forecast in October 2020 to 4.0% by the International Monetary Fund (IMF), with world growth upgraded to 6.5% from a global 6.0% forecast. In the context of a Coronavirus pandemic and monetary instability, Sri Lanka announced a 3.6 per cent decrease in 2020. Global growth, however, is being driven by the US, which is predicted to expand by 6.4% after 3.5% in 2020. However, the World Economic Outlook report stated that Europe (OACD) is forecast to expand by 4.5% and that the Euro Region will rise by 4.4%. Asia is forecast to rise by 7.6%, while China will grow by 8.4% in 2020, after 2.3% and India by 12.5% after 8.0% last year (IMF, 2021).

The global economic influence of Covid-19 is expected to be unseen after the Great Depression of the 1930s. As a result, the Covid-19 pandemic is likely one of the most critical environmental developments in recent marketing history, with the potential to significantly affect business ethics and service marketing. Regardless of how the pandemic ends, it is already expected to have long-term fiscal, social, political, and cultural ramifications. In this article, we explore tentative thoughts about how this pandemic could affect the marketing philosophy, mainly service marketing in the tourist industry, as it became a hot topic during the pandemic. In terms of marketing, we will concentrate on the future consequences of fundamental marketing principles, marketing sense, and marketing policy that need to be extended

and modified for the tourist industry in Sri Lanka.

2. LITERATURE REVIEW

2.1 Sri Lankan Tourist Industry

The revenue gained by Sri Lanka from tourism reached 957 USD Mn in December 2020, far below the 4 USD recorded in the previous year. The revenue of Sri Lanka since 2009, where the all-time highest height was recorded at 4,381 USD in December 2018, and the lowest was at 1 USD in 1967 December.

A few tourist arrivals were registered in December 2020 when the pilot project to resume tourism was launched. Thus, in December 2020, 393 Ukrainian tourists visited Sri Lanka. Accordingly, in 2020, the overall arrivals of tourists were 507,704, relative to 2019 913,702. Consequently, by 2020, cumulative tourism earnings are expected to be US$ 957 million, centred on visitor arrivals.

2.2 Impact of the Tourist Industry on The Sri Lankan Economy

In terms of infrastructure, technical and consulting services, hotel facilities, furniture, water purification systems, electrical systems, energy-efficient equipment, restaurant and kitchen utensils, meals and drinks, accessories to bathrooms, spa and fitness facilities, and water-sports equipment, the tourist industry could provide considerable long-term opportunities for the industry (Ratnayaka, Kumara, & Silva, 2020). The growth of the hospitality sector, updating current accommodations and building international hotel networks that demand high-tech inputs provide significant opportunities for the tourist industry. In recent years, Sri Lanka has seen a substantially increasing number of informal dining, fine dining and quick food restaurant outlets. International restaurants and domestic ones are multiplying. Several restaurant businesses that are fresh to the industry strive to seek prospects and invest. Sri Lankan providers have increased opportunities to incorporate related items into the country's rising culinary and hospitality sector (Kandewatta, Fernando, & Silva, 2018).

Sinharaja is Sri Lanka's last viable primary tropical rainforest district. It is situated in Southwestern Sri Lanka. Over 60% of the trees are endemic, and many are uncommon. Many wildlife, primarily birds, are endemic. However, more than 50 % of Sri Lanka's endemic mammal and butterfly species and many kinds of insects, reptiles, and rare amphibians live in this reserve (Mufeet, Mubarak, & Nusrathali, 2021). A meaningful discourse on the deforestation activities recorded from many areas of the country, including Sinharaja, may directly affect the industry, negatively emphasizing deforestation in Sri Lanka.

2.3 Post-Covid-19 on Tourist Industry

Traditionally, tourism was the country's third-highest foreign exchange earner. In 2019 Sri Lanka saw over 1,9 million visitor arrivals, down 21% from last year because of the Easter Terrorist attacks. The sector has been forecast to raise some $3.5 billion in 2019. The consequence of the global Covid -19 pandemic paralyzed the sector by 2020, which currently caters to visitors and

international arrivals almost entirely under tight constraints on "travel bubbles". Sri Lanka provides attractions like beaches, nature reserves, rain forests, Sinharaja and tea plantations. In the Travel and Tourism Competitiveness Report 2019 of the World Economic Forum, Sri Lanka placed 77th among 141 nations. The most significant number of tourist arrivals was in the country, followed by the UK, Germany and France in India and the People's Republic of China (PRC).

Tourism investments were high in 2019, with accepted projects worth approximately $153.9 million that year. Sri Lanka is aimed at attracting worldwide. Several hotel channels in Sri Lanka, including Hilton, Marriott, Shangri-La, Six Senses, and Movenpick, have started to develop or operate international and regional hotel chains. In 2017, Hilton took over the ownership of DoubleTree from the Hilton Weerawila Rajawarna Resort, and in 2020 it took over the operations of Shangri-La and Movenpick. Additional programmes like Sheraton and ITC are underway (Fernando, 2020). Any local conglomerates own many of Sri Lanka's luxurious hotels.

Moreover, the boutique hotel idea rapidly developed during 2021, the first quarter. International hotel firms were unaccounted for from the country during the long civil war in Sri Lanka that ended in 2009. For several years Hilton had managed a luxurious hotel (owned by the government) and an apartment complex in Colombo, the only global player in Sri Lanka (Ranasinghe, 2021).

Tourism provides prospects for investment as well as trade in the country. The government now provides tourist creation due to its beauty. Eastern Sri Lanka is a region with considerable potential because beaches are regarded as world-famous in this country. The major attractions for surfing enthusiasts are locations like Pasekudah and Arugam Bay. The country consists of many parks and forests with a multiplicity of birds, unique fauna and flora and is regarded by various international conservation organizations as a hotspot for biodiversity. Banning the sale of the property to outsiders will make it more challenging to build new lands. Environmentally sustainable resorts are becoming more common as many developers opt for green hotels to attract an expanding segment of the ecotourism industry. Increased tourism propelled the restaurant sector to considerable growth before the global pandemic(Munasinghe, Gunawardhana, & Ariyawansa, 2020).

In January 2021 Sri Lanka opened its doors in the context of a "bio bubble" model to foreign tourism arrivals following the closure of airports to commercial traffic in March 2020. Bio bubble waives the quarantine provision for recreational travellers so that they may escape the confines of their hotel rooms as long as they are not engaging with locals at licenced hotels. Although travellers cannot leave their hotels alone for the first 14 days of the "bio bubble," they are free, at some periods, to take allowed visits to selected tourist sites. Licenced travel agencies or hotels to the attractions monitor travel. The Sri Lankan Tourism and Health Authorities

have approved ninety-eight hotels. Biological bubble visitors can use both services at these hotels, but the hotels are not allowed to welcome local customers. Hotel physicians can track workers' and visitors' well-being following the Ministry of Tourism, Sri Lanka guidelines.

2.4 The Impact of Service Marketing on Tourism

Marketing is a critical case study when addressing the many aspects in which Covid-19 has modified our disciplines and activities. The impacts of Covid-19 have been profound and widespread. To organize our study, we will investigate how the pandemic has altered the core service marketing concepts and marketing strategies to develop the tourist industry in Sri Lanka.

In the middle of the pandemic, consumers were frustratingly hampered by limited choice, product quality, and immediate demand rather than by considered considerations of varying products, long-run appeal, or potential loyalty reflections. In specific ways, rather than marketing myopia (Levitt, 2017), in which advertisers over-rely on the physical aspects of their goods, customers' focus on the facilities needs to be noticed. Since customers are restricted to visit stores physically, customers have come to rely on the services marketers provide. The core of service marketing can be thought of as a trade. Such trade is based on mutual consensus, value expectations, and contact – many of which were drastically altered for many buyers and suppliers due to the events of Covid-19 (Shao et al., 2004).

Utilities' marketing heavily relies on the interdependence of Marketing, Operations, and Human Resources. The following are the distinctions between tourism marketing and other services which service marketers need to focus on: (1) the primary items offered by recreation/tourism companies are leisure activities and hospitality, (2) Instead of moving the goods to the consumer, the customer must fly to the product (area/community), (3) travel accounts for a large portion of the time and money spent on leisure and tourist experiences, and (4) is a significant factor in people's choices about whether or not to visit your company or community. Further, the Intangibility, inseparability, perishability, and heterogeneity of the services made the tourist industry offer quality service to the customers to attract and retain them in the post-pandemic situation (He and Harris, 2020).

Changes in the marketing environment and ecosystem compelled the tourist industry to cultivate competitive versatility pre, during, and post-pandemic. Self-isolation and restrictions on freedom of travel enforced by Covid -19, like every other slowdown, have caused customers to resort to more basic, essential, and non-negotiable needs. However, the abrupt departure from their daily activities and the independence from social and company expectations and care have caused individuals to experience distress and tension. Therefore, the tourist industry can reinstate their service by adding value to their existing services to reduce people's stress levels during the pandemic. These were not isolated efforts by travellers left to deal with issues on their

own, as the media and organizations interested in mindfulness research, as well as commercial providers of mindfulness-related programs, generously provided advice, free lectures, and access to a premium edition of their services (The Mindfulness Initiatives, 2020).

More conscientious consumers who are more mindful of their implicit habits, spending practices, and increased ability to avoid the lure of fake satisfaction could support a post-pandemic tourist industry (Stankov et al., 2020). As a result, we anticipate that more travellers will be more preoccupied with the issue of pleasure and that they will be more self-aware of enigmatic tourism ads. As a result, the tourist industry should abandon tired tropes in favour of a more simple solution, such as marketing vacations as a way of expressing life plurality, constructive citizenship, and socially and environmentally conscious travel, rather than as a finished commodity that can satisfy people's "dreams and wishes" (Stankov et al., 2018).

2.5 Towards Compassionate Tourism

The actual Covid -19 truth of that and other idealistic dreams of modern tourism reminds all tourism stockholders that such targets are hardly achievable/manageable and that tourism, as an industry, will hardly meet the highest expected aspirations. As previously said, tourism as a responsible and sustainable enterprise remains a long-term target, as certain game-changing and promising attempts soon face the harsh realities of a highly competitive market. For example, rather than leaving more room for profit for smaller hotels, modern online

travel intermediaries enforce high fees and intervene with rigid pricing policies. Sharing economy platforms resemble commercial, excessive profitmaking counterparts (Slivar et al., 2019).

The tourist industry's environmental agendas would be easier to achieve if they received truthful input from visitors. Tourists who are more immersed in the immediate moment are more likely to note what is wrong with the current state of tourism. Tourists can become more sensitive to the false smiles of overworked receptionists or housekeepers working double shifts, many of whom are from low-income countries. Tourists will not be able to act on these instantly, nor is it needed at this time, but these encounters may become transformational in the long run, transforming them from what is now derogatorily referred to as a mass tourist to a force of mass conscientious change and, eventually, to more humane tourism in order to develop the Sri Lankan tourist sector.

3. METHODOLOGY

This study aims to understand service marketing in the tourist industry better and how relevant it is for marketers to attract new tourists in the post-pandemic context. The change in service marketing in the tourist industry in the post-pandemic clearly indicates that this study focuses on a multi-layered and complex reality of a phenomenon where different service providers in the tourist industry will have different views on the given topic and the way they evaluate it is also subject to their personal experiences, therefore in order to

understand how they think of the change, we need to gather answers from them and analyse multiple interpretations from them in their specific context. With this philosophical understanding, the research paradigm is interpretivism.

This research will follow a qualitative methodology using a case study approach as the strategy of inquiry. Case studies have been largely used in the social sciences and have been found to be especially valuable in practice-oriented fields (Starman, 2013). And this approach provides an in-depth exploration from multiple perspectives of the complexity and uniqueness of a particular system in a variety of real-life situations (Simons, 2009).

Tourist industry is considered to be a service industry where the knowledge is primarily generated based on practices, and in order to gain an in-depth knowledge on the change in service marketing in the post-pandemic, the researcher conducted a pilot study in a selected destination management company in Sri Lanka and investigated multiple perspectives in different marketing aspects from managers of the specific key source market of Sri Lanka inbound tourism.

4. PILOT STUDY

The selected company A is categorized as a SME tourism company based on the standard given by Sri Lanka tourism board and data being accessed is from its main inbound source market China, where company A ranks top 3 in this specific market relating to its number of Chinese tourists accommodated monthly.

China is a crucial inbound market for Sri Lanka and it requests more attention from Sri Lanka tourism industry to cater to the changing needs of this potential giant. Notably, China has climbed up as the top 3 inbound source market again for Sri Lanka within 6 months after reopening its border and many countries have witnessed the behaviour changes of Chinese tourists.

Consequently, analyzing how Sri Lanka tourism company markets their service pre and after the pandemic to the most identical tourism market will shed some light on this topic.

Three managers with over 6 years of employment in charge of hotel reservations, business development and operations respectively were selected for three semi-structured individual interviews and one focus group discussion.

The data of this pilot study have been collected through multiple methods including interviews, observations, documents, archival records and physical artefacts.

5. DISCUSSIONS

As per the data collected in pre-pandemic 2018 and post-pandemic 2023, we have identified that there are more small groups and theme products in the post pandemic than pre-pandemic period and customers have more dynamic needs instead of requesting standardized products and services. Moreover, there are more direct bookings derived from social media platforms of the company.

Responding to the above facts, the company's marketing initiatives also show

a trend of sustainability, flexibility and exclusiveness exemplified by below table. In order to cater to the post-pandemic tourists on their needs for more exclusive and flexible services, the company made efforts to develop exclusive local attractions and support the local community to lift up their wellbeing, simplify the inquiry process and payment process using technology, and highly involve in promoting responsible travel to their customers.

Table 1**.** Change in Marketing Aspects for Pre-Pandemic versus Post-Pandemic

Marketing Aspects

Hotel Reservations

Pre-Pandemic - highlight mainly on the basic facilities

Post-Pandemic - include more facts on hotel sustainability initiatives and exclusive customer experiences

Business Development

Pre-Pandemic - standard contents for digital platforms and use a lot of printed flyers and brochures

Post-Pandemic - include more contents on company sustainability initiatives and exclusive offerings; use recycled paper, reduce paper use, include sustainability part in the feedback forms

Operations

Pre-Pandemic –

Attractions: highlight mainly the standard attractions

Meals: highlight mainly the value-added buffet option

Transport: highlight mainly on the basic facts of the vehicle fleet

Shopping: highlight standard souvenir options and shopping items

Guides: only have basic introduction

Post-Pandemic –

Attractions: include more exclusive attractions and experiences

Meals: include notes on not wasting the food

Transport: include highlighting the tipping culture and encourage customers to pay more for the dedicated service

Shopping: include notes on protecting the environment and provide tailor-made sustainable souvenir production services

Guides: include more detailed introduction about the expertise and experience and create guide professional personal profiles

The above findings provide us with the fact that tourists from China have shown a different behaviour owing to the influence of the pandemic and tourism companies are making efforts to respond to the new demands of this growing market. The pandemic did play a role in either shifting or accelerating the change, however, it requests the validation from tourists aspect to determine the actual role of the pandemic on the change of marketing initiatives and strategies.

5. CONCLUSION

We are tackling the significant multi-faceted challenges the tourist industry poses and an integrated approach to policymaking by many governments in the last few decades. Cohesiveness and consistency are essential for ensuring the success of tourism policy in the design and execution of policies at all levels of government. It was noticed that the implementation of a tourism policy would play a significant role in including the government, the enterprise, destination societies, and other players in determining a direction and route to growth and setting targets for achieving long-term and sustainable tourism. Cooperation between the public and private sectors in tourism is continuously underlined. This review offers an overview of the areas in which public policy initiatives can be more efficient.

Tourism is seen as a responsible engine of growth in developing economies like Sri Lanka. In this description, the function of tourism in shaping the critical growth pillars of Sri Lanka's economic development is assessed. Different econometric methods and frameworks were used to examine the causal links between tourism and economic growth, electricity and farming and poverty. The study underlines the significant position of tourism in emerging economies growth. The results show that a 1% growth in tourism significantly improves Gross Domestique Power (GDP) by 3%, foreign direct investment by 6%, domestic growth by 7%, and poverty reduction by 2% in the extended product. Politicians should also be told that tourism will create and promote integrated strategies through public investments in developed countries by designing and implementing them. Political uniformity and coherence are also essential for competitiveness, sustainable development, and maximization of tourism benefits to the nation.

The current pandemic will attract more visitors, creating more and potentially sustainable tourism experiences. Tourism companies change their unsustainable service offerings in response to a new market; according to that vision, more attentive visitors could serve as an underlying network that binds, promotes, and nurtures the whole tourism ecosystem for all benefits.

These examples were interpreted as good practices to express in tourism contexts and local tourism promotion to benefit regional and local growth in the Sri Lankan context. A tentative contribution; however, it is planned that in the future, a comprehensive analysis with questionnaires among consumers (tourists) will be developed to determine the effect of the Covid -19 on their travel activities. From an interdisciplinary standpoint, the current manuscript provides insights into tourism in Sri Lanka and service marketing growth during the crisis.

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Digital Travel Narratives: A Postcolonial Thematic Literature Survey

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ABSTRACT

An overarching thematic literature review was performed on studies focused on travel narratives and their promotional aspects published from the year 2010 to 2020. This review systematically selected 20 journal articles. Articles were reviewed based on, the use of theories, main findings and conclusions, in order to gain a thorough overview of the literature and knowledge in this area of study. Results of the review revealed that the concepts of exotica, gender, travel, authority, and authenticity are central to the analysis of discourses on tourism promotion, and that travel literature/narratives are instrumental in the representation and distribution of such discourses. Further, significant gaps were identified, pertaining to context and other variable factors of postcolonial tourist narratives, that could be bridged by future studies.

1. INTRODUCTION

"If all travel involves an encounter between self and other that is brought about by movement through space,

all travel writing is at some level a record or product of this encounter, and of the negotiation between similarity and difference that it entailed." (Thompson, 2011, p. 10)

The above quote encapsulates the complexities encountered within travel writing and literature, in terms of identities and representations of the self and the subject it discusses—the chosen destination, its people and culture—which may be seen as the other, thus, different from the self. Therefore, the present study finds significance in delving into the discourses disseminated via various genres of travel literature the representations of postcolonial identities.

For instance, Sri Lanka (henceforth referred to as SL) has a long history as a tourist

destination. However, 2018 to 2020 also proved the vulnerable state of SL tourism, especially due to geopolitical challenges. After the ravages of a 30-year civil war in SL, the tourism sector enjoyed a two-digit post-war growth in international tourist arrivals and revenues, which were immediately disrupted by the terrorist attacks on several churches and hotels in the island on Easter Sunday in April 2019. The industry suffered a loss of USD 1.5 billion of tourism revenue (de Silva, 2019). Further, COVID-19 once again drastically impacted the tourism industry and continues to do so, resulting in a zero-revenue period, with a potential 20%–30% drop in international tourist arrivals for 2020 as a whole. The industry gauges that a decline in tourism revenue in Sri Lanka could range from USD 107 million to USD 319 million (LBO, 2020). With the understanding that international tourism has a much higher capability to bring about economic development relative to domestic tourism in destinations such as SL (UNWTO, 2013), geopolitical challenges, especially ones that impose vast damage to infrastructure and resources, in addition to hindering the safety and wellbeing of locals and potential tourists, is problematic for SL tourism. This vulnerability of the tourism sector to countless external factors makes the continuous usage and distribution of tourist promotional material paramount. Promotional material in various forms and genres is utilised to disseminate and sell an image of a destination and is therefore the primary material utilised for marketing purposes. What is interesting for this study is how certain genres of travel literature

may play a more explicit role in promoting tourism than others.

Tourist promotional campaigns and literature therefore play a significant role in attracting tourists and ensuring that the image of a country is kept intact regardless of the geopolitical challenges the country is facing at the time. Generally, in the process of attracting tourists, a skilfully engineered image of the country and its people is depicted. In fact, this particular depiction becomes the initial point of contact between Sri Lanka and prospective tourists. This initial connection becomes crucial in creating the ideal first impression of the country—a curated identity is materialised in order to attract the ideal consumer, and thus, the country is depicted as both different and familiar. This image is mediated by many stakeholders, including the governing body of SL Tourism and the government itself, as well as travel blogs and travelogues authored by independent travel writers, creating a circuit of knowledge that controls the representation and identity of the country whilst also controlling how the product is produced, distributed, and ultimately consumed by the tourist. Especially since "tourism representations do not exist in isolation but are inexorably intertwined in a circuit of culture whereby representations utilise and reflect identity" (Hall, 1997). Thus, by promoting or selling an image of what a country, in this case, Sri Lanka, has to offer via literature that promotes tourism, one is inadvertently selling a curated identity of Sri Lanka, even perhaps to the extent of essentialising it.

It is important, however, to understand that all forms of representation, regardless of their relation to tourism, are constructed. Hall (1997) substantiates this idea, stating, "meaning is *constructed by the system of representation*" (p. 7), while Clough further asserts that "all factual representations of empirical reality, even statistical representations, are narratively constructed" (as cited in Plummer, 1995, p. 19). Therefore, it is with this understanding that the present study unpacks the construction and depiction of postcolonial Lankan identities and representations embedded within literature promoting tourism.

1.1 Research Problem

Literature on tourism is informative and entertaining as well as imbued with cultural politics, wherein lies an interesting connection between experiencing a country as a tourist and (re)constructing its identity via promotional materials. Tourism promotion in Sri Lanka is conducted via negotiated discourses involving many stakeholders and institutions of authority. As Sri Lanka, like any other multicultural nation, has always been a country entrenched in identity politics, it would seem that at the point of portraying Ceylon to the world as a tourist destination, many narratives loosely revolve, with many actors playing with its identity, in order to form a "negotiated creation of the destination," which in turn has become a recognisable system of discourse on Sri Lankan tourism. Thus, with the ultimate aim of portraying the best version of Sri Lanka, a narrative system is constructed via the promotion of Sri Lankan tourism with the support of numerous disparate actors, such as the government, the tourist board, writers, media, and public relations specialists, etc. Many cohesive discourses can be identified. However, this narrative system also tends to rupture or allows itself to be ruptured. One of the main aims of this study is to ascertain the factors that lead to the establishment and rupture of the existing and official tourist discourse, disseminated by governing bodies of SL tourism. This tendency for the narratives on SL to either be established or rupture is due to the fixed and fragile frame established by the Ministry of Tourism and SLTB, which strives to represent SL and its identities within a singular narrative. This sets up the backdrop which also allows for difference to take place and be recognised as exceptional.

The study then attempts to address the following research questions in order to explore the above-mentioned research problem.

1.2 Research Questions

The following research questions are explored and answered within the present study:

1.	How are Lankan identities represented through different platforms/multiple spaces and locations/perspectives?

2.	How does the marketing aspect of travel writing shape the narratives/texts?

3.	What are the dominant representations/narratives that are constructed, and how are they established and disrupted?

Thus, in order to delve further and answer the above questions, a thematic literature review was conducted, in order to understand the many areas that have been discussed and identified within this area of study.

2. METHODOLOGY

A systematic literature search on travel narratives and its promotional aspects was performed using PRIMO, the University of Plymouth electronic library. Specific high impact databases such as Emerald, Wiley and Blackwell, Taylor and Francis, Sage, Jstor, and Elsevier were utilized in order to gather the most relevant and high-quality articles, pertaining to the research area. The following search terms were used in appropriate combinations: travel narratives and promotions, travel narratives and postcolonial lens, digital travel narratives and postcolonial, travel narratives and marketing. The terms were appropriately combined within a search string, in order to extract the most relevant literature available.

Limits were placed during the search on the PRIMO site with regard to the Year of Publication (data posterior to 2010), the language of publication (English only), the type of articles (peer-reviewed only). These limitations were due to practical and feasible reasons, the inclusion of literature only after 2010, was to ensure that the most recent information was extracted, as tourism and tourism promotions has greatly evolved over the years, and so have the notions of postcolonial aspects. Moreover, I selected articles published in English only, for practical linguistic reasons of comprehension. Furthermore, peer-reviewed articles were selected to maintain quality. Thus, the initial manual search yielded 192 articles.

This was further limited based on more inclusion criteria, such as the availability of full texts only, and removal of duplicates. This resulted in a total of 102 articles. Following this, I eliminated articles that had titles that were irrelevant to the study. Thus, this further limited the number of articles to 30. The final count of articles that met the criteria, was therefore, 20, following close readings of titles, abstracts and subsequently the full text, in order to select only the most relevant and closely linked articles to the question at hand.

3. RESULTS/ LITERATURE REVIEW

3.1 Conceptualising Travel Writing

Bill Buford (1984) attributes travel writing to its "wonderful ambiguity," lying "between fact and fiction" (as cited in Anjum, 2014, p. 191). It is also described as a "notoriously raffish open house where different genres are likely to end up in the same bed. It accommodates the private diary, the essay, the short story, the prose poem, the rough note and polished table talk with indiscriminate hospitality. It freely mixes narrative and discursive writing" (Anjum, 2014, p. 192). The travel book thus combines "the heterogeneous (using all in one the form of memoir, diary and the letter) and disparity, it aims at the mosaic" (Anjum, 2014.). A multiple genre in itself, which consists of other genres. According to Mary Campbell (1991), travel writing is "a literary instrument of consciousness, a

genre of cultural translation" (as cited in Anjum, 2014, p. 193; Burke & Hsia, 2007; Ong, 2013). Peter Burke (2010) identifies an additional dimension of travel as translation. He contends that it is "a double process of decontextualisation and recontextualisation, first reaching out to appropriate something alien and then domesticating it, a process not much different from colonisation" (as cited in Anjum, 2014, p. 9). He further states that this takes place from "a double viewpoint: from the receiver's point of view, it is a form of gain, enriching the host culture as a result of skilful adaptation, while from the donor's point of view, on the other hand, translation is a form of loss, leading to misunderstanding and doing violence to the original" (Anjum, 2014, pp. 9–10). Innocent comments as "we do it this way, they do it that way" may sound neutral but may also contain a "subtext" of superiority and inferiority. And thus, travel writing has been accepted as "one of the ideological apparatuses of empire" (Brown, 2000, p. x). European travellers, as they recorded their observations of other lands and peoples, contributed to the "growth of a new, empirically informed discourse about both man and nature" (Hulme & Youngs, 2002, p. 257). Mary Louis Pratt's *Imperial Eyes* (2003) is particularly important as it shows how travel writing has produced "the rest of the world" for European readerships. It investigates how the European people engaged with expansionist enterprises of colonial powers. Moreover, some critics state that:

"Travel and travel writing are determined by and determine gender, racial identity, economic status and a host of other interrelated markers of status and privilege. The genre of travel writing … was the cultural by-product of imperialism, often written by those actively involved in the expansion or maintenance of empire (explorers, soldiers, administrators, missionaries, journalists), and dependent upon the support of the institutions of imperialism to facilitate the writers' travels" (Ivison, 2004, as cited in Edwards & Grauland, 2011, p. 1).

The present study seeks to look at different factors, one of which is the marketing aspect of shaping and constructing a destination's image and subsequently its representation to various audiences.

Since the late nineteenth century, there has been a semblance of resistance to historical and cultural myths of eurocentrism found within travel narratives, known as counter travel narratives. Two recent examples of such texts are Caryl Phillips's *The European Tribe* (1987) and Jamaica Kincaid's *A Small Place* (1988). Postcolonial travel texts resist the gravitational pull of metropolitan centrality and cosmopolitanism by articulating experiences and ontologies that are often unfamiliar to dominant European or North American productions of knowledge, packaged in a familiar format (Anjum, 2014). Patrick Holland and Graham Huggan (1998) refer to the writers who adopt the genre's potential for cultural critique as "countertravellers"—travel writers who resist the inclination to indulge in exoticism or establish clear borders in order to differentiate or separate national and cultural identities (p. 165). This

"counter travel" genre of postcolonial travel writing attempts to avoid binaries or the venture of "writing back"; it strives to offer frames of reference outside the boundaries of European knowledge production (Edwards & Grauland, 2011). However, if such an attempt could be achieved successfully is debatable. Thus, as Edwards and Grauland (2011) claim, "people are still influenced by the Empire to travel; people still migrate because of the Empire and people are still hampered in their travels by the Empire. This power, this pull, continues to shape the territories travelled as well as the people travelling in them" (p. 9). The empire is, in other words, still in place, literally as well as figuratively, as after all this is the legacy, trace, and duress of the empire. Therefore, the present study is interested in not just the colonial view of a destination imbued with colonial history, but also how it is re-worked and reconstructed in modern postcolonial travel narratives. The idea of selling a "good story" is an intrinsic element in travel narratives, and it is therefore a primary concern of travel writers to ensure they divulge the enjoyable highlights of their travels whilst "ignoring the irritants" (Abram & Norum, 2006, p. 11). The travel story published for the reading pleasure of its audience is "a negotiated creation of [the] destination," comprising of a tightly meshed relationship among many players: travel companies, transport providers, the hospitality industry, publishers, and even PR agents (Abram & Norum, 2006, p. 12). These stories are most often ready-made narratives supplied by authorial figures who seek to control the portrayal of the particular destination, reducing individual travel narratives to transactional pieces of controlled publications and levels of obligation to choose the "right" angle for the story in return for a broad readership and future commissions. This, then, questions the integrity of travel narratives that have been commissioned or sponsored by tourist organisations (Abram & Norum, 2006).

It has been claimed that travel writing is an "intrinsic pretension to truth" (Thompson, 2011, as cited in Calzati, 2014, p. 1). Calzati (2014) also adds that this conveys that the contract that binds the travel writer to the reader is one of trust: the former strives to provide an accurate account of what s/he has experienced, and, in turn, the reader evaluates such an account based on his/her epistemological horizon. Travel writing "unfolds a rather contested kind of narrative that constantly shifts between fact and fiction" (Calzati, 2014, p. 1), especially since it is imperative to note that it is a particular interpretation of a destination that is portrayed and the "truth" the writer projects is described within the travel narrative. This ideology positions travel narratives as flitting between fact and fiction. Holland and Huggan (1998), define travel writings as "fictions of factual representation" (p. 10). The travel book and the travel blog are two genres which "interpret" and give shape, in their own way, to the travel writing genre. This is largely due to what Anthony Pagden (1993) notes, that "travellers tend inevitably to frame the unknown in terms of the known, according to a 'principle of attachment,' that helps them make sense of reality" (as cited in Calzati, 2014, p. 3). Travel writing

can also be understood as a reflection of dominant ideologies which "provide us with the means of 'making sense' of social relations and our place in them" (Hall, 1995, p. 19). Thus, how writers and editors represent such experiences and interactions situates their writing within a wider discussion regarding ideology because such texts "expose the author's culturally specific 'ways of seeing' the world, as all of them, to different degrees, are now considered to incorporate the culture of the author" (McGregor, 2000, p. 28). The present study seeks to address a gap in research by unpacking the various "ways of seeing," and representations (visual and textual) that are embedded across multiple platforms, genres, and locations of writers of travel narratives on SL.

3.2 The Exotic Other

Transforming an encounter into an exotic or comical moment is a coping mechanism for many travel writers forced to deal with, from their point of view, the unexpected and the unusual, a situation which causes the tourist to re-evaluate their reality (Skinner, 2008). According to Skinner (2008), the travel writer may encompass this general mentality and paint exotic scenes and situations with associations that trace back to their world and that of the "imagined" reader. Therefore, the travel writers inadvertently reveal their opinions and attitudes, and their assumptions and expectations of what they consider to be "normal" (Hand, 2012).

While the exotic, being an unfamiliar setting, could evoke anxiety, some travel writers may view a destination as an escape

to a better world. The concept of "paradise" serves as a powerful trope (Alexeyeff & McDonnell, 2018; Ojeda, 2011; Hand, 2012), for this very instance, where discovering and subsequently "experiencing the perfect place where one can escape from the banal existence we live on a daily basis" becomes the crux of the narrative (Kravanja, 2012, p. 180). "Paradise" as a concept is also interesting to the present study as it has been formulated and manipulated to suit the needs and fulfil the desires of contemporary tourists who visit Sri Lanka. As Kravanja (2012) further states, SL has been a geographical object of fascination with seafarers, merchants, and pilgrims for much of recorded history, and therefore, the metaphor of "paradise on earth" is often used for the promotion of Sri Lankan leisure holiday destinations. Picard (2008) states that in total there exist four types of paradise images: "paradise contrived (or a so-called pure paradise without people), paradise confined (images of a tourist ghetto), paradise controlled (locals depicted as servants, vendors, and so on), and paradise confused (closer contact with locals and blurred boundaries between them and the tourist). Such 'uncivilised' indigenes encountered by Europeans during colonial encounters were most often portrayed as savage, unpredictable, impure, and, above all, 'magical'" (as cited in Kravanja, 2012, p. 185). Orientalism in its original sense (a critical factor that led to the historical construction of the images of the "paradise" concept) seems less of an implication today, even though the power dynamics are still in place, because the orient/occident divide seem less evident in comparison to the colonial past; however,

the foundations of the paradisal concept have not been substantially transformed. They are, for instance, increasingly refined through the influx and ubiquity of new media platforms (Kravanja, 2012, p. 186). Subsequently, the "crisis of representation" (Marcus & Fischer, 1999, pp. 7–16) is now a massive phenomenon wherein international tourism with its persistent reproduction of the imagery of paradise plays an important role (Kravanja, 2012).

Some travellers seek difference: however, they still prefer to "remain at home" even "while travelling, consolidating the Center" (Ghaderi & Roselezam, 2014, p. 127) and thereby ensuring that they surround themselves with the familiar, or rather the aspects that are similar to their home countries, within the destination they choose to visit, while clearly demarcating the instances that they consider to be part of the local culture as unfamiliar and therefore exotic. Such a reductive representation of cultural difference is termed colonial exoticism and is mostly practised by imperial apologists. Ghaderi and Roselezam (2014) further claim that such travellers leave no room for accepting colonial difference as diversity and the alternative expression of another nation in an attempt to exert imperial hegemony and to achieve its political and economic imperatives.

According to Bernard McGrane, "to travel is to see—travel is essentially a way of seeing, a mode of seeing: it is grounded in the eye, in our visual capacity" (1989, p. 116). The gaze is then reproduced into the travel narratives, whether in written or in visual form. The ways of seeing produce a narrative space from which the narrator and reader scrutinise, judge, and categorise the varied cultures and societies they explore through writing and reading. Illustrations, in particular, come to play a central role in the perception of places and people (Alu & Hill, 2018). They played a crucial role in supporting the traveller-observer's claims of reliability and truthfulness and the need "to conjure up the appearances of something that was absent" (Berger, 1972, p. 10). Simultaneously, visual representation is often less realistic than it seems; it distorts rather than reflects social reality. In other words, pictures testify to the mental and metaphorical "image" of the Self and/or of the Other (Burke, 2001, pp. 30–31). This becomes problematic in the presence of "iconotexts" which occur when the description and the visual image hinged onto the description clash, mirroring the cross-cultural encounter between the traveller and what Mary Louise Pratt (2003) calls the "travelee," between the self and the Other. As such, it also mirrors the negotiations between similarity and difference, resistance and acceptance, that such an intercourse involves (Alu & Hill, 2018).

Images and text combine to create a hierarchy of vision that privileges the seer over the seen, the traveller over the travelee (Alu & Hill, 2018). Colbert (2016) formulates an "aesthetic vision that privileges the appropriation of wilderness, landscape, and, ultimately, the nation itself, as a reflex of an originary appropriation idealised in republican Greece" and terms this an "archaeological gaze," where the "the appeal of the past [is seen] as spectacle" (Colbert, 2016, p. 236). Price

(2000) illustrates that photography offered to the Western spectator, images of indigenous peoples which, far from providing transparent, dispassionate access to visual truth, as contemporary proponents of photography's objectivity repeatedly claimed, frequently confirmed prevailing views of "otherness" as primitive, bizarre, barbaric, or picturesque. Western travellers attempted to use photography to delineate, record and classify particular "anthropological types" (Price, 2000, p. 57) and asked local and indigenous people to pose for them so as to exemplify specific kinds of clothes, social roles, and material cultures (Edwards, 1992; Poole,1997). This is significant to the present study, as the central text, which is the official tourism website of SL, as well as the travel blog, utilise a large amount of photography and images to display Sri Lankan culture, people, and landscapes. Thus, it becomes interesting to examine and unpack how the visual element is utilised within these texts to represent SL, and if they too capture SL as an "appealing Other."

Further, by reading modern travel writing via a gendered lens, the present study would investigate the current status of women as travellers/writers and as subjects in a travel narrative: the gendered aspects of prominent expressions in the categorisations/descriptions of spaces, their features and relations to people, as well as the portrayal and representation of gender dynamics. Regulating and objectifying women's bodies, attire, and behaviour is therefore another central manifestation of exotic tourism. This portrayal of women's bodies existed from the inception of travel

discourse, which translated into the perceptions of travel writers. Colonised by gender, but colonisers by race, women travel writers were often received and treated differently by editors, publishers, reviewers, and readers (Ghose, 1998, as cited in Thompson, 2017, p. 2). Thompson (2017) proceeds to clarify that frequently categorised under the condescending label of "lady traveller," women faced satire or outright censure if they appeared to overstep the norms of contemporary "femininity" (p. 2). While few scholars now recognise essential differences between male and female travel writers, most acknowledge that cultural constraints exercised a powerful influence on women's accounts, generating a degree of difference from male-authored narratives, and justifying some consideration of women's travel writing as a distinct strand within the genre (Thompson, 2017).

Sara Mills (1991) argues that "women's travel texts are constructed in the process of interaction of colonial textual constraints and constraints of gender" (p. 40). She further claims that "a gendered colonial discourse study" serves to highlight that female travel writers scrutinised the concept of gender to pinpoint the ideologies and practices of colonialism (p. 195). However, travel books allowed women to circumvent the prejudice of defining the social/cultural roles of women as "household angels" (Mouloud, 2019) to a certain degree. Until quite recently, the genre of travel writing, both fictional and non-fictional, was closely associated with the masculine (Thompson, 2017; Thompson, 2011; Ryall et al., 2010). However, late nineteenth century and early

twentieth-century travel saw momentum in women's move to motion; with travel defining a sense of agency, current trends such as "female solo travel" gained popularity. This movement is considered to be a truly liberating act of adventure and ultimate freedom. In the current discourse, this trend spurred tourist promotions to depict cities and countries as "safe" zones for solo women travellers, aligning tourist attractions, sites, and images to entice this new audience.

3.3 Commodifying and Authorising Difference

In travel writing, the matter of authority is rarely far from the surface. Travellers are often witnesses, reporting on cultures and places. Among them, writers are given a degree of authorisation to publish what they have witnessed (Anjum, 2014). However, it must be noted that writers are engaged in a tight mesh of relationships that ties together travel companies, actors in the hospitality industry, publishers, PR agents, and others, and often well supplied with ready-made narratives by PR agents, travel guides, and destination marketing organizations in the copy they provide for informational purposes (Ajum, 2014). Abram and Norum (2006) claim that writers also hear first hand from local business actors the stories they would like to have told about themselves, and are therefore under different degrees of obligation to choose the "right" angle for their publications (p. 12).

By reading cultural signs, authors and editors reproduce power relations that contribute to the separation between the writer/reader and the Other (Urry, 1990).

Richardson (1990) argues that "no textual staging is ever innocent. We are always inscribing values in our writing" (p. 12). In addition, Santos (2006) asserts that "such mass-mediated narratives are filled with enduring Western cultural and social ideological values which, some propose, transform and/or destroy the Other's national culture" (p. 68). The host is seen as an assistant rather than part of the experience. Thus, once again, the host travels from the periphery to the centre, to assist and then to return to the periphery (Almeida, 2006), locating culture as a site of contention where conflicting interpretations and meanings work themselves out under the ruling of a dominant culture and its ideology (Martin and Nakayama, 1996). MacCannell (2001) argues, however, that the culture of tourism is a "millennial stage of colonialism," and states that "the actual difference is that the earlier displaced symbols have the dignity of marking actual historical events … their contemporary relatives mark nothing but the power of global capital to efface history and to construct generic localities, or to package identity" (p. 385).

Sociologist Duane Champagne writes from the point of view of the locals about commodifying the destination: "native communities are already concerned about economic issues, but they do not wish to sacrifice culture, preferred institutional relations and their internal social relations in favour of economic development" (Champagne, 2007, p. 58). With the choice to commodify one's culture comes great responsibility over cultural, material, and spiritual resources in which indigenous

tourism professionals feel enormous pressure to deliver a competitive product that appeals to perceived consumer desires for "the Other," while confronting stereotypes that persist in popular culture (Champagne, 2007; Bunten, 2008; Viken & Muller, 2017; Reisinger, 2010). Hence, Bunten's (2008) query poses an interesting dilemma: "How does one go about selling culture without selling out?" (p. 52). One instance in which this is done is via the establishment of a model culture in which performance is key by the indigenous persona, i.e., a "model culture that selectively attempts to portray the best of those tangible, believable aspects of culture with which tourists can identify" (Wood, 1984, p. 366). The most outstanding feature of a model culture is its simplicity. The model culture presented is a simplified simulacrum of the real thing, thereby becoming a constructed commodity that is sellable whilst not hindering "reality" (Bunten, 2010). For culture to be marketed and sold, it must be packaged according to consumer desires that are informed by specific ideas about what constitutes the value of non-Western culture, art, literature, medicine, and bodies (Bunten, 2010). In the same way that fourth world arts are simplified for tourist consumption, culture itself must be simplified, transformed into iconic, consumer-friendly visuals such as traditional dress, digestible sound bites such as a greeting in the heritage language, and standardised ethnographic information presented on tour (Graburn, 1976, as cited in Bunten, 2010).With the assistance of country-conscious tour guides, the presentation of alternative visions of lives outside of the tourism context help change

commonly-held stereotypes that portray them as multigenerational victims.

3.4 Authenticity

As Viken and Müller (2017) argue, "tourism is basically founded on differences" (p. 3), especially when these differences are highlighted as "authentic." Authenticity is considered an essential means to attract tourists. Different enterprises and destinations compete for visitors, and authenticity is an important factor in influencing the visitor's travel decisions (De Bernardi, 2019). The authenticity of the place is often related to the interaction between people, and between people and objects (Knudsen & Waade, 2010). However, the concept of authenticity, especially in the portrayal of indigenous peoples, has been problematic and has attracted criticism for the portrayal of colonial images and descriptions that no longer correspond to the contemporary situation (De Bernardi, 2019). When an indigenous population presents its culture in the context of tourism, the attractive aspects are usually different cultural traits. Tourists search for different cultures and kinds of nature (Viken & Müller, 2017), and they have expectations of seeing such things (Olsen, 2006), which can be influenced by marketing (Niskala & Ridanpää, 2016).

To facilitate such processes, cultures are shown as "timeless and unchanging" (Silver, 1993, p. 304; Echtner & Prasad, 2003; Harootunian, 2010). This is also an important aspect of the "quest for authenticity" (MacCannell, 1973). This representation gives an image of native populations as just there for tourists'

consumption (Silver, 1993). In other instances, however, authenticity has also been conceptualised as a performance (Su, 2018). Therefore, authenticity is neither objective nor subjective but performative (Zhu, 2012). This type of authenticity is an alternative solution to excessively objective or subjective conceptualisations of authenticity. The notion of authenticity is intrinsic to SL tourism, and therefore to the present research, as it is a vital component that the tourism authorities utilize to create and sell a specific brand image of destination SL, projecting authenticity as a form of credibility, a tool that constructs and offers realistic experiences to potential tourists.

Authenticity is a vital ingredient of the autonomous modern self, expressed as an "ethic of authenticity" (Ferrara, 1993). Taylor (1991) critiques this definition; authenticity can also be seen as something that transcends the self, recognising the existence of others and their values. In its nationalist articulation, authenticity becomes a punitive discourse, banishing and marginalising those who are "inauthentic" (Gellner, 1983). It is also a notion of authenticity that has the ability to command from its national community a kind of "filial" duty and blind allegiance (Said, 1983). In colonial/postcolonial discourse, authenticity is central to decolonising nationalism, and imagining an authentic cultural domain which is not contaminated by the colonial is problematic (Chatterjee, 1993). In the Sri Lankan context, there exists contested cultural and political discourse concerning "Sinhala authenticity." Rambukwella (2018), one of

the key theorists on the trajectories of the notion of authenticity in SL and the ways in which authenticity is perceived and grappled with in SL narratives and discourse, illustrates that at the heart of the discourse of authenticity lies the notion of "apey kama," loosely translated as "ourness" or the idea that there are things that are authentically Sinhala and Buddhist. This is a systematic discourse, institutionalised, reproduced, and transmitted from generation to generation.

In order to further this cultural experience, a popular tourism tactic and promotion is its new take on travel through the lens of slowness. "The slow travel movement encourages tourists to use slower modes of transport, to leave the beaten track, to get to know locals, to learn some basics of the foreign language and to welcome unexpectedness" (Mingazova, 2019, p. 175). Nowadays, "it's often freedom from information, the chance to sit still, that feels like the ultimate prize" (Iyer, 2014, p. 6). The commercialisation of slowness in travel writing is strongly linked to the genre's central features, i.e., nostalgia, the experience of place, and the traveller/tourist dichotomy (Mingazova, 2019, p.176). Mingazova (2019) further asserts, slowness is a master trope for initiatives that not only focus on temporal experiences but more generally seek to fight capitalism, inequality, and climate change while promoting localism, sustainability, attention, and mindful consumption.

Another defining feature is "nostalgia," a notion that intersects with authenticity; the concept of authenticity encases a desire and nostalgia to return to a "better" past. The

concept of nostalgia has been identified as a pervasive feature of travel writing, as demonstrated, for instance, by Ali Behdad (1994), and Patrick Holland and Graham Huggan (1998; 2004). Holland and Huggan (1998; 2004) identify two main kinds of nostalgia in contemporary travel writing: a yearning for the imperial order, for the Empire itself on the one hand, and an "imperialist nostalgia" on the other. Coined by Renato Rosaldo, "imperialist nostalgia" refers to the paradoxical yearning of the agents of colonialism for "the very forms of life they intentionally altered or destroyed" in the process of colonisation (1989, p. 69). According to Holland and Huggan (2004), this kind of nostalgia is present in contemporary travel writing in the yearning for a "simpler" past, a "simpler" way of life, often rural, premodern, and preindustrial, packaged as "truly authentic" (p. 29).

4. CONCLUSION

It is evident from the above discussion that the concepts of exotica, gender, travel, authority, and authenticity are central to the study of discourses on tourism promotion, and that travel literature/narratives are instrumental in the representation and distribution of such discourses. Thus, using the findings from this literature review, the researcher aims to delve into the systemic discourses and cohesive systems embedded within select travel narratives, analysing in-depth the politics that govern tourism promotional campaigns and narratives in SL tourism via a postcolonial lens. However, within this paradigm of SL tourist literature, there seems to be a dearth in literature, and thus, requires further research.

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Developing An E-Tourism Adoption Model for Small and Medium Tourism Enterprises as A Framework for Sri Lanka's Tourism Industry

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ABSTRACT

Information Technology (IT) plays a dynamic role in the travel leisure and tourism industry. The success of the tourism enterprise will be determined by the integration and application of IT. In Sri Lanka, socio-economic development is massively supported by SMEs. These enterprises contribute up to 52% of the GDP (Sri Lankan Export Development Board, 2021). SME establishments in Sri Lanka accounted for up to 1.017 million, providing livelihood to nearly 2.225 million individuals in the non-agricultural sector (Department of Census and Statistics in the year 2014). Small and medium tourism enterprises (SMTEs) create the largest percentage of tourism service providers in Sri Lanka. Even with the emergence of technology small and medium tourism enterprises (SMEs) are lagging in adopting technological applications and they are reluctant to operate in an extremely tech-savvy business environment. The repercussions of this will negatively impact on the tourism sector. If these enterprises fail to adapt to this technological revolution, they will inevitably be left behind in the competitive travel industry. The study focuses on developing an e-tourism adaptation model through the comprehensive analysis of existing literature. The research is expected to support tourism stakeholders allowing them to explicitly develop e-tourism initiatives- to improve service quality.

Keywords — information communication technology (ICT) tourism adoption model, small and medium tourism enterprises (SMTEs)

1. INTRODUCTION

Tourism is a crucial factor for advanced and emerging countries as it is one of the leading sources of revenue. The travel and tourism industry is one of the largest economic sectors in the world accounting for 10.4% of the global gross domestic product (GDP). The industry is creating 313

million jobs which is 9.9% of the total employment (WTTC, 2022).

In Sri Lanka, tourism plays a major role in the socio-economic development with it being one of the 3rd largest sources of income for Sri Lanka. In 2019 the tourism sector of Sri Lanka reportedly generated 4.3% of its local GDP (SLTDA, 2020). It is also a key sector that accommodates thousands of local Small, and Medium Enterprises (SMEs). Each tourist destination represents an amalgamation of SMEs providing tourists with diverse products and services. Therefore it is evident that SMEs dominate the tourism sector in Sri Lanka.

Information Technology (IT) has had a significant impact on people's everyday lives, transforming how they communicate and connect with others, purchase, and access information. The tourism industry is a booming industry where IT plays a major role. According to statista.com, over 4.1 billion individuals worldwide have internet access, and they utilize it for various day-to-day activities, including travel planning, selecting a restaurant to dine in, and many more. Among these activities, searching for travel information ranks as one of the top 10 searches, with 73% of internet users engaging in it. Travelers not only search for travel-related information online but also use online platforms to plan, compare, book, and pay for tour packages (Buhalis & Jun 2011). Particularly, platforms like Trip Advisor provide reviews and information on hotels, restaurants, and attractions from over 190 countries globally.

With the rapid growth of the IT industry, most of the enterprises in the world are inclined to adapt to IT-based business models/interfaces. The travel and tourism sector also uses ICT for its operations. The application and integration of IT is essential and important for tourism enterprises to drive toward fast success.

Even with the emergence of technology small and medium tourism enterprises (SMEs) are lagging in adopting technological applications. They are reluctant to operate in an extremely tech-savvy business. The repercussions of this will negatively impact the sustainable growth of the industry. Small and medium-sized tourism enterprises (SMTEs) are in labor-intensive branches of tourism, their productivity falls below average, and they pressure in domestic factor markets. (Innovation and Growth in Tourism OECD, 2006). If the SMTEs adopt the e-tourism adaptation model that will impact international competitiveness. The study of Karanasios & Burgess (2008), shows that developing countries may have similar challenges such as low information environment and communication technology adoption, and unstable political and macroeconomic circumstances.

Like every other nation, there are distinct and unique characteristics when it comes to tourist attractions. The use of Information and Communication Technologies to digitize services in the tourism industry is often referred to as e-tourism, much like the widely recognized concept of e-commerce for online commercial transactions. Drawing parallels with the well-established concept of e-tourism, this concept paper

aims to explore the adoption of e-tourism in Sri Lanka.

Research question:

How can an appropriate e-tourism adoption model enhance the SMEs in the tourism industry in Sri Lanka?

Research objective

1. To develop a comprehensive e-tourism adoption model as a framework for enhancing the SMEs in the tourism industry in Sri Lanka.
2. To examine successful e-tourism adoption models from other countries and assess their applicability to enhance the SMEs in the tourism industry in Sri Lanka.

2. Literature Review

2.1 Small and Medium Enterprises (SMEs)

The term SMTEs is used to denote small and medium tourism enterprises. In every economy, irrespective of the development status Small and medium-sized enterprises (SMEs) play a key role. SMEs' contribution to the economy is multidimensional. (Harvie 2002; Asasen, Asasen, and Chuangcham 2003). In Sri Lanka, small and medium enterprises hold a significant position within the country's economy. They exert a direct influence on the economic development of Sri Lanka, and several factors play a crucial role in categorizing these businesses. These factors include the number of employees, the magnitude of fixed investments, the nature of the business, and the specific business sector. In the Sri Lankan context, the Ministry of Industry and Commerce has established the criteria for defining small and medium Enterprises (SMEs) as per the

micro, small and medium tourism enterprise policy framework. This definition is primarily based on the number of employees and the annual turnover (Ministry of Industry and Commerce, 2016).

Asia-Pacific Economic Cooperation Forum (APEC) found that SMEs are significant players in business-to-business electronic commerce, which accounts for more than 80% of all e-commerce activities.

The majority of research indicates that the government holds a crucial role in enabling the adoption of electronic commerce within the tourism industry. It is recommended that governments collaborate with the private sector to develop a more extensive and coherent policy framework for the implementation of e-commerce in tourism. Moreover, the establishment of evaluation mechanisms is essential to assess the effectiveness of these policies and to recognize what strategies are successful and what are not.

2.2 Nature and Definition of Tourism System and E-tourism

The revolution in Information and communication (ICT) technologies has had a profound effect on the tourism industry. Xu, Buhalis, & Weber (2017). A crucial aspect of this evolution is the role played by tourism management systems, which are instrumental in the strategic planning of tours and the provision of vital information, including weather updates, geographical locations, and upcoming events, to system users. These systems find applicability not only in leisure tourism but also in the context of professional and corporate travel,

where they have been shown to have a substantial impact on the field of e-tourism (Onuiri, et. al, 2016).

Dimitrios Buhalis's analyses on tourism in the context of dynamic interactions between ICTs and the components of the classical tourism system (Buhalis, 2003). According to the study, the e-tourism concept and e-tourism domains are focused on the role of ICTs for strategic and operational management in the various sectors of the tourism industry: airlines, hospitality, tour operators, travel agencies, and destinations.

In e-tourism, "E" indicates the basic and leading cause of the dynamics and fast-accelerating development and a new set of economic outcomes to be performed, including the travel and tourism industry. The travel and tourism industry constantly changing and evolving due to developments in ICTs (Buhalis, 2003; O'Connor & Murphy, 2004; Buhalis & O'Connor, 2005; Law & Jogaratnam, 2005).

E-tourism can be defined as the analysis, development, implementation, and application of IT solutions and e-commerce in the tourism industry; as well as the analysis of relevant economic processes, market structures, and customer relationship management, therefore, accordingly, the need for universal managers able to provide management and management of the tourism business, the integration of information and communication technologies (ICT) within the company, to anticipate and promote the development ICT for better understanding the needs of the tourism business (Tkachenko & Kovalska2017).

These E-tourism systems involve the electronic distribution of tourist information on services and products, applying considerable influence on consumer behavior and the transition to e-tourism. Research has explored factors and determinants, identifying consumers' apprehension and behavior toward e-tourism services (Bajpai & Lee, 2015)

2.3 Theoretical Groundwork of E-tourism Adoption

Various theories have been used to examine the adoption of ICT in SMEs: Researchers seem to investigate the impact of only a limited number of variables (Jeyaraj et al., 2006) that have been empirically tested and validated to have influenced the adoption. Most of the existing frameworks on adoption are related to ICTs or innovation rather than e-commerce or e-tourism adoption. In most developing countries, the Adoption of e-commerce is disturbed by a lack of a proper framework (Lawrence & Tar 2010),

2.3.1 Technology, Organization, and Environment (TOE) model

Tornatzky and Fleischer (1990), developed the TOE framework consisting of three constructs. The technological context, the organizational context, and the environmental context of the firm. Different studies have used the TOE theoretical framework as a foundation to study the adoption of technology (Awa, Ojiabo & Emecheta 2015; Baker 2011; Oliveira & Martins 2011). This is argued to be a unifying framework that provides a holistic and guiding theoretical foundation from ICT adoption research. This model can be

recognized as a classical framework for predicting a firm's intention to adopt an information system (IS).

According to Oliveira and Martins (2011), the TOE framework could be used to understand the determinants that influence the adoption of new technology innovation by an enterprise.
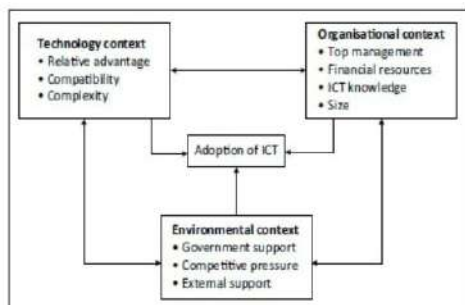
Source: Tornatzky, L.G., Fleischer, M. & Chakrabarti, K., 1990, *Processes of technological innovation*, Lexington Books, Lexington, MA.

Figure 1. Technology, Organization, and Environment (TOE) model

2.3.1.1 Technology Context

According to Awa & Ojiabo. (2016), Technology relates more to perceived behavioral control, that is, users' agility and adoption are shaped by cognate resources needed to exploit the potential of the proposed applications (Awa, Baridam, and Nwibere, 2015). Premkumar (2003) claims that there are very few studies that have examined the impact of technological characteristics on SMEs' adoption of ICT by SMEs. Relative advantage, compatibility, complexity, trialability, and observability are considered to be technological factors that influence the adoption by SMEs.

According to Rogers (2003, p. 229). Relative Advantage is defined as "the degree to which an innovation is perceived as being better than the idea it supersedes." Studies have found that Relative Advantage is positively related to ICT adoption (Grandon and Pearson, 2004; Kuan and Chau, 2001).

Roger (2003, p. 240) explained in one of his research projects the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters (Geczy et al., 2012). Premkumar (2003) found compatibility to be an important determinant of ICT adoption by SMEs. The adoption of new technologies can bring significant changes to the work practices of businesses and resistance to change is a normal organizational reaction (Premkumar and Roberts, 1999).

Complexity is defined as "the degree to which an innovation is perceived as relatively difficult to understand and use" (Rogers, 2003, p. 257). The complexity of a technology creates greater uncertainty for successful implementation and therefore increases the risk in the adoption decision (Premkumar and Roberts, 1999).

2.3.1.2 Organizational Context

Organization factors are anchored directly on the availability and use of internal resources (Wymer and Regan, 2005). This context can be claimed to have a high impact on SMEs' adoption. Factors in the organizational context seem to be the primary focus of many studies in SMEs (Premkumar, 2003). Top management support, ICT experience, and size are considered to be organizational factors that influence EA adoption by SMEs.

Top management support is one of the best predictors of organizational adoption of ICT (Jeyaraj et al., 2006). Top management can stimulate change by communicating and reinforcing values through an articulated vision for the organization (Thong, 1999). Many studies found top management support to be critical for

creating a supportive climate to adopt new technologies (Premkumar and Roberts, 1999; Grover and Goslar, 1993). In SMEs, the decision maker is very likely to be in the top management team and his/her support is vital for the adoption to take place (Awa et al., 2015a, b; Hambrick and Mason, 1984; Thong, 1999; Zhu et al., 2003; Chuang et al., 2009)

The availability of the needed organizational resources is another crucial factor in measuring whether a firm has sufficient ICT sophistication and financial resources (Iacovou et al., 1995; Swatman and Swatman, 1992). economic burden and lack of technical knowledge are identified as two of the most important factors that permit technological growth in small firms (Cragg and King, 1993). ICT sophistication assesses whether a firm is technologically ready, while financial resources express an organization's capital available to invest in ICT (Chwelos et al., 2001).

Size has been identified by Jeyaraj et al. (2006) as one of the best predictors of organizational adoption of ICT. The typical argument is that larger firms have a greater need, resources, skills and experience, and the ability to survive failures than smaller firms (Levenburg et al., 2006; Yap, 1990). Thus, it can be argued that larger SMEs are more likely to adopt to technology.

2.3.1.3 Environment Context

According to Raymond (2001), An organization's propensity to innovate or to engage in strategic and tactical issues is often shaped by the opportunities threats strengths, and threats (SWOT) imposed by its environment.

The factors captured in the framework are government support and competitive advantage.

Further, external support perhaps from government agencies and NGOs was confirmed not just a significant determinant of ICT success (Delone, 1988) but also correlates positively with ICT adoption. Awa et al. (2010, 2015a) propose that most ICT platforms transcend the digitalization of the business domain of individual enterprises.

2.3.2 Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) is considered the most influential and commonly employed theory for describing an individual's acceptance of information systems (Naeini & Krishnam, 2012). TAM assumes that an individual's information systems acceptance is determined by the individual's intention to use a system and will be verified by the perceived usefulness and perceived ease of use of that system. (Figure 2).
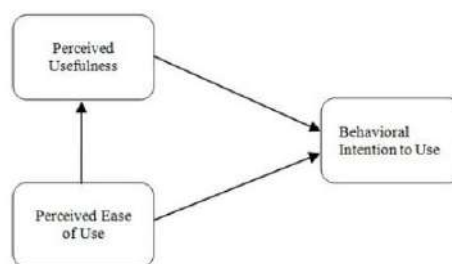
Figure 2. Technology Acceptance Model (TAM)

TAM is a revision of the Theory of Reasoned Action (TRA) around Information Systems (IS). Some limitations such as limited skill, time, environmental or

organizational limits, and unconscious habits will limit the liberty to act. Various studies have been carried out by using the TAM to investigate the usage of IT. Davis et al. (1992) examined the Theory of Reasoned Action (TRA) with TAM to find out the "combination factors of the two models with the purpose of being delivered more complete sight of what will determine the users' acceptance." Information systems use a variety of theoretical perspectives.

2.3.2.1. Perceived ease of use (PEOU)

PEOU is defined as "the degree to which a person believes that using a particular system would be free of effort" (Van der Heijden, 2003, p. 542). Although the perceived usefulness of new technology was originally defined with respect to one's job performance within an organization, the concept now often refers to an individual's subjective assessment of new technology in a specific task-related context (Venkatesh, Thong, & Xu 2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology.

2.3.2.2. Perceived Usefulness and perceived usefulness (PU) in information systems (Taylor & Todd, 1995; Venkatesh & Davis, 2000).

PU is defined as "the degree to which a person believes using a particular system would enhance his or her job performance" (Van der Heijden, 2003, p. 542), while Attitude refers to a person forming favorable or unfavorable feelings toward adopting a certain technology (Kim, Citation2016), which leads to the intention to use a particular technology and determines the adoption of such technology

(Wang, Wu, Lin, Wang, & He, Citation2012). Past studies found that PU and PEOU positively affect users' intention to adopt systems (Chin & Todd, Citation1995).

3. CONCEPTUALIZATION

This study suggests a model for E-Tourism Adoption for SMTEs as a Framework for Sri Lanka's Tourism Industry using mixed methods, i.e., qualitative, and quantitative. Data can be collected through interviews and surveys with representatives of tourism associations and the SMTEs in Sri Lanka. Initial factors are investigated from the existing literature. E-tourism adoption model was developed using the Technology organizational environment (TOE) model and the Technology acceptance model (TAM). These components are used since they have been already extensively tested in previous studies as highlighted in the literature review.

Based on the selected frameworks, the factors are classified into environmental

Organizational and technological factors are internal categories as illustrated in. This theoretical model has been developed for the E tourism adoption in SMTEs to improve service quality. By using perceived usefulness and perceived ease of use as two mediating variables to trigger the intention of e-tourism adoption in SMEs.in SL.

This study has been able to bridge several factors covering social, environmental, and technological aspects with the intention to adopt technology in the fields of tourism and provide a unique way. Figure 2.

3.1 Technology Context and Intention of E-tourism Adaptation in SMTEs

The proposed framework will focus on Relative Advantage, Compatibility, and Complexity aspects of technology. Relative advantage is defined as in which technological innovation is perceived by SMTE as better than existing ones. Studies have found that Relative Advantage is positively related to ICT adoption (Grandon and Pearson, 2004; Kuan and Chau, 2001).

Compatibility can be defined as the level to which an innovation is considered to be consistent with the potential users' existing values, previous experiences, and requirements (Geczy et al., 2012). From the perspective of e-tourism adoption For SMTEs compatibility is an internal organizational issue and is considered relevant for the behavioral pattern of SMTEs, existing values of the host community, and experience.

Complexity is defined as the level of inconvenience and constraints towards understanding and using a system. From the perspective of e-tourism adoption in an organization, this complexity is considered an internal organizational issue, and it is conceptualized and weighed by measuring the extent to which applications are using the technological infrastructure, the time required for performing a task, intelligent decision-making effectiveness, and efficiency (Parveen and Sulaiman, 2008), conceptualized from the above discussion. The alternative hypotheses are formulated

H1: Technological context will impact the Intention of E-tourism Adaptation in SMTEs

3.2 SMTEs Organizational Context and Intention of E-tourism Adaptation in SMTEs

This context can be claimed to have a high impact on SMEs' adoption as anchored directly on the availability and use of internal resources. From the tourism industry perspective factors can be understood as the owner's knowledge and information about e-tourism and its benefits and usage, human skills and other skills to implement, and Resources such as hardware and software, cost for initial and operational required for e-tourism. The role of the owner/top management owner supports the degree of the owner's commitment and encouragement to use. Owner's characteristics Owner's confidence about e-tourism. Based on the above discussion, the following hypotheses are proposed.

H2: SMTEs organizational context will impact the Intention of E-tourism Adaptation in SMTEs

3.3 Environmental Context and Intention of E-tourism Adaptation in SMTEs

An organization's propensity to innovate or to engage in strategic and tactical issues is often shaped by its environment.

Government support to SMTEs such as plans and policies of government relating to technology. Incentives and motivation provided by the government, national status of the country regarding laws relating to e-tourism.; tourism infrastructure development such as the situation of the country regarding technical resources such as the status of the internet and the digital divide; Competitive advantage is defined as the level at which a technological factor seems to provide a better benefit for organizations (Rogers, 2003), acquiring a competitive advantage act as an important factor for the diffusion of innovative technology (Yang et al., 2015). Upon the

above discussion, the following hypotheses are proposed:

H3: Environmental context will impact the Intention of E-tourism Adaptation in SMTEs.

3.4 Technological Context and Perceived Usefulness

Framework will consider on Relative Advantage, Compatibility, and Complexity aspects of technology. Studies have found that the above aspects are significant to ICT adoption. Chatterjee et. al. (2021). As an example, from the perspective of e-tourism adoption in SMTEs, this complexity is considered an internal organizational issue, and it is conceptualized by measuring the extent to which time is required for performing a task, intelligent decision-making effectiveness, and efficiency If the complexity increases organizations will experience problems therefore the usefulness decrease Chatterjee et. al. (2021).

H4: Technological context will impact the Perceived Usefulness

3.5 SMTEs Organizational Context and Perceived Usefulness

Tan et al. (2007) described organizational context as the perception and evaluation of the degree to which the managers believe that their organization has the awareness, resources, and support from the owners and top management to adopt IT. Researchers argue that firms that have effective infrastructure, expertise in their employees, and financial support their usefulness will increase. Therefore, the following hypothesis is proposed:

H4: SMTEs organizational context will impact the Perceived Usefulness.

3.6 Environmental Organizational Context and Perceived Usefulness

According to Van der Heijden (2003), perceived usefulness is defined as the degree to which a person believes using a particular system would enhance his or her job performance. An organization's tendency to innovate is often shaped by its environment (Chatterjee et. al. 2021).

Government support and regulations, tourism infrastructure development, and competitive advantage will have a significant impact on perceived usefulness. For instance, gaining a competitive advantage over other tourism SMEs will impact the employees of that organization, as they feel satisfied as properly trained employees will then perceive the usefulness of this technology Chatterjee et. al. (2021).

H6: Environmental context will impact the Perceived Usefulness.

3.7 Technological Context and Perceived ease of use

As explained in 3.4, This concept is conceptualized through the sense of ease of use. When organizations or employees are struggling with the technology that resonates the ease-of-use decreases. Therefore, the following hypothesis is proposed:

H7: Technological context will impact the perceived ease of use.

3.8 SMTEs Organizational Context and Perceived ease of use

As explained in 3.5, When the awareness, resources, and support from the owners and top management increase, the ease of use also increases.

Therefore, the following hypothesis is proposed:

H8: SMTEs organizational context will impact the perceived ease of use.

3.9 Environmental Context and Perceived ease of use

As explained in 3.6, Gaining government support and regulations, tourism infrastructure development, and competitive advantage encourage organizations to perceive ease of use Chatterjee et. al. (2021).

H9: Environmental context will impact the Perceived ease of use.

3.10 Perceived ease of use and Perceived Usefulness

Perceived ease of use is interpreted as the extent to which a person has a belief that using a new system, or a new technology would be free of effort (Davis, 1989) In this study, TAM has been used to explain the use intention of e-tourism adoption in SMTs. therefore, the following hypotheses are proposed:

H10: Perceived ease of use will impact perceived usefulness.

3.11 Perceived ease of use and E-Tourism Adoption in SMEs

In addition, it has been observed that the intention to use a new system is predicted by the concept of ease of use. These discussions have helped to perceive that the intention to adopt E tourism in SMTEs derived from the ease of using technology. Hence, we formulate the following hypothesis:

H11: Perceived ease will impact the intention of e-tourism adoption in SL.

3.12 Perceived Usefulness (PU) and E- E-Tourism Adoption in SMEs

Perceived usefulness is interpreted as the potential users' subjective possibility that using a system or the application of a system will enhance the job performance of the users within the context of the firm (Lee et al., 2003). In this study, PU includes the concepts of subjective norms, image, job relevance, output quality, and result demonstrability (Venkatesh & Bala, 2008).

H12: Perceived usefulness has a positive impact on the intention of e-tourism adoption in SMEs.in SL

4.   PROPOSED CONCEPTUAL MODEL
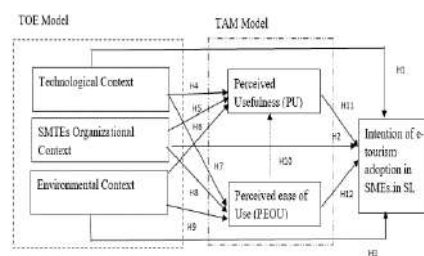
Figure 3. Proposed Conceptual Model

This framework is developed as a model integration using the technology organizational environment (TOE) model and the technology acceptance model (TAM). Based on the selected frameworks,

the factors are classified into environmental, organizational, and technological factors are internal categories as illustrated in.

By using perceived usefulness and perceived ease of use as two mediating variables to trigger the intention of e-tourism adoption in SMEs.in SL.

This study has been able to bridge several factors covering social, environmental, and technological aspects with the intention to adopt technology in the fields of tourism and provide a unique way.

5. CONCLUSION

Information Technology (IT) has had a significant impact on people's everyday lives, transforming how they communicate and connect with others, purchase, and access information. The tourism industry is a booming industry where IT plays a major role. Even with the emergence of technology small and medium tourism enterprises (SMEs) are lagging in adopting technological applications. The repercussions of this will negatively impact on the tourism sector. If these enterprises fail to adapt to this technological revolution. The study focuses on developing an e-tourism adaptation model using a model integration. E-tourism adoption model was developed using the Technology organizational environment (TOE) model and the Technology acceptance model (TAM). The research is expected to support tourism stakeholders allowing them to explicitly develop e-tourism initiatives- to improve service quality.

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A Conceptual Essay on the Determinants of Healthcare Provider Choice Among Outpatients in Sri Lanka

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ABSTRACT

With the increase in non-communicable diseases and healthcare needs of the rapidly aging population in Sri Lanka, healthcare providers are an essential part of people's daily lives. The choice of healthcare providers varies amongst Sri Lankans, specifically when seeking outpatient treatments. The aim of the current study is to shed light on factors that lead people to choose one out of the two main out-patient healthcare providers in Sri Lanka: public and private. The current concept paper is built upon the theory of consumptions values to discern what leads people to make the choice that they make between private and public out-patient care. The prospective outcomes of this investigation hold the capacity to exert a substantial influence on both scholarly discourse and practical initiatives. They stand poised to offer invaluable direction to policymakers and institutions in their endeavors to device measures to attract and retain out-patients.

Keywords **- choice behavior, consumption values, healthcare provider**

1. INTRODUCTION

The outstanding performance of Sri Lanka in healthcare has persisted for an extended timeframe. The maternal mortality ratio is 29 to 100,000 live births (World Health Organization, 2020) compared to 223 globally, while infant mortality is recorded at 6 per 1000 live births compared to a global statistic of 28 per 1000 live (World Bank, 2023b). Though Sri Lanka continues to report impressive health indicator statistics (Kumar, 2019) specifically compared to other countries in the South Asian region, with its public-financed healthcare system (Smith, 2018), half the national healthcare expenditure is accounted for by the private sector (Kumar, 2019) which is out-of-pocket expenditure.

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This shows the ineptitude of the state sector to meet the ever-increasing demand for healthcare in Sri Lanka, even though the public healthcare expenditure is also on the increase (World Bank, 2023a).

The private sector continues to thrive due to the tremendous demand for treatments for NCDs (Non-communicable diseases) and the needs of the repidly aging population, which will continue in the forseable future (Perera et al., 2019). This is further established by the ever-increasing out-of-pocket expenditure on healthcare as depicted in Figure 1.
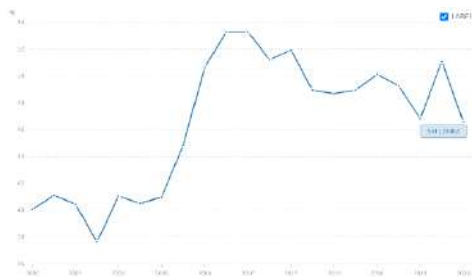
Figure 1. Out-of-pocket healthcare expenditure in Sri Lanka (2000-2021)

Note: The graph shows the increasing trend in out-of-pocket healthcare expenditure in Sri Lanka. World Bank Data Bank, 2023. Copyright 2023 by The World Bank Group.

The extant body of literature has demonstrated that healthcare expenses borne directly by individuals can engender a substantial fiscal burden on households, thereby leading to occurrences of catastrophic healthcare expenditures and subsequent medical impoverishment (Pandey et al., 2018; Sirag & Nor, 2021). Hence, there arises a problem why Sri Lankans would opt for private healthcare services, when a comprhensive public healthcare system is available free of cost.

In light of the foregoing context, the principal aim of this research endeavor is to conceptually explore what determines the Sri Lankans' choice of healthcare providers for out-patient care, based upon the theory of consumption values.

2. LITERATURE REVIEW

Patients seeking out-patient healthcare in Sri Lanka have two main choices as discussed: public or private. Diverse patients opt for varying choices under distinct circumstances. As Vitoor et al. (2012) identify, research on the domain should focus on identifying characteristics people base their decisions on in real choice situations rather than in an experimental context. The choice in the current context is deemed to be shaped by a multifaceted interplay involving a plethora of both patient and provider characteristics (Victoor et al., 2012).

The theory of consumption values is anticipated to furnish a sufficient explanation regarding the determinants influencing Sri Lankans in their preference for one healthcare provider over another. This is due to the facts that it clarifies the factors behind consumers' decisions to either purchase or abstain from purchasing (or employ or abstain from employing) a particular product, why consumers select one product category over another, and why consumers opt for one brand over another, and is applicable to choices encompassing a comprehensive spectrum of product types including services (Sheth et al., 1991).

The theory of consumption values is underpinned by three fundamental axiomatic propositions: (1) consumer choices are contingent upon a composite of

various consumption values, (2) these consumption values exert distinct influences in diverse choice scenarios, and (3) these consumption values operate independently (Sheth et al., 1991). This theoretical framework has been extensively applied and rigorously examined in over 200 empirical studies, consistently showcasing robust predictive validity (Sheth et al., 1991). The theory explains that a consumer's choice behaviour is affected by any or all of five consumption values: functional, social, emotional, epistemic and conditional. Functional value is the perceived benefit obtained from an alternative's ability to deliver "functional, utilitarian, or physical performance" (pp. 160). Conditional value is the perceived value gained from an alternative's affiliation with one or more distinct social groups. The perceived value obtained from an alternative's ability to evoke emotions or affective states is encapsulated in emotional value. Epistemic value refers to the perceived value gained from an alternative's ability to pique curiosity, offer novelty, and/or fulfill a thirst for knowledge. The perceived value gained by an alternative due to the particular situation or circumstances encountered by the decision-maker is captured in Conditional value.

2.1 Functional value

The functional value of an alternative can be ascribed to its inherent characteristics or attributes (Ferber, 1973), including factors such as reliability, durability, and pricing (Sheth et al., 1991). Price/cost is a common factor studied in extant literature on choice of healthcare providers, where certain studies find lower costs to be more

appealing (Jia et al., 2020; Schleifer et al., 2015; Vuong & Nguyen, 2015), while others found that respondents associate higher costs with higher quality (Hibbard et al., 2012). Reliability/credibility of healthcare professionals also is an important factor that is encompassed in functional value, and affects healthcare provider choice (Vuong & Nguyen, 2015). Hence, it is proposed that:

H1: Functional value has an impact on healthcare provider choice for out-patient treatment.

2.2 Social value

The social value of an alternative is established through its alignment with demographic, socioeconomic, and cultural-ethnic groups that may carry either positive or negative stereotypes (Sheth et al., 1991). In healthcare provider choice, one may be influenced by their family and friends (Freed et al., 2010) and follow their instructions or stick to the stereotypes developed by them, though this may not always be the case (Kozikowski et al., 2022). Hence, it is proposed that:

H2: Social value has an impact on healthcare provider choice for out-patient treatment.

2.3 Emotional value

Emotional value is conferred upon an alternative when it becomes linked with particular emotions or when it triggers and sustains those emotions (Sheth et al., 1991). Though not much explored empirically to the researcher's knowledge, one may have an emotional attachment to/detachment from a certain healthcare provider that

might significantly affect the choice of healthcare provider (Kemp et al., 2014). Hence, it is proposed that:

H3: Emotional value has an impact on healthcare provider choice for out-patient treatment.

2.4 Epistemic value

Epistemic value is attained by alternative options through the inclusion of items related to curiosity, novelty, and knowledge (Sheth et al., 1991). As an example, the available information/knowledge acquired on different healthcare providers is reported to have a significant impact on healthcare provider choice (Vuong & Nguyen, 2015). Novelty of available technology at healthcare provider facilities also affect the choice (Murphy, n.d.). Hence, it is proposed that:

H4: Epistemic value has an impact on healthcare provider choice for out-patient treatment.

2.5 Conditional value

Conditional value is attributed to an alternative when antecedent physical or social contingencies are in place, augmenting its functional or social worth (Sheth et al., 1991). This means that the consumer choice would often depend on situational factors (Sheth et al., 1991). Seeking out-patient treatment also often depends on the context of a situation a person is facing (Fischer et al., 2015): Clinical (Chandra et al., 2011)or otherwise. Hence, it is proposed that:

H5: Conditional value has an impact on healthcare provider choice for out-patient treatment.

In summary, the theory of consumption values provides a robust understanding of the complicated relationships between the different values and choice made by consumers on healthcare service providers. The current study builds upon the theory and explores a novel dimension in consumer choice in healthcare sector, which has not been analysed in the cosumption values stand point to the researcher's knowledge.

3. METHODOLOGY

This research endeavor aims to explore the nuanced interplay between influential factors on healthcare provider choice for out-patient care. Through the adoption of a rigorous research philosophy, the utilization of a well-structured conceptual framework, and the application of robust data analysis techniques, the study aspires to uncover significant insights within this emerging realm of inquiry.

3.1 Research philosophy

The current study would follow a quantitative research epistemology which constitutes a structured and empirical methodological approach to the investigation of the concerned phenomena through the systematic collection and analysis of numerical data. This epistemological framework places significant emphasis on the utilization of rigorously designed research methodologies, standardized measurement tools, and statistical procedures to quantify and elucidate relationships, patterns, and

trends within a designated research domain. It is grounded in the conviction that the inherently objective and quantifiable nature of numerical data can provide substantive insights and contribute to the formulation of empirically substantiated conclusions. Such an approach aligns with a positivist or post-positivist epistemological standpoint, prioritizing the values of objectivity, replicability, and generalizability. Extant literature has also based on quantitative approach ((Amaghionyeodiwe, 2008; Fischer et al., 2015; Gotsadze et al., 2017; Kozikowski et al., 2022; Zhu et al., 2019). The selected method is deemed as the most suitable as the intention is to identify the determinants of healthcare choice and to test their statistical significance in the decisions made, along with the aim of generalizing the findings to the population at large.

3.2 Conceptual framework

The research will be grounded in the theoretical framework of the theory of consumption values, which will serve as the foundational conceptual framework for understanding what determines the Sri Lankan outpatients' choice of healthcare providers. This would guide the selection and use of validated scales of measurement for each variable of interest such as the one adopted by Lin and Huang (2012). Figure 2 illustrates the conceptual framework of the current study.

It is expected that functional value, social value, emotional value, conditional value, and epistemic value would have statistically significant impacts on the consumer choice of out-patient healthcare provider, in line with the theory of consumption values.

Hypotheses 1 to 5 are as discussed under the previous section.

3.3 Population, sample and sampling technique
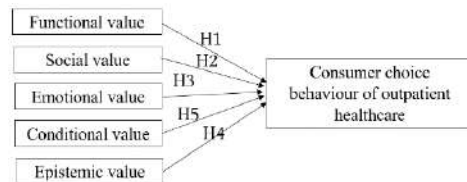
Figure 2. Conceptual framework
Note: Developed by author based on the theory of consumption values

The study's target population comprises individuals actively seeking outpatient care, as similar to extant literature (Freed et al., 2010; Kozikowski et al., 2022; Vuong & Nguyen, 2015). Employing a purposive sampling approach, a heterogeneous sample will be deliberately selected from various demographic backgrounds to ensure the inclusion of a representative cross-section of outpatient care utilizers. Purposive sampling technique is emplyed because it is a non-probabilistic sampling technique, which allows the researcher purposefully choose particular individuals, groups, or cases to include in the study in order to address research objectives and gain a deeper understanding of a particular phenomenon (Patton, 1990).

Data will be collected through way of structured surveys thereby allowing a quantitative analysis of choice determinants (see Zhu et al., 2019). The proposed sample size is 384 based on the Morgan table (Krejcie & Morgan, 1970), since the population of the study is expected to exceed 100,000 individuals, as every

individual in the country may have to seek out-patient care each year.

3.4 Data analysis methods

The quantitative data collected through structured questionnaires will undergo analysis using Structural Equation Modeling (SEM) with the aid of SmartPLS software. Structural Equation Modeling (SEM) is a valuable tool for elucidating latent relationships and assessing hypotheses concerning causal pathways (Hair et al., 2013, 2014). The formulated hypothesis will be thus tested on their acceptability as been done in previous similar studies (Kemp et al., 2014).

4. EXPECTED OUTCOMES AND IMPLICATIONS

The current study anticipates to uncover the impact of different consumption values on the outpatients' choice of healthcare providers. It is expected that the thoery of consumtion values would be ideal in understanding the choice behaviour of Sri Lankans regarding the outpatient healthcare. Though it is not expected that each consumption value would definitely and equally be determinant of such choice, the researcher expects that each value would be proven significant in different circumstances.

4.1 Theoretical implications

The current paper suggests that the thoery of consuption values be tested in the healthcare industry, where it has not been put into test previously in the researcher's knowledge. The importance of testing an existing theory in such a new context is copious.

At the outset, determining the degree to which a theory's principles, constructs, and relationships are valid outside of its original context is facilitated by testing the theory in a different setting. This improves one's comprehension of the robustness and applicability of the theory (see Gupta & Govindarajan, 2000; Hofstede, 1984). As the current paper suggests its application to the healthcare industry, it being a volatile context would provide such rich understandings.

Testing in a different setting may also highlight subtleties or improvements to the theory, improving its precision and accuracy in describing specific aspects of the phenomenon. For instance, the applicability of the some determinants highlighted in the theory of consumption values may be found more important than others, and may need refinement when tested in similar contexts. The current study suggests testing of all determinants of consumer choice in the healthcare context, which may assist in proving the contextual applicability of its separate determinants.

4.2 Practical implications

In the realm of healthcare, informed decision-making plays a pivotal role, engendering a cascade of consequential outcomes. An understanding of how each value may enhance or impede an individual's choice in out-patient healthcare provider may facilitate the provision of accurate information from the suppliers' side. When individuals are endowed with access to a compendium of information regarding diverse healthcare providers, encompassing facets such as the quality of care dispensed, the array of services

proffered, and the experiential feedback from patients, a corollary effect ensues: the augmentation of their capacity to make judicious choices pertaining to their healthcare. This, in turn, begets a nexus of salient benefits, chief among them being the enhancement of healthcare outcomes and an enhanced level of contentment with the care received.

Furthermore, the understanding of the reasons for consumer preference would enhance the improvement of service quality provided by the public as well as the private healthcare institutions. The incentive structure for healthcare providers is reconfigured in a setting where consumers are endowed with choices. In such an environment, both private and public healthcare providers are impelled to engage in a competitive struggle to entice and retain patients. This competitive crucible stimulates providers to augment the quality of healthcare services, make strategic investments in advanced technologies, and proffer innovative treatment modalities.

Further more, on the consumers's side, an understanding of the factirs affecting their provider choice, and the fiscal disparities between healthcare providers empowers individuals to make choices that align seamlessly with their monetary constraints and insurance coverage. This dexterity in fiscal discernment, underpinned by knowledge, not only serves as a potential source of monetary savings for patients but also holds the potential to mitigate the aggregate cost of healthcare on a broader scale.

Moreover, the proliferation of consumer choice engenders heightened accountability within the healthcare scene. As consumers gain autonomy in their selection of healthcare providers, the latter find themselves subject to greater scrutiny. Negative appraisals or adverse feedback from patients can profoundly impact the standing and reputation of healthcare providers, thereby incentivizing them to uphold rigorous standards of care.

Furthermore, the dissemination of information concerning healthcare providers imbues patients with the empowerment to embark on a healthcare journey that resonates harmoniously with their preferences and values. This empowerment lays the foundation for a more patient-centric paradigm in healthcare, with providers adapting their services to comport with individual idiosyncrasies and requirements.

When individuals perceive themselves as being vested with choices and endowed with the capacity to make decisions concerning their healthcare, the resulting effect is an augmented level of confidence reposed in the healthcare system as a whole. This bedrock of trust constitutes a cornerstone in nurturing fruitful patient-provider relationships and fostering overarching satisfaction with the healthcare ecosystem.

5. CONCLUSION

In conclusion, the current study expects to explain the choice of outpatient healthcare providers through the theory of consumtion values, which has not bysofar been adopted in the healthcare realm. Its theoretical implications are that testing the established theiry in a context which is defferent from the original improves its generalizeability

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and accuracy, and applicability. Practically, the findings aim to assist private and public healthcare providers improve the quality, and any other aspects as proved important to consumers. Moreover, consumers benefit by gaining a thorough understanding of what factors they need to take in to account when seeking outpatient care.

The study hence suggests that future research be conducted in the consumer choice determinants of outpatient healthcare in light of the theory of consumption values, to gain deeper insights to individual's behavioural choices.

However, it is imperative to acknowledge that the influence exerted by knowledge on consumer choice of healthcare providers is subject to variegation contingent upon an assortment of factors, such as geographical location, insurance coverage, and socioeconomic strata.

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Accounting Information Systems Adoption: Understanding the Factors Driving the Employee Perceptions

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ABSTRACT

Effective utilization of Accounting Information Systems (AIS) would ensure the organization's survival in today's fast-driven digital platform. The awareness of employee perception towards AIS usage would crucially impact safeguarding the organizational stake's expectations. Hence the study aims to identify and analyze the prominent factors behind the employee perception of AIS within the business context. Accordingly, the user's level of accounting knowledge, level of computer and information technology skills, and experience level of using accounting information systems have been tested in this study. It is intended to investigate the nature and gravity of the association between each of these variables against the employee perception towards AIS.

The study follows an experimental approach that pertains to analyzing cross-sectional primary data gathered from 161 employees from distinct organizations. The findings of the research demonstrate the significant applicability of user technology skills and user experience on the employee perception of AIS whereas it withdraws the significance of user accounting knowledge towards the dependent variable. Further, the study illustrates how the dynamics of internal resources can extend an impact on the success of AIS while enabling businesses to enhance and optimize the AIS implementation resulting in improved financial reporting and management.

Keywords - Accounting Information Systems, User accounting knowledge, User experience

1. INTRODUCTION

In an era defined by the persistent advancement of technology and the seamless integration of digital techniques into every aspect of business operation, the role of Accounting Information Systems (AIS) stands as a beacon of transformation. AIS would not just extend a platform to integrate business tasks, it will be crucial for organizational excellence and improved decision-making. Empirical evidence suggests that distinct factors would decide the effectiveness of AIS such as incentives,

employee's level of education, experience, and skills (Ernawatiningsih & Kepramareni, 2019).

Despite the potential advantages, managers often encounter challenges in ensuring continuous engagement in AIS as it is vital to understand the factors behind the employee perception of AIS and shape them in a way to maximize the effectiveness of these systems. The emergence of AIS not only transforms the way businesses manage their financial affairs but also introduces a dynamic interplay of factors that shape employees' perceptions of these systems (Dobroszek et.al, 2019). Consequently, to maximize the efficacy and capitalize on its transformative potential, it is imperative to unravel the intricacies of these factors and devise strategies that foster positive employee perceptions and active utilization of these systems.

The accomplishment of the key objectives behind the implementation of AIS would rely on the impact driven by numerous factors. Therefore, the research seeks to explore the dynamic relationships between some key factors and employee perceptions of organizational AIS usage. Thus, the researcher intends to investigate the significance of User accounting knowledge, User technology-related skills, and user experience with AIS towards the way employees perceive and interact with AIS.

Employee perception of Accounting Information Systems (AIS) refers to the employees' subjective beliefs, attitudes, opinions, and impressions about the nature, utility, ease of use, and overall impact of AIS on their work tasks, and decision-

making processes within an organizational context. In accordance with the previous work, employee perception of AIS involves various dimensions that influence their acceptance and utilization of these systems. Hence literature suggests that employees' attitudes towards AIS are shaped by factors such as perceived usefulness, perceived ease of use, relevance to their job responsibilities, management communication, and overall fit with their workflow (Khairi & Baridwan, 2015).

User knowledge in accounting refers to the level of understanding, familiarity, and expertise that employees possess with regard to the functionalities, processes, and principles of the accounting domain. This knowledge plays a crucial role in how effectively users interact with AIS in their professional roles and how well they are able to leverage the system's capabilities for accurate financial reporting, data analysis, and decision-making (Haleem & Teng, 2018; Ernawatiningsih & Kepramareni, 2019).

In the context of Accounting Information Systems (AIS), user technology skills refer to ones' competency and capacities in employing technological tools and software to effectively administer, and exploit AIS for accounting and financial duties (Haleem & Teng, 2018). These abilities include the technical knowledge, capabilities, and practical abilities required to navigate, manipulate, and make educated decisions utilizing AIS.

User experience plays a critical role in the successful adoption and utilization of AIS. It refers to the overall quality of interactions, perceptions, and satisfaction

that individuals perceive while using these systems (Mashapa & Greunen, 2010). It holds a holistic view of how users engage with AIS, encompassing aspects such as ease of use, efficiency, effectiveness, accessibility, and emotional satisfaction.

This study can uncover elements that impact employee perception of accounting information systems usage. Employee productivity can be enhanced by detecting these drivers and their impact on employees. Employee efficiency may also be increased, and if it is poor, the essential measures to develop it can be implemented.

Simultaneously, findings from this study can be utilized in notifying the strengths and weaknesses of the employees. It is also critical to design accounting information systems that are user-friendly for employees and to gather ideas for creating systems that they wish to use and understand.

One notable limitation of this study pertains to the diverse sample of employees drawn from various organizations. Data collection was conducted without specific consideration for the inherent cultural, structural, and contextual distinctions among these organizations. While the study aimed to examine the broader relationships between user accounting knowledge, IT skills, user experience, and employee perceptions of Accounting Information Systems (AIS), it did not fully account for the potential influence of organizational factors on these perceptions

2. LITERATURE REVIEW

Accounting information systems (AIS) can be considered to be the backbone of effective financial management in today's dynamic corporate world, assisting firms in making informed decisions and maintaining regulatory compliance. These digital systems have advanced dramatically, incorporating sophisticated features and revolutionizing the way financial data is processed, analyzed, and reported. As businesses attempt to improve their operations, one crucial factor that frequently determines the success of AIS adoption extends beyond the technology itself — it is in the effort and perception of the individuals who engage with these systems.

This review intends to deconstruct the elements that influence employee perceptions of AIS by drawing insights on recognized theoretical frameworks such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT). TAM which was originally developed by Davis (1989) is a theoretical explanation on the basis for learning and understanding user behavior in obtaining and using information systems. The TAM concept's expansion is supposed to help predict one's attitudes and adoption of technology, as well as provide fundamental information about the factors that determine the individual's attitude. Nevertheless, the UTAUT model has been recognized as one of the most highly-cited Information technology (IT) adoption models which elaborates how IT is adopted by end-users while incorporating additional factors to TAM for better explanation (Alamin et al., 2015).

Rapina et al. (2020) seek to investigate the impact of personality traits and organizational structure on AIS whereas it

has been proven the existence of a significant impact of organization structure yet no effect from personality traits on AIS. Furthermore, as a result of an attempt to explore the critical factors for ensuring AIS adoption by accountants, Wongsim (2016) found top management support, user training and education, and steering committees affect substantially in successful AIS adoption and related AIS performance. Apparently, it is also figured out that effort expectancy, perceived technology fit, facilitating conditions, self-efficacy, and coercive pressure play persuasive roles in the AIS adoption by accountants (Alamin et al., 2015).

According to Gupta and Kohli (2006), competency describes successful performance. Furthermore, user competency is derived through user knowledge and skills which enable the user in reaching to successful ending in the task (Boockholdt, 1999). Hence user competence is regarded to be of prime importance in describing the employee perception of information systems (IS). User skills have been categorized into technical skills, human skills, and conceptual skills in IS applications (Nour & Mouakket, 2014). User knowledge can be further deconstructed into user know-how in accounting and user experience (Komala, 2012). However, Haleem and Kevin (2018) support the significant impact of both User skills and user knowledge on AIS success. Furthermore, a positive impact has been revealed between accounting knowledge and the effectiveness of accounting information systems (Utomo, 2019). A comparative study done on the perception of accounting and non-accounting students

suggests the successful delivery of AIS reinforces positive perceptions of accounting students whereas it enhances the interest of non-accounting students (Petros et al., 2017).

Having identified the explorations by (Sutantyo, 2017) which relies on the insignificance of task technology fit on the employee performance in using AIS it is encountered that the literature unties mixed signals on user tech skills – employee perception on AIS usage.

2.1 Conceptual Model

Researcher has developed the conceptual model for the study based on the findings of prior research studies consisting of three main variables as user tech skills, experience and knowledge. These variables were validated through empirical study to investigate the future direction of the research. The conceptual model is shown in Figure 1.
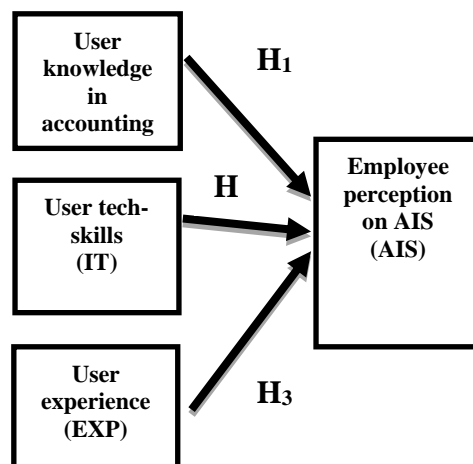
Figure 1. Conceptual model

2.2 Research Hypothesis

H1: User accounting knowledge significantly influences the employee perception of AIS.

H2: User tech-skills have a significant relationship with employee perception of AIS.

H3: User experience has a significant relationship on employee perception of AIS.

3. RESEARCH DESIGN

This study employs a cross-sectional research design to investigate the factors affecting employee perception of accounting information systems (AIS). The study's target population consists of employees from various organizations across different industries who regularly interact with AIS. A non-probability convenience sampling technique has been utilized to select participants due to its practicality and ease of access to potential respondents. A structured questionnaire was developed based on the insights taken from the technology acceptance model and prior research (Komala, 2012; Ismail, 2009; Tamoradi, 2014). A five-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree) was used in this study. 161 responses have been considered for the study and this sample size is considered adequate for cross-sectional studies and has provided a sufficient dataset for analysis and generalizability within the scope of the study. Thus, the cross-sectional design confines the establishment of causal relationships between constructs. Additionally, the convenience sampling technique may introduce a potential for selection bias, impacting the generalizability of the findings to a broader population.

4. ANALYSIS AND DISCUSSION

Statistical Packages for Social Sciences (SPSS) has been used for the analysis in this study. Descriptive analysis, Reliability and Validity, Multiple Linear Regression, and Correlation tests have been conducted and the findings are discussed in this chapter.

4.1 Descriptive Analysis

Descriptive analysis for 161 respondents who are employed in different jobs both in the private and government sectors and have been assessed in this study against their knowledge, experience and technical skills with the perception on Accounting Information Systems (refer to Table 1).

Accordingly, over 50% of respondents are representing the female category. The highest proportion of the sample graduated with a bachelor's degree (37%) and 70% of the respondents are engaged in private-sector jobs whereas 52% represent the finance sector.

4.2 Reliability and Validity

4.2.1 Testing the reliability of the scale

As we frequently use the term "reliability" in the vocabulary to denote honesty, consistency, and stability in the context of research reliability signifies the same attributes relating to the research data. The reliability analysis, it shows that the Know, IT, Exp, and AIS are all reliable with the initial observed variables. (Cronbach's Alpha coefficients are greater than 0.7)

Table 2. Reliability Analysis Findings

Variable	Cronbach's Alpha	No. of items
Know	0.795	05
IT	0.764	05
Exp	0.861	03
AIS	0.928	07

4.2.2 Testing the validity of the scale

Obtaining high validity stresses that research could provide results that correspond to actual properties, variations, and characteristics in reality. The researcher has incorporated Kaizer-Mayer-Olkin (KMO) and Bartlett's Test (has to be greater than 0.5) and Total variance to test the validity.

4.3 Correlation Analysis

Results from the correlation test indicate that multicollinearity does not exist among the independent variables as the highest correlation coefficient among independent variables (0.445) is in between KNOW & EXP signifies a weak relationship. (refer to Table 4)

Table 3. Validity Test Findings

Variable	KMO and Bartlett's value	Sig. value	Total Variance
Know	0.746	0.001	0.5498
IT	0.760	0.001	0.5205
Exp	0.732	0.001	0.7819
AIS	0.885	0.001	0.7039

Table 1. Descriptive Analysis Findings

Variable	N	%
Gender		
Male	85	52.80%
Female	76	47.20%
Age		
16-25	69	42.86%
26-35	56	34.78%
36-45	25	15.53%
over 46	11	6.83%
Education Level		
GCE Advanced Level	13	8.07%
Diploma	25	15.53%
Undergraduate	44	27.33%
Graduate	60	37.27%
Postgraduate	19	11.80%
Working Organization		
Government Sector	47	29.20%
Private Sector	114	70.80%
Working Department		
Administration	22	13.66%
Customer Service	1	0.62%
Finance	85	52.80%
HR	22	13.66%
IT	4	2.48%
Logistics & Supply Chain	19	11.80%
Sales & Marketing	5	3.11%
Technical	2	1.24%
Other	1	0.62%

Table 4. Correlation Analysis Findings

		Know	IT	Exp	AIS
Know	Pearson Correlation	1	0.290**	0.445**	0.409**
	Sig. (2-tailed)		0.001	0.001	0.001
IT	Pearson Correlation		1	0.274**	0.329**
	Sig. (2-tailed)			0.001	0.001
Exp	Pearson Correlation			1	0.768**
	Sig. (2-tailed)				0.001
AIS	Pearson Correlation				1
	Sig. (2-tailed)				

**. Correlation is significant at the 0.01 level (2-tailed)
*. Correlation is significant at the 0.05 level (2-tailed)

4.4 Residual Analysis

The researcher intended to analyze the residuals to ensure they meet the assumptions of linear regression. Hence Normality, Homoscedasticity, and Independence of residual tests have been conducted.As per the graphical illustration, the scatters are distributed in a manner that shows there is no significant indication of the heteroscedasticity problem in the regression model. This suggests that the assumption of constant variance of errors is likely met, and the linear regression model is valid for the dataset.
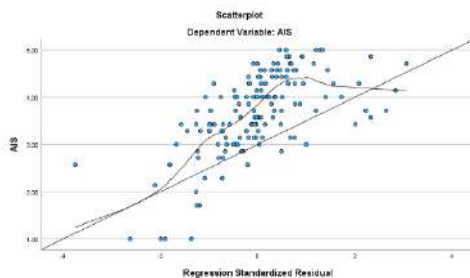
Figure 2. Homoscedasticity Test - Scatter Plot

4.5 Anova Test

ANOVA test has been conducted to examine the model adequacy in predicting the dependent variable.

Table 5. R-squared result

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.779	0.607	0.600	0.5284

Table 6. ANOVA test results

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	67.813	3	22.604	80.954	<0.001
Residual	43.839	157	0.279		
Total	111.652	160			

Based on the findings, the model appears to be robust, achieving an R2 of 0.607, which translates to explaining 60.7% of the total variability in AIS through the model.

The F-statistic for the model is 80.954, and the associated significance level is 0.001. This indicates that there is strong evidence to suggest that at least one of the independent variables in the regression model has a statistically significant impact on the dependent variable. In other words, model is likely a good fit for the data, and the relationship between the predictors and the dependent variable is not purely due to chance. The low significance level (0.001) typically means that the model's overall explanatory power is statistically significant.

4.6 Multiple Regression Analysis

In statistical analysis, multiple regression is emerging as a powerful and versatile tool for exploring complex relationships between various predictor variables and dependent variables. The researcher intended to investigate the association between the predictors (KNOW, IT, EXP) and predicted variable (AIS) via the multiple regression analysis.

Table 7. Multiple regression coefficients

Variable	Regression Coefficient	t	Sig.
Constant	0.721	2.331	0.021
KNOW	0.059	1.045	0.298
IT	0.118	2.218	0.028
EXP	0.709	12.514	0.001

According to the statistics shown in figure 3 it is clear that all three predictors (KNOW, IT, EXP) are extending a positive effect on AIS while two of them (IT & EXP) are having a significant impact on the Employee Perception on AIS.
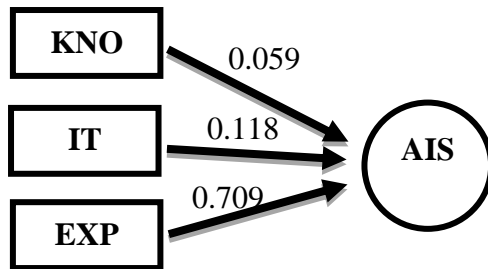
Figure 3. Regression Coefficients

Hypothesis Test

Hypothesis 1: User knowledge significantly influences on employee perception on AIS was not accepted.

Hypothesis 2: User tech-skills have a significant relationship with employee perception on AIS was accepted with 0.028

< 0.05 significance level. Accordingly, it is validated that the user tech skills are showing a significant positive association with employee perception on AIS.

Hypothesis 3: User experience has a significant relationship with employee perception on AIS was accepted with 0.001 < 0.05 significance level while demonstrating a positive significant relationship between EXP and perception on AIS.

4.7 Discussion

In this study, we sought to examine the impact of user knowledge, user tech-skills, and user experience on the perception on accounting information systems using 161 sample of employees who are engaged in different job roles. Several major conclusions have emerged from a thorough study of the data obtained, revealing insight into the link between these variables.

Firstly, the findings have suggested a statistically insignificant relationship between user knowledge and employee perception of accounting information systems which also aligns with Arif & Setyobakti, (2020) research findings yet revealing contradictory arguments (Nasrizal, 2015; Carolina, 2017; Christina, 2013). This unanticipated finding implies that knowledge and understanding of standard accounting principles and practices may not always translate into a more favorable impression of AIS. This conclusion refuses conventional accounting insight and emphasizes the importance of firms considering criteria other than accounting knowledge when evaluating the efficacy of their AIS. Thus, this argument

raises doubts on the role of understanding and training in accounting topics would make any impact on one's proficiency in AIS. So there is a critical concern about the necessity of accounting education and training for AIS users. Hence further investigations should be made to analyze whether there is an impact from specific dimensions of accounting knowledge such as cost accounting, auditing, tax, forensic, and etc. on AIS perceptions.

Findings propose significant relationships between user tech-skills and experience towards the perception of AIS. Accordingly, these findings imply that employees with higher tech-skills and more extensive experience may make more informed decisions using AIS-generated information (Lingga, 2020), potentially enhancing the organization's decision-making processes. Hence organizations could invest more in training and development aimed at enhancing the tech-skills of employees who use AIS regularly which would ultimately result in increased efficiency and effectiveness in utilizing the system. This result holds implications for organizations in terms of the strategic investment in technology-related education and the promotion of a tech-savvy workforce.

Further to that, the user experience may tend to develop a deeper understanding, increased comfort, and a more favorable view of AIS functionality and utility within their organizational context (Choe, 1996). This is also complying with the findings of the study; the more employees interact with AIS and gain experience, the more likely they are to develop a deeper understanding

of its capabilities and limitations. Furthermore, this relationship highlights the potential for user experience to positively impact not only employee satisfaction but also organizational efficiency and effectiveness in leveraging AIS for financial and managerial purposes. It is also suggested to consider the user's prior experience when hiring new employees as it has been shown a positive association with the perception of AIS.

5. CONCLUSION

In this inclusive study of the factors influencing employee perceptions of Accounting Information Systems (AIS), it has shed light on the pivotal roles that user tech-skills and user experience play in shaping these perceptions. The findings of this study have not only confirmed the significance of these variables but have also offered valuable insights into their practical implications within organizational contexts.

The findings show that individuals with higher levels of technical skills have a more positive attitude toward AIS, which is likely owing to their improved ability to take advantage of the system's potential. Similarly, extensive AIS user experience was found to be associated with more positive perceptions, as people having a history of involvement and familiarity with the system tend to have a better comprehension and comfort level.

Future research should focus on the hidden features of tech-skills and user experience, taking into account the moderating impacts of organizational contexts and the developing nature of AIS technology.

In summary, the findings of this research provide organizations with realistic insights to enhance the acceptance and effectiveness of AIS among their employees. By investing in tech-skill development and promoting user experience, organizations can unlock the full potential of these systems, ultimately contributing to improved decision-making processes and increased competitiveness in today's dynamic business environment.

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Concept Paper: Exploring the Key Factors Influencing Socially Responsible Investment Intentions and the Moderating Role of Perceived Financial Performance

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ABSTRACT

In the ever-changing world of investment, there has been a significant shift from solely focusing on financial returns to adopting a more comprehensive approach that considers the social and environmental consequences of investments. This shift is evident in the increasing popularity of Socially Responsible Investment (SRI) strategies, which seamlessly combine financial goals with ethical and sustainable objectives. As global challenges such as climate change and social equity become increasingly urgent, it is crucial to understand the factors that influence individuals' intentions to engage in SRI. This concept paper aims to explore these factors by utilizing the Value-Belief-Norm (VBN) Theory, which explains the relationship between personal values, beliefs, social norms, and pro-environmental actions, including SRI. Additionally, this concept paper introduces the concept of perceived financial objectives with the expectations of the wider community. The objective of this concept paper is to provide a deeper understanding of how personal values, beliefs, and norms, when considered alongside perceived

financial performance as a potential moderator in this relationship. Given the significant growth of global SRI assets, reaching a notable $35.3 trillion, it is evident that investors are aligning their ce, shape individuals' intentions to engage in SRI. The anticipated findings of this study have the potential to contribute to scholarly insights and inform the decision-making processes of investors and policymakers in responsible investing.

Keywords - Socially Responsible Investments (SRIs), Value-Belief-Norm (VBN) Theory, Values, Beliefs, Norms, Perceived Financial Performance.

1. INTRODUCTION

As the investment landscape undergoes constant transformation, there has been a growing recognition that the impact of

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investments extends beyond financial gains, encompassing their broader implications for society and the environment. This shift is exemplified by the increase in SRI strategies, where financial goals are linked to ethical and sustainable goals (Wieland, 2016). Given the complex challenges the global community faces, such as climate change, social equity, and corporate responsibility, understanding the factors that shape individuals' intentions towards SRI has become increasingly important (Jansson & Biel, 2020).

This concept paper aims to shed light on the various influential forces that lead individuals to make socially responsible investment choices. It specifically draws on the VBN Theory, which offers a comprehensive framework for understanding the relationships among personal values, beliefs, social norms, and intentions towards pro-environmental behaviours, including participation in SRI (Stern et al., 1999). Expanding on this foundation, we extend the VBN theory to explore how these factors collectively shape individuals' intentions to engage in SRI.

According to the Global Sustainable Investment Alliance (GSIA), global sustainable investment assets reached an impressive $35.3 trillion, representing a remarkable 15% increase in just two years (GSIA, 2022). This growth emphasizes the transformation of investment practices beyond a purely financial perspective, signalling a new era where investors actively seek to align their financial endeavours with broader societal goals.

While the VBN framework provides a strong theoretical basis for understanding the dynamics of SRI intentions, this concept paper goes a step further. It proposes that the relationship between personal values, beliefs,

norms, and SRI intentions may be influenced by a crucial but often overlooked factor—perceived financial performance. In an investment landscape that requires a balance between ethical aspirations and financial returns, individuals' perceptions of SRI's financial viability could significantly impact their intentions to participate in such endeavours (Stern et al., 1995).

By exploring the potential moderating role of perceived financial performance, this concept paper aims to provide new insights into the insightful connection between individuals' values, beliefs, norms, and SRI intentions. The findings of this investigation will have implications that go beyond theoretical scopes, influencing the strategic decisions of investors, financial institutions, and policymakers navigating the ever-evolving field of responsible investing.

1. LITERATURE REVIEW
2.1 Predictors of Value-Belief-Norm (VBN) Theory:

VBN theory is a useful framework for comprehending how personal values impact environmental behaviour (Tangen, 2020). According to Stern et al. (1999), individuals' personal values, particularly altruistic and biospheric values, have a significant influence on their attitudes towards pro-environmental behaviours. Recent studies have demonstrated that these predictors can also be applied to understand investment behaviours, specifically in socially responsible investments (Smith et al., 2018).

2.2 Personal Values Aligned with Social and Environmental Concerns:

The increasing popularity of sustainable investments can be attributed to individuals' desire to align their personal values with social and environmental issues (Johnson &

Schueth, 2007). This tendency often arises from a genuine concern for the well-being of society and the preservation of the environment. Clark et al., (2019) observed that investors are more likely to invest in socially responsible options when they perceive a congruence between their personal values and the core values of these investment choices.

2.3 Beliefs about the Impact of Socially Responsible Investments on Society and the Environment:

The decisions made by investors are greatly influenced by their belief systems. When investors hold the belief that their investments can have a positive impact on society and the environment, they tend to favour socially responsible investments (Harjoto & Laksmana, 2018). Baxter and Moles (2016) suggest that investors who strongly believe in the societal and environmental effects of their investments are more likely to stay committed to socially responsible portfolios.

2.4 Perceptions of Social Norms:

According to Jackson (2013), social norms, which refer to the expectations and accepted behaviours within a society, have a substantial impact on investment decisions. When investors perceive socially responsible investing as a norm, they are more inclined to align their portfolios accordingly. In their study, Davis et al. (2017) discovered that in communities where sustainable investment was considered a common practice, individual investors demonstrated a greater interest in and prioritization of these types of investments.

2.5 Perceived Financial Performance

The notion that socially responsible investments may generate lower returns than traditional investments has long been a source of worry for investors (Renneboog et al., 2008). Nevertheless, a recent study conducted by Fernandez and Kölbel (2020) reveals that sustainable portfolios have the potential to perform just as well, if not better, than conventional portfolios. This change in perception regarding the financial performance of socially responsible investments has significantly contributed to the increased interest and participation of investors in this field.

2.6 Socially Responsible Investment Intentions:

The decision to invest responsibly is influenced by multiple factors, as explained earlier. The investor's intention to engage in socially responsible investments is determined by a combination of personal values, beliefs, perceptions of social norms, and perceived financial performance (Lee & Shin, 2010). Recent empirical research demonstrates that investors are motivated not only by financial gains but also by a desire to make significant contributions to society and the environment.

2. METHODOLOGY OF THE STUDY

The chosen research methodology for this study is a systematic literature review focused on the concept of Socially Responsible Investment (SRI) Intentions and the moderating role of perceived financial performance. Systematic reviews, as explained by Goyal & Kumar (2021), can vary in their approaches - structured reviews based on methodological theories and constructs (Rosado-Serrano et al., 2018), framework-based reviews (Paul & Benito, 2018), Hybrid-narrative reviews (Dabic et al., 2020), and others. This review method is

suitable for critically analyzing existing research on a specific topic. Callahan (2014) emphasizes the importance of synthesizing existing literature to support evidence-based decision-making, while also acknowledging the role of literature reviews in identifying gaps in knowledge (Booth et al., 2012, as cited in Callahan, 2014).

For this systematic review, keywords such as "Socially Responsible Investment," "SRI Intentions," "Perceived Financial Performance," "Corporate Social Responsibility," and "Sustainable Investment" were used. Given the increasing focus on sustainable investment practices and the growing attention to corporate social responsibility, it is crucial to understand the key factors that influence investors' SRI intentions, particularly when perceived financial performance is considered.

Following the Six "C" s proposed by Callahan (2014), the review was:

Table 1. Characteristics of the Review

Concise	Aims to integrate and analyze a diverse collection of articles in order to fill knowledge gaps regarding the factors that influence individuals' intentions to engage in socially responsible investing (SRI).
Clear	Effectively communicates the procedure for gathering data from an extensive collection of literature.
Critical	Considers the researcher's personal

perspective, shares their background knowledge, and suggests possible areas of investigation for future academic studies.

Convincing	Presents innovative arguments and offers compelling justifications for the current issues.
Contributive	Aims to make a significant contribution to the academic field, potentially extending or establishing a new theory. Specifically, proposes a theory on how various investor intentions, including SRI, are influenced by perceived financial outcomes and personal dispositions.

Source: Developed by researchers

In conclusion, this systematic literature review aims to bridge the gap between the increasing relevance of socially responsible investments and the factors that shape these investment decisions, while also considering the impact of perceived financial performance.

3.1 Values and Socially Responsible Investment Intentions

Values are enduring motivational goals that guide individuals' attitudes and behaviours. In the context of SRI, values play a significant role in shaping investment intentions. Han et al., (2021) found that individuals who prioritize values related to social justice, environmental stewardship, and ethical

responsibility are more likely to express positive intentions toward SRI participation (Geraldine, & Ottemoesoe, 2022). This aligns with the fundamental premise of the VBN Theory, which suggests that personal values act as a foundation for shaping individuals' pro-environmental intentions. Therefore, it is proposed:

H1a: There is a relationship between individuals' personal values aligned with social and environmental concerns and their intentions to engage in socially responsible investing.

3.2 Beliefs and Socially Responsible Investment Intentions:

Beliefs play a significant role in influencing an individual's willingness to engage in a particular behaviour. In the context of Socially Responsible Investing, beliefs regarding the positive societal and environmental impacts of such investments can serve as a motivating factor for individuals to participate in SRI (Saci et al., 2022). Kaiser and Menkhoff (2014) found that individuals who perceive their SRI choices as contributing to positive changes are more likely to express their intentions to invest responsibly. This finding aligns with the emphasis of the VBN framework, which recognizes the influence of beliefs on shaping behavioural intentions. Therefore, we propose:

H1b: There is a relationship between individuals' beliefs about the impact of socially responsible investments on society and the environment and individuals' intentions to engage in socially responsible investing.

3.3 Norms and Socially Responsible Investment Intentions:

Social norms have a significant impact on how individuals behave, including their intentions to engage in SRI. These norms can be divided into descriptive norms, which involve perceptions of what others are doing, and injunctive norms, which involve perceptions of what should be done (Geraldine, & Ottemoesoe, 2022). According to a study by Renee and Tangen (2020), individuals are more likely to participate in SRI when they feel pressure from their peers and social circles to do so. This finding supports the VBN Theory and highlights the crucial role that social norms play in shaping pro-environmental intentions. Based on this, we suggest:

H1c: There is a relationship between perceptions of social norms and individuals' intentions to engage in socially responsible investing.

3.4 Perceived Financial Performance and Its Moderating Role

The financial performance of SRI has a significant impact on investment decisions. According to Statman (2000), individuals' willingness to invest in SRI is often influenced by their expectations of financial returns. This aspect, which is not adequately addressed in the existing VBN paradigm, introduces an important consideration— the role of perceived financial performance. In SRI, the influence of individuals' values, beliefs, and norms may vary depending on their perception of financial stability (Statman, 2000). Schueth (2003) suggests that even investors with strong ethical inclinations seek assurance regarding the financial viability of their choices. Additionally, Renneboog et al., (2008) discovered that

while social and environmental factors significantly influence SRI decisions, the perceived financial health of these investments is equally crucial in shaping investor behaviour. By integrating these insights, it becomes evident that the assessment of financial returns plays a crucial role in moderating the relationship between individuals' core personal values and their intentions to engage in SRI. Thus, we can hypothesize:

H2a: The relationship between individuals' personal values and their intentions to engage in socially responsible investing is moderated by the perceived financial performance of such investments.

H2b: The relationship between individuals' beliefs and their intentions to engage in socially responsible investing is moderated by the perceived financial performance of such investments.

H2c: The relationship between individual's social norms and their intentions to engage in socially responsible investing is moderated by the perceived financial performance of such investments.
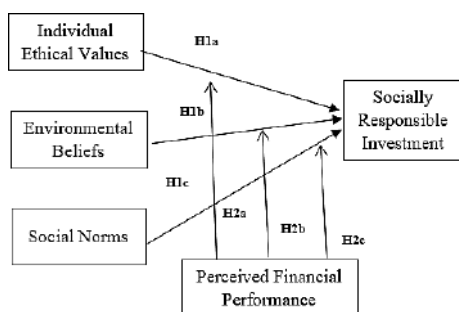
Figure 1. Conceptual Framework

3. THEORETICAL IMPLICATIONS

The anticipated outcomes of this study have the potential to provide valuable insights into

the predictors of SRI and shed light on the role of perceived financial performance as a moderator. Based on the principles of the VBN Theory, we expect to discover significant connections between personal values, beliefs, and norms, and individuals' intentions towards SRI. Building upon previous research (Han et al., 2021; Renee & Tangen, 2020), we anticipate that individuals who prioritize values aligned with social and environmental concerns will demonstrate stronger intentions to engage in socially responsible investing.

Additionally, we hypothesize that perceived financial performance will play a moderating role in the relationship between influential factors and SRI intentions. As suggested by Statman (2000), positive perceptions of financial returns from SRI ventures could strengthen the link between individuals' intrinsic motivations and their intentions. The findings of this study will contribute to the growing body of knowledge in the field of SRI by clarifying how financial considerations interact with core motivational factors.

The implications of this study extend to the theoretical domain, enhancing our understanding of how personal values, beliefs, and norms collectively shape SRI intentions within the framework of the VBN Theory (Robiyanto et al., 2019). The identification of perceived financial performance as a moderating factor enriches the existing theoretical landscape and opens up opportunities for further exploration.

4. MANAGERIAL IMPLICATIONS

This study will provide valuable insights for

professionals in the investment industry, financial advisors, and policymakers. It will shed light on the complex factors that influence individuals' decisions to engage in socially responsible investing. By understanding the impact of perceived financial performance, these stakeholders can develop strategies that align with investors' motivations and potentially increase participation in socially responsible investing. This understanding can promote more sustainable and responsible investment practices, ensuring that the financial sector adjusts its strategies to meet the changing mindset and preferences of today's investors.

6. CONCLUSION AND REFLECTIONS ON FURTHER RESEARCH

In conclusion, this concept paper presents a comprehensive exploration of the relationship evolution and adaptability of personal values in different socio-economic contexts; investigating the formation and validation of investment beliefs in light of real-world societal and environmental outcomes; and understanding new implications of normative influences across diverse cultural contexts. Additionally, it is crucial to reassess investor perceptions of the financial performance of socially responsible investments, particularly in an ever-evolving global financial landscape. Holistic models that involve a broader range of psychological, economic, and socio-cultural variables could provide a more comprehensive understanding of investor intentions. The moderating role of perceived financial performance in these models warrants further investigation, and there may be a potential in examining other variables, such as perceived societal and financial risks. Comparative cross-cultural studies could shed light on how deeply

between influential factors and SRI intentions. Grounded in the VBN Theory, this research aims to uncover the underlying psychological mechanisms that drive individuals' intentions to engage in SRI. By considering the moderating influence of perceived financial performance, this concept paper seeks to enhance our understanding of how this factor interacts with personal values, beliefs, and norms, shaping decision-making processes. The anticipated findings have the potential to inform investment strategies, promote more sustainable financial practices, and contribute to the ongoing discourse on responsible investing. Building on this foundation, future research can expand in several directions: further exploring unexplored predictors within the VBN theory that influence socially responsible investments; examining the established cultural values shape investment intentions.Lastly, insights from the extensive body of literature have implications for financial education, highlighting the importance of cultivating a new generation of investors who align financial goals with societal and environmental well-being. Incorporating these diverse perspectives could potentially lead to a thorough comprehension of the investment environment in future academic investigations.

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Determinants of financial performance in listed insurance companies on the Colombo Stock Exchange

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ABSTRACT

This study focuses on analyzing the determinants of financial performance in listed insurance companies on the Colombo Stock Exchange (CSE) in Sri Lanka. The primary research objective is to identify the most significant factors influencing the financial performance of the insurance industry in the country. The researcher selected a sample of nine listed insurance companies on the CSE and collected secondary data from annual reports and websites.

Various analyses, including the formulation of eight hypotheses corresponding to specific factors, were conducted on the gathered data to examine the determinants of financial performance in the Sri Lankan insurance sector. Common measures such as mean, maximum, minimum, standard deviation, and percentage were employed in the analysis. Regression analysis was utilized to explore the existence of any significant relationship between dependent variables (financial performance) and independent variables, categorized into firm-specific factors (internal) and macroeconomic factors (external).

The research findings indicate significant relationships between the financial performance of insurance companies in Sri Lanka and the growth rate of GDP and exchange rate. However, no significant relationship was identified between the financial performance of insurance companies and an unspecified variable.

In conclusion, this study contributes valuable insights into the crucial determinants affecting the financial performance of listed insurance companies on the Colombo Stock Exchange. The findings deepen our understanding of the complex dynamics within the Sri Lankan insurance industry, offering practical implications for industry stakeholders, policymakers, and academics.

Keywords - Colombo Stock Exchange, Financial Performance, Insurance Companies.

1. INTRODUCTION

Insurance is a means of protection from financial loss. It is a form of risk management primarily used to hedge against the risk of a contingent or uncertain loss. An entity that provides insurance is known as an insurer, insurance company, insurance carrier, or underwriter. A person or entity who buys insurance is known as an insured or as a policyholder.

Insurance companies provide unique financial services to the growth and development of every economy. Such specialized financial services range from the underwriting of risks inherent in economic entities and the mobilization of a large number of funds through premiums for long-term investments. The risk absorption role of insurers promotes financial stability in the financial markets and provides a "sense of peace" to economic entities. The business world without insurance is unsustainable since risky businesses may not have the capacity to retain all kinds of risks in this ever-changing and uncertain global economy (Ahmed et al., 2010). Mehari & Aemiro (2013) indicated that a positive and significant relationship between size, tangibility, and leverage with profitability; however, the loss ratio is statistically significant and negatively related to Return on Assets. The result also revealed that there is a negative relationship between age and profitability but statistically insignificant.The Insurance of Sri Lanka. The secondary objectives are to decide what are the most relevant

Regulatory Commission of Sri Lanka (IRCSL), is the regulatory body of the Sri Lankan insurance sector, has therefore intensified its supervision, field visits, and has adopted a risk-based assessment of insurers' activities. All of these regulatory measures are to ensure that the financial performance of insurance companies is in sound condition. Insurers' profitability is influenced by both internal and external factors. Profit does not only improve upon insurer's solvency state, but it also plays an essential role in encouraging policyholders and shareholders to supply funds to insurance firms. Thus, one of the objectives of the management of insurance companies is to attain profit as an underlying requirement for conducting any insurance business. Identifying the key success indicators of insurance companies facilitates the design of policies that may improve the profitability of the insurance industry. Hence, the determinants of insurer's profitability have attracted the keen interest of investors, scientific researchers, financial markets analysts and insurance regulators. To this end, this study is examined the determinants of insurance company's profitability In Sri Lanka.

The financial performance of the insurance industry is a very important element for the Sri Lankan economy. Therefore, the main objective of the study is to identify the most significant factors affecting the financial performance of the insurance industry factors that affect the financial performance of the insurance industry

of Sri Lanka and to determine what are the necessary actions to maximize the organization's profit.

2. LITERATURE REVIEW

Shiu Shiu analyzes the determinants of the overall performance of UK general insurance companies over the period 1986-1999. He found a positive correlation with interest rates, return on equity, solvency and liquidity, and a negative correlation with inflation and hedging.

The Serbian insurance market falls into the class of developed markets and that there are proper views of evolution, says Ikonic et al. (2011) Using IMF CARMEL methodology analyze the profitability of the Serbian insurance market. The authors highlight that capital adequacy is vital for a company to generate good levels of profitability.

Insurance sector in Pakistan has been under-performing over the last decade. Malik (2011) examines 35 insurance companies, for the duration of 2005–2009, by applying a multiple regression with 6 variables. Results highlight that corporation size and quantity of equity affect positively and significantly the profitability of insurers.

Daniel & Tilahun (2013) indicated that a positive and significant relationship between size, tangibility, and leverage with profitability; however, the loss ratio is statistically significant and negatively related to ROA. The result also revealed that there is a negative relationship between age and profitability but statistically insignificant.

The primary study of the financial performance of the Indian life insurers belongs to Charumathi (2012), who took below consideration a variety of 6 independent variables. In India, life insurers' profitability is significantly and positively influenced by the aid of company size and liquidity, whilst leverage, an increase of gross written premiums, and quantity of equity have a negative and significant influence. Moreover, it is frequently observed that there is no linkage between underwriting risk and profitability.

3. METHODOLOGY

Different empirical pieces of evidence suggested that the profitability of financial institutions affected by both internal and external factors. This study used both internal and external determinants of insurance's profitability includes Reinsurance Dependence, Leverage, Premium Growth, Company Size, Equity Capital, the Growth Rate of GDP, Exchange Rate and Inflation. The study was identified how these variables determine the profitability of an insurance company in Sri Lanka. The sample of the study was nine insurance companies that are listed on the Colombo Stock Exchange and use the secondary data for the study obtaining from the insurance company's annual reports and Insurance Board of Sri Lanka annual reports. After collecting the data for the study, data was analyzed by using E Views statistical software package. Panel regression analysis was used for testing of hypothesis and to identify the impact of

the determinants of the financial performance of listed insurance companies on the Colombo Stock Exchange. To investigate the effect of insurance-specific and macroeconomic determinants of insurers' profitability, the following

Variable	Measurement
Dependent Variable	
Return on Assets (ROA)	(Profit After Income Tax /Total Assets) *100
Independent Variables	
Reinsurance Dependence (RD)	Premium Ceded/Total Asset
Company Size (CS)	Natural Logarithm of Total Assets
Premium Growth (PG)	(GWP (t) – GWP (t-1)) / GWP (t-1)
Equity Capital (EC)	Natural Logarithm of Equity Capital
Leverage (LEV)	Total Debt/Total Equity
The Growth Rate of Inflation (I)	(Inflation−Inflation−1)/Inflation – 1
The Growth Rate of GDP (GDP)	(GDP t−GDPt – 1)/GDP t – 1
Exchange Rate (ER)	Real Exchange Rate of LKR Against US Dollar

econometrics model was is adopted from different studies conducted in the same

$$ROA_{it} = \beta_0 + \beta_1 PG_{it} + \beta_2 EC_{it} + \beta_3 RD_{it} + \beta_4 CS_{it} + \beta_5 LEV_{it} + \beta_6 I_{it} + \beta_7 GDP_{it} + \beta_8 ER_{it} + \varepsilon_{it}$$

4. DATA ANALYSIS

The common measures such as the total, mean, minimum, maximum, standard deviation and percentage are used to analyze the data gathered through the secondary data sources.

To determine determinant of financial performance of insurance companies in Sri Lanka, the study uses multiple linear regression model to measure the extent to which these determinants exert impact on insurer's profitability. For this purpose, the firm characteristics (premium growth, size, equity capital, leverage) and macroeconomics variable (inflation, exchange rate & growth rate of GDP) are regressed against return on assets.

To investigate the effect of insurance-specific and macroeconomic determinants of insurers profitability, the following general multiple regression model is adopted from different studies conducted on the same area.

$$ROA_{it} = \beta_0 + \beta_1 PG_{i,t} + \beta_2 EC_{i,t} + \beta_3 RD_{i,t} + \beta_4 CS_{i,t} + \beta_5 LEV_{i,t} + \beta_6 I_{i,t} + \beta_7 GDP_{i,t} + \beta_8 ER_{i,t} + \varepsilon$$

5. FINDINGS

This section presents the empirical findings from the econometrics model output on the determinants of insurance companies' profitability in Sri Lanka.

Regression Analysis

Under the following regression outputs the beta coefficient may be negative or positive; beta indicates that each variable's level of influence on the dependent variable. The R squared value measures how well the regression model explains the actual variations in the dependent variable (Brooks, 2008). R-squared statistics and the adjusted- R squared statistics of the model was 25.48% and 8.927% respectively. The R2 value 25.48% indicates the total variability of determinant of insurance companies' profitability was not explained by the variables in the model. Thus, these variables collectively, are not good explanatory variables to identify the determinants of insurance companies' profitability in Sri Lanka. This table indicates that there is adjusted R2 value of 25.48%. This value indicates that independent variables explain 25.48% of the variance of dependent variable changes.

The researcher has used balance panel data set and to test the stationarity of each variable the researcher has done Levin, Lin, Chu test. Based on the results of the Levin, Lin, Chu test, all the variables P Values are P <0.05 at levels. This confirms that all the variables in this study are stationary at levels. The researcher did the Hausman Test to select the best model. Based on the P Values of the Hausemen Test (P Values > 0.05) researcher has identified that P Values are insignificant. Therefore, the researcher has used the Random Effect Model to test the determinates of the financial performance of the listed insurance companies on the Colombo Stock Exchange. The model used in this study is statistically significant since Prob(F-statistic) value is less than 0.05.

Table 03.   Coefficient Values of Regression Analysis

Coefficients of Regression Analysis				
Variable	Coefficient	Standard Error	T-Statistic	Prob.
C	3.642	1.611	2.260	0.029
Company Size	0.032	0.028	1.143	0.260
Equity Capital	-0.032	0.029	-1.104	0.276
Exchange Rate	-0.015	0.006	-2.238	0.031
Growth Rate Of GDP	-29.92	13.31	-2.247	0.030
Inflation	-0.150	0.085	-1.769	0.085
Leverage	-0.011	0.008	-1.313	0.197
Premium Growth	0.126	0.107	1.180	0.245
Reinsurance Dependence	-0.011	0.454	-0.024	0.980

Based on the above panel regression results, the researcher has identified that only the Exchange Rate and the Growth Rate of GDP statistically significant for the financial performances of the listed insurance companies in the Colombo Stock Exchange. Regarding the coefficient of explanatory variables; Equity Capital, Reinsurance Dependence, Debt to Equity Ratio, inflation rate, GDP growth Rate and Exchange Rate were negative against the financial performances of the listed insurance companies on the Colombo Stock Exchange since the coefficients for those variables were -0.032368, -0.011031, -0.011489, -0.150858, -29.92875 and -0.015336 respectively. On the other hand, Company, Size and Premium Growth had a positive relationship with profitability since their respective coefficient's values were 0.032456 and 0.126537 respectively.

6. CONCLUSION

In accordance with the findings of the conducted research, the outcome emphasis that there are significant relationships between GDP growth rate, Exchange and return on assets.

According to that firm's specific factors such as Company Size and Premium Growth have positive insignificant relationships between return on assets of the insurance companies and equity capital, reinsurance dependency leverage has a negative insignificant relationship between return on assets of the insurance companies. As well as GDP growth rate and inflation has a negative significant relationship between return on assets as external factors. The following

recommendations are also important to increase the insurance penetration to GDP by increasing financial performance of insurance companies in Sri Lanka.

To increase the Gross Written Premium of the insurance companies, insurance companies can be underwriting more risk, can be design attractive policies to attract the customers & can be use proper & quick claim handling process.

By increasing size of the insurance company can be get more financial performances. As a result of this insurance companies can be using more resources, better risk diversification, efficient information system and better expense management system.

It is better to more capital inflow to the insurance companies. Because it caused to expand & open new branches. Then it caused to get economies of scales. Therefore, it caused to increase the financial performance of insurance companies. Insurance companies should try to attract more equity capital to the insurance companies. To do this they have to keep sound financial performance to attract to new investors.

To increase the financial performances of insurance companies, it is important to high GDP growth rate. Because growth of the overall economies encourage demand for insurers services & it indirectly result in higher premium income. Therefore, it is better to operate insurance companies to over developed countries within worldwide.

If there is a high claim ratio, it caused to increase the financial performances of the insurance companies. Because if some insurance company pay more claim it caused to attract more business. Therefore, it is better to keep high claim ratio.

It is better to keep lower debt to equity ratio. Because if it is high, it caused to pay more interest to debtors. Therefore, insurance companies should keep the less liability within them.

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Conceptual Relationship: Motivational Orientations and Financial Conservation Patterns through the Lens of Saving Attitudes.

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ABSTRACT

This concept paper aims to explore the relationship between psychological dynamics and motivational orientations that influence individual savings behaviours. Given the concerning decline in global savings rates, it is crucial to examine the various factors that impact savings.

To achieve a comprehensive understanding of savings behaviour, we integrate the principles of the Theory of Planned Behavior (TPB) and Regulatory Focus Theory (RFT). Specifically, we focus on the Promotion and Prevention Regulatory Focuses and investigate their influence on patterns of financial conservation, as well as the mediating role of attitudes towards savings.

Thus, this concept paper examines consumer behaviour and financial decision-making, with the objective of exploring how individuals' attitudes towards saving and their motivational orientations shape their financial behaviours. It goes beyond economic frameworks to consider the psychological drives and motivations that underlie individuals' thoughts and interactions with money. The aim is to shed light on how individuals' tendencies to pursue positive outcomes or avoid negative ones shape their savings behaviour, and how attitudes towards saving act as a cognitive channel connecting orientations to real-world behaviours.

The anticipated results of this study have the potential to significantly impact both academic discussions and real-world actions. They can provide valuable guidance for policymakers and institutions in their efforts to promote savings among different demographic groups.

Keywords - Motivational Orientations, Theory of Planned Behaviour, Regulatory Focus Theory

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1. INTRODUCTION

In today's rapidly changing economic landscape, it is crucial to understand the factors that impact an individual's savings behaviour. A recent report drew attention to a decline of 5% in the global savings rate over the past decade, emphasizing the urgency of this issue (Parker & Lee, 2020). Savings not only serve as a financial safety net during unforeseen economic challenges but also play a significant role in enhancing national economic stability (Smith & Johnson, 2018). Surprisingly, a survey of 10,000 respondents revealed that 45% admitted to having no savings at all, while another 20% reported saving less than 5% of their monthly income (Martinez & Rodriguez, 2019). This inconsistency is not solely due to economic limitations but is also deeply influenced by individual psychological and motivational factors.

TPB suggests that individual intentions, shaped by attitudes, subjective norms, and perceived behavioural control, have a crucial role in determining behaviour (Ajzen, 1991). Conversely, RFT proposes that people are motivated either by the aspiration to achieve positive outcomes (promotion focus) or by the desire to prevent negative outcomes (prevention focus) (Higgins, 1997). These motivational orientations can significantly impact one's attitude towards savings and, consequently, their savings behaviour.

While both theories offer valuable insights into the determinants of savings behaviour, there is a lack of research that integrates these perspectives to provide a comprehensive understanding. This concept paper aims to bridge this gap by examining how promotion and prevention regulatory focus influence savings behaviour and how attitudes towards saving mediate this relationship.

2. LITERATURE REVIEW

2.1 Underpinnings of Theory of Planned Behavior

The Theory of Planned Behavior (TPB), introduced by Ajzen (1991), is a significant framework for understanding what influences different behaviours, especially those related to financial decisions. TPB focuses on three important factors: attitude towards the behaviour, subjective norms, and perceived behavioural control. These aspects work together to shape a person's intentions and, consequently, their actual behaviours (Fishbein & Ajzen, 1975). In the context of financial behaviours, specifically attitudes towards saving, an individual's perception of the consequences of saving, combined with their personal value judgments about these consequences, form their overall attitude towards saving (Smith & McSweeney, 2007).

2.2 Underpinnings of Regulatory Focus Theory

Promotion Regulatory Focus Theory (RFT) is based on the idea that individuals go through their decision-making processes with two main motivational orientations: promotion focus and prevention focus (Higgins, 1997). Promotion focus refers to an orientation characterized by aspirations and the pursuit of positive outcomes, while prevention focus is driven by duties and the avoidance of negative outcomes. These distinct orientations not only affect how individuals perceive rewards and

punishments but also influence the strategies they use when setting and pursuing goals (Higgins, 1998).

2.3 Promotion Regulatory Focus

Promotion focus refers to an individual's motivation to achieve their aspirations, goals, and accomplishments. This motivational orientation is driven by the desire for personal growth, advancement, and positive outcomes (Higgins, 1997, p.1282). In the context of financial decision-making, individuals with a strong promotion focus are more likely to take a proactive approach. They are open to investment opportunities and willing to take on financial risks in order to potentially achieve higher returns and improve their financial position (Pham & Avnet, 2004).

2.4 Promotion Regulatory Focus

In contrast, the prevention regulatory focus is rooted in a sense of responsibility, well-being, and protection. Individuals who are primarily driven by a prevention focus are deeply committed to safeguarding themselves and their possessions, placing great importance on "avoiding negative outcomes" (Higgins, 1997, p.1282). In finance, such individuals often demonstrate conservative financial behaviours. They have a strong inclination towards preserving their wealth and ensuring stability, resulting in a preference for saving and a reluctance to engage in high-risk investments or excessive spending (Molden et al., 2008).

2.5 Attitude towards Saving

The way people feel about saving money is influenced by various factors and can be seen from different angles. Intrinsic motivators are related to personal beliefs and values that are deeply established in a person's upbringing, experiences, and personal reflections. On the other hand, extrinsic factors are influenced by the larger environment, including societal norms that define what is considered acceptable or praiseworthy saving behaviour, as well as the prevailing economic conditions that can either encourage or discourage saving (Xiao & Noring, 1994). It is important to note that having a positive attitude towards saving brings tangible benefits. Individuals with such an outlook tend to engage in better financial conservation practices, often driven by a future-oriented perspective that prioritizes long-term financial stability and security over short-term pleasures or expenses (Webley & Nyhus, 2006).

2.6 Financial Conservation Patterns

Financial conservation patterns refer to the various behaviours, tactics, and strategies that individuals adopt to wisely handle, prudently save, and cleverly invest their financial resources (Canova et al., 2005). The development and adherence to these patterns are not random but are influenced by a combination of factors. Intrinsic attitudes towards saving, underlying motivational orientations, and the prevailing economic conditions all play a significant role in shaping these patterns (Perry & Morris, 2005).

3. METHODOLOGY

The chosen research methodology for this study is a systematic literature review, which aims to explore the conceptual relationship between motivational orientations and financial conservation patterns, specifically through the lens of saving attitudes. According to Goyal & Kumar (2021), systematic reviews can employ different methodologies, such as structured reviews grounded in methodological theories (Rosado-Serrano et al., 2018), framework-based reviews (Paul & Benito, 2018), or hybrid-narrative reviews (Dabic et al., 2020). Adopting such a methodological approach is appropriate for conducting a thorough and critical examination of existing research on the chosen topic. Callahan (2014) emphasizes the importance of synthesizing existing literature to support evidence-based conclusions and highlights the crucial role of literature reviews in identifying gaps in knowledge (Booth et al., 2012, as cited in Callahan, 2014).

For this systematic review, relevant keywords such as "Motivational Orientations," "Financial Conservation Patterns," "Saving Attitudes," "Financial Behavior," and "Investment Patterns" were used. Given the evolving dynamics of financial behaviours and the growing emphasis on responsible financial management, it is essential to understand the factors that shape individuals' saving attitudes and their resulting financial conservation patterns.

Following the Six "C"s framework proposed by Callahan (2014), the review was structured as follows:

Table 1. Review Characteristics

Concise	Aims to consolidate and analyze a wide range of articles to clarify the connection between motivational orientations and financial conservation patterns.
Clear	Clearly gathers data from a vast collection of literature.
Critical	Incorporates the researcher's perspective, presents foundational knowledge, and suggests potential avenues for future academic inquiries.
	Convincing: Puts forth innovative arguments and provides compelling justifications for ongoing discussions.
Contributive	Aims to contribute to academic discussions, potentially by introducing or refining theoretical concepts. Specifically, it proposes a theory that explains how saving attitudes, influenced by motivational orientations, shape financial conservation patterns.

Source: Developed by the researchers

In summary, this systematic literature review seeks to explore the interaction between motivational orientations and financial conservation patterns, with a particular focus on saving attitudes. By doing so, it provides insights into the determinants of responsible financial behaviours.

3.1 Promotion Regulatory Focus and Financial Conservation Patterns

The concept of Promotion Regulatory Focus highlights the importance of aspirations and the pursuit of positive outcomes (Higgins, 1997). When considering financial behaviours, individuals who have a dominant Promotion Regulatory Focus are likely to be motivated to accumulate wealth in order to achieve their desired end goals, such as luxury or comfort. Conversely, Financial Conservation Patterns refer to the strategies that individuals use to protect and increase their financial resources over time (Smith & Johnson, 2002). Based on existing literature, we propose the following:

H1a: There is a relationship between the level of promotion regulatory focus and financial conservation patterns.

3.2 Prevention Regulatory Focus and Financial Conservation Patterns

Individuals with a Prevention Regulatory Focus, characterized by a desire for security and stability, tend to prioritize the prevention of losses and the minimization of risks. This mindset often translates into more conservative financial behaviours, such as maintaining larger emergency funds or favoring stable, low-risk investment options (Huang et al., 2019). The cautious nature of those with a Prevention Regulatory Focus may lead to a stronger inclination towards long-term financial conservation. Therefore, we propose:

H1b: There is a relationship between the level of prevention regulatory focus and financial conservation patterns.

3.3 Attitude Towards Saving and Financial Conservation Patterns

The way individuals perceive and evaluate specific behaviours is influenced by their attitudes (Wutun et al., 2023). When it comes to financial conservation patterns, one's attitude towards saving plays a significant role in financial decision-making. Fernandes et al. (2014) conducted research that found a positive relationship between a positive Attitude toward saving and higher levels of saving and investment. This suggests that individuals who have a favourable attitude towards saving are more likely to engage in behaviours that align with long-term financial conservation goals. Therefore, we propose:

H2: There is a relationship between attitude towards saving and financial conservation patterns.

3.4 Attitude Towards Saving and Its Mediating Role

The role of Attitude Towards Saving as a mediator between motivational orientations and financial conservation patterns is a crucial aspect of this study. Attitude Towards Saving serves as a cognitive link between individual orientations and actual behaviour. A study conducted by Tang et al. (2019) found that Attitude Towards

Saving partially mediates the relationship between Promotion Regulatory Focus/Prevention Regulatory Focus and saving behaviour (Wutun et al., 2023). This suggests that an individual's motivational orientation influences their attitude towards saving, which in turn affects their financial conservation patterns. Based on these findings, the following hypotheses are proposed:

H3a: Attitude towards saving mediates the relationship between promotion regulatory focus and financial conservation patterns.

H3b: Attitude towards saving mediates the relationship between prevention regulatory Focus and financial conservation patterns.

In summary, the investigation of motivational orientations based on the TPB and RFT framework yields valuable insights into financial conservation patterns (Lemu, 2020). The orientations of Promotion Regulatory Focus and Prevention Regulatory Focus have an impact on financial behaviours, with Attitude Towards Savings playing a mediating role. This concept paper enhances our comprehension of how psychological factors are linked to financial choices, thereby facilitating the creation of specific interventions to improve financial well-being.
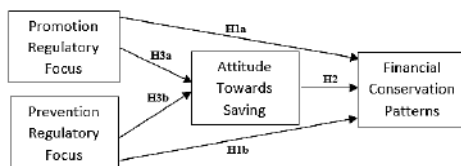
Figure 1. Conceptual Framework

4. THEORETICAL IMPLICATIONS

This concept paper aims to enhance our understanding of fundamental theories in financial behaviour from a more human perspective. Specifically, we will be examining TPB (Ajzen, 1991) and RFT (Higgins, 1997). Our objective is to validate these theories as comprehensive frameworks for understanding how individuals approach financial conservation. Inspired by recent studies (Smith & Lee, 2018), a key aspect of our investigation is to determine whether individuals primarily operate under a 'Promotion Regulatory Focus' or a 'Prevention Regulatory Focus'. Such an understanding has significant implications for categorizing saving orientations among different populations (Chen & Kim, 2020). Additionally, our findings can shed light on the role of 'Attitude towards Saving', a concept previously explored by Johnson et al. (2019), as it potentially connects one's motivational orientation with their tendency to save. Exploring these connections could help us understand the importance of attitudes in translating motivational factors into concrete financial behaviours, an area that has received considerable attention in recent years (Williams & Thompson, 2021). Finally, by examining the relationships between financial conservation strategies, saving attitudes, and motivational pathways, we anticipate gaining insights into the dominant motivational forces that shape saving attitudes (Davis & Turner, 2022).

5. MANAGERIAL IMPLICATIONS

From a practical standpoint, this research has the potential to greatly benefit financial strategists and policymakers. By

uncovering correlations and patterns in saving behaviours, we aim to provide a roadmap for institutions seeking to foster saving habits among diverse demographic groups. Our findings could pave the way for customized financial interventions that cater to an individual's primary motivations and attitudes towards saving. This personalized approach, informed by our research, could prove crucial for financial institutions in creating effective campaigns to enhance saving tendencies. Essentially, by examining the relationship between psychological factors and saving tendencies, our goal is to equip financial entities with novel strategies to successfully navigate and thrive in a constantly changing economic landscape.

6. CONCLUSION AND FUTURE RESEARCH DIRECTIONS

In conclusion, this concept paper examines the complicated saving behaviour within the current dynamic economic environment. The need to understand the factors that influence saving behaviours has become more urgent due to the global decline in savings rates. While financial obstacles are certainly influential, this concept paper highlights the importance of considering the interaction between psychological factors and saving behaviour. It explores the distinct roles of Promotion Regulatory Focus and Prevention Regulatory Focus in shaping individuals' tendency to save, drawing insights from the well-known TPB and the RFT. Additionally, it highlights the mediating role of Attitude towards Saving in this relationship. The findings from this study will shed light on the multifaceted nature of motivational orientations and their impact on financial practices.

While this study provides a foundational understanding of the relationship between motivational orientations and financial conservation patterns, it also emphasizes the need for further empirical investigation. Future research could explore how societal norms, cultural influences, and economic fluctuations further shape these psychological factors. Longitudinal studies could also provide insights into how saving attitudes evolve over time, particularly in response to significant life events or global economic shifts. Additionally, there is potential to explore the effectiveness of interventions designed to enhance positive saving attitudes, building on the insights from this study.

Building on the present study, it sets the stage for additional empirical examination, enriching our understanding of the psychological foundations of financial conservation patterns. Recognizing the relationship between financial determinants and psychological influences is crucial in understanding how individuals save and plan for the future in the face of the uncertainties of the contemporary economic environment. Grasping these dynamics is essential for promoting improved saving habits, thereby enhancing economic resilience at both individual and societal levels.

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Assessing The Influence of Digital Financial Inclusion on Financing Decisions While Addressing the Challenge of Information Asymmetry - A Conceptual Exploration

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ABSTRACT

The dawn of digital financial inclusion, driven by rapid technological advancements, has steered in a transformative era in the financial landscape, particularly within emerging economies. This concept paper delves into investigating the intricate relationship between digital financial inclusion and financing decisions, focusing on the Sri Lankan banking sector as a quantitative study. Anchored in the Pecking Order Theory, which posits that firms prefer internal financing over external financing due to information asymmetry concerns the research study is expected to investigate the mediating effect of information asymmetry in between the association of dominant variables while contributing to a knowledge gap in the existing literature. The relevance of this study lies in its potential to provide insights into the evolving dynamics of the financial sector, where technology-enabled financial inclusion initiatives are reshaping the way businesses access and utilize financial resources.

1. INTRODUCTION

Financing decisions are a critical aspect of a firm's financial management, as they can significantly impact the firm's ability to achieve its objectives, maintain competitiveness, and create value for shareholders. Deciding the capital structure of a firm will impact the firm from several angles; funding growth and investments, balancing risk and return, meeting regulatory requirements, maximizing shareholder value, etc (Brigham & Ehrhardt, 2017; Hitt et al., 2019; Ross et al., 2018).

Pecking order theory is a financial theory that explains how companies choose between different sources of financing based on the cost and availability of capital. This theory was first proposed by Donaldson (1961) and further developed by Myers and Majluf (1984) discusses how the

heterogeneity of the distribution of information between agents and principals of an entity creates information asymmetry which steers financing decisions and results in prioritizing debt over equity. According to this theory, companies will first use internal financing, such as retained earnings, to fund their projects. If internal financing is not sufficient, companies will then turn to debt financing, such as bank loans or bonds, before resorting to equity financing, such as issuing new shares or stock options. This preference for internal financing and debt financing over equity financing is known as the "pecking order".

Information asymmetry is a well-known problem in the financial markets, which can lead to adverse selection and moral hazard issues. The pecking order theory suggests that firms prefer to use internal financing, followed by debt financing, and lastly, equity financing, in order to avoid information asymmetry problems. However, the advent of digital technology has opened up new opportunities for firms to alleviate information asymmetry issues and improve their financing decisions. This can be achieved through digital communication channels, such as social media, online forums, and crowdfunding platforms, which provide firms with direct access to a wider pool of investors and enable them to disseminate relevant information to potential investors (Zhang & Huang, 2018).

The use of digital technology can play an important role in alleviating information asymmetry problems and improving financing decisions for firms, which is consistent with the pecking order theory.

By using digital communication channels and alternative financing sources, firms can reduce their reliance on traditional financing sources and better align their financing decisions with their business objectives and long-term goals.

Information Asymmetry has led an adverse selection cost in financing decisions whereas equity is subjected to a serious adverse selection. This is due to the higher risk perceived by an outside investor pertaining to equity than debt (Myers, 1984). Accordingly, equity investors expect a higher compensation in return, thus the perspective of firm managers would prefer to fund all the projects with internal funds.

Management is assumed to know more about the firm's value than potential investors. Hence it was observed that the lack of information has led to persistent undervaluation of equity issues which may cause firms to refuse to issue stock (Allen, 2006). Therefore, the information imbalance between the internal and external parties of a firm would lead to future losses which shall result in having forgone investment opportunities.

Having noticed the absence of research conducted to examine how digital finance inclusion affects the information asymmetry between the parties engaged in financing decisions, the study would cater to finding the impact of digital finance inclusion on financing choices with the mediation effect of information asymmetry. Sri Lanka is an emerging market in the Asia Pacific region, and a large information asymmetry could be observed which can be regarded as a common scenario in imperfectly competitive markets. Although

there is growing recognition of the potential benefits of digital financial inclusion and a dearth of research on how firms can effectively use digital financial services and technologies for capital structure decisions.

2. LITERATURE REVIEW

The field of finance has witnessed a massive transformation in recent years due to the advent of digital financial inclusion. Digital financial inclusion refers to the integration of digital technologies, such as mobile banking and electronic payment systems, to expand access to financial services, particularly in emerging markets and among underserved populations. This chapter explores the impact of digital financial inclusion on capital structure decisions in firms, with a prominent focus on how it mediates the role of information asymmetry. As a way in, it is important to discuss the role of various theories under the capital structure umbrella.

2.1 Financing Decisions

Financing decisions of firms have been the subject of extensive research in corporate finance. The literature on this topic covers various aspects of how firms choose their sources of financing, such as debt, equity, and internal funds.

2.2 Capital Structure related theories

2.2.1 Trade-off theory

The trade-off theory, introduced by Kraus and Litzenberger (1973), discusses that firms choose their capital structure by balancing the benefits of debt, such as tax shields and lower cost of capital, against the costs of financial distress, such as bankruptcy costs and agency costs of debt.

Ultimately, firms aim to find an optimal debt-equity ratio that balances the tax benefits of debt with the costs of financial distress and agency conflicts. This ratio can be varied based on the firm's risk profile and operating environment (Harris & Raviv, 1991).

2.2.2 Pecking Order Theory

Myers (1984) proposed the pecking order theory, which suggests that firms prefer to use internal funds first, followed by debt financing, and then equity financing as a last resort. Myers argued that this preference is driven by the asymmetric information between managers and investors, which creates adverse selection costs for external financing. So, it is ascertained, that the internal parties predominantly managers possess more information than external investors. Consequently, equity investors would claim a comparatively higher rate of return than the lenders leaving managers the best option to fund as debt.

Several studies have been conducted to test the pecking order theory, and the results have been mixed. Some studies have found support for the theory, while others have found evidence that companies do not always follow the pecking order. For example, a study by Ebrahim and Fattah (2015) found that firms in Pakistan tend to follow the pecking order, while a study by Frank and Goyal (2003) found that US firms do not always follow the pecking order.

Despite the mixed results, the pecking order theory remains a widely accepted theory in finance and is often used by companies to make financing decisions. By prioritizing

internal and debt financing over equity financing, companies can minimize the cost of capital and avoid diluting existing shareholders.

2.2.3 Pecking Order vs. Trade-Off Theory

The debate between the pecking order theory and the trade-off theory has been ongoing in the literature. Some studies have found support for the pecking order theory, such as the work of Myers and Majluf (1984), while others have found support for the trade-off theory, such as the studies of Bradley et al. (1984) and Rajan and Zingales (1995). However, recent studies have suggested that both theories may be relevant for different types of firms and industries and that factors such as market conditions and growth opportunities may influence firms' financing decisions (Frank and Goyal, 2009; Huang et al., 2018).

Existing empirical evidence over pecking order theory is mixed. Shyam-Sunder and Myers (1999) argue that the pecking order theory explains firms' financing behavior much better than the trade-off theory. Frank and Goyal (2003) question the hypothesis that the pecking order theory offers a good approximation for firms' financing choices – negative pecking order theory.

2.2.4 Agency Theory

The agency theory posits that conflicts of interest between shareholders and managers can influence firms' financing decisions. For example, managers may prefer to finance investments with debt to increase their control over the firm, while shareholders may prefer equity financing to reduce agency costs. Empirical studies have shown mixed results on the relationship between agency costs and firms' capital structure, with some studies finding a positive relationship (Jensen & Meckling, 1976) and others finding a negative relationship (Myers, 1984).

2.2.5 Information asymmetry

More broadly speaking, Information asymmetry can be described as an imbalance exchange of information between actors engaged in the same transaction (Kajtazi, 2010). Thus, Information asymmetry - the difference in information possessed by firm managers and the market participants extends an advantage to the managers of firms. This would lead to a rational response of market prices to changes in the capital structure of the firm (Dierkens, 1988).

2.3 Digital Financial Inclusion (DFI)

Digital Finance is an evolution preceded by expanded connectivity and enhanced speed of information processing at the customers' end and the managers' end. Further, it challenges financial institutions even well-established service providers while creating novel opportunities to be in line with tech-savvy clientele. Eventually, researchers have come across the concept, Digital Finance Cube; a combination of digital finance business functions, digital finance institutions, digital finance technologies, and technology concepts (Gomber et al., 2017). However, digital financial inclusion can be described as a narrowed pathway under the digital finance umbrella which focuses on ensuring financially excluded and underserved populations reach the formal financial products and services via the deployment of digital means at a cost

affordable to them and facilitating sustainable existence of providers (Shen et al., 2020).

2.4 Digital Financial Inclusion and Information Asymmetry

Literature suggests a complex interplay between digital financial inclusion and information asymmetry. Multiple facets provide numerous relationships between these two factors. Digital financial inclusion facilitates access to a wide array of digital tools and services including mobile banking, digital payments, and fintech applications which target to extend financial services to underserved populations. Additionally, digital platforms have enabled low-cost access to financial transactions while making it more affordable for individuals and businesses (Mas & Radcliffe, 2010). Studies have proven that digital financial inclusion can mitigate information asymmetry by providing a more transparent and accessible platform for financial transactions (Singh et al., 2020). Apparently, disparities in digital literacy can create information gaps affecting in decision-making process (Beck et al., 2017). Hence if the users lack the necessary digital literacy to interpret financial information, it can lead to an enhanced level of information asymmetry.

Proposed hypothesis (H1): There is a statistically significant relationship between digital financial inclusion and information asymmetry.

2.5 Digital Financial Inclusion, Information Asymmetry, and Financing Decisions

Several studies have examined the role of digital technology in alleviating information asymmetry and improving the decision-making process in a firm. For example, Zhang and Huang (2018) found that social media can significantly reduce information asymmetry by providing a more direct and transparent communication channel between firms and investors. Similarly, Li and Liang (2021) showed that crowdfunding platforms can improve the quality of information disclosure by requiring firms to provide detailed information about their business operations, financial performance, and growth prospects.

Moreover, digital technology can also facilitate the use of alternative financing sources, such as peer-to-peer lending and cryptocurrency crowdfunding, which can reduce information asymmetry problems and provide firms with more flexible financing options (Nicolau, 2021). These digital financing platforms rely on blockchain technology and smart contracts, which provide a secure and transparent way for investors to lend money to firms and receive interest payments.

Proposed Hypothesis (H2): There is a statistically significant relationship between information asymmetry and financing decisions.

Proposed Hypothesis (H3): There is a statistically significant relationship between digital financial inclusion and financing decisions.

2.6 Proposed Conceptual Framework

Conceptualization assists in transforming elements of an abstract theory into provable

hypotheses in a deductive research approach. This section elaborates on the relationship of variables to derive the conceptual framework and hypotheses of the current study through the theories and empirical evidence available in the literature. The study will be conducted to test the mediating effect of information asymmetry in the association between digital finance and financing decisions.

3. RESEARCH METHODS

3.1 Research Design

It is a framework that has been structured in a manner to get answers to the research questions. Moreover, it is an arrangement of prerequisites for the collection and analysis of data in order to formulate an answer to the research problem while maintaining the objectivity, validity, and accuracy of the study. According to Kumar & Goyal (2016), research design helps the researcher to handle the research problem efficiently and in a logical manner and also provides insights about how to conduct research using a certain methodology. Out of the two prominent research designs, Inductive and Deductive, the researcher will follow the deductive method while relying upon the existing theory of pecking order and developing the hypothesis for the problem identified.

3.2 Research Philosophy

According to Saunders et al., (2019) the term research philosophy denotes a system of beliefs and assumptions about the improvement of knowledge. Furthermore, it discusses the cause, environment, and the improvement of knowledge. Furthermore, it focuses on assumptions that the researcher

has relied on, the design of the research study as well as data analysis and interpretation of the findings. Under positivism, the researcher will use existing theory to develop hypotheses on research questions. These declarations would provide hypothetical justifications that can be tested and confirmed.

Source: Author compiled

3.3 Research Approach
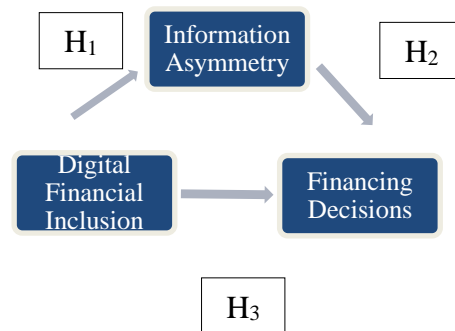
The quantitative research approach is

Figure 4: Conceptual framework

highly visible in the literature relating to the subject as most of the theories coming under capital structure are evaluated based on numerical financial figures.

Komera & Lukose (2014) tested the pecking order theory against information asymmetry under a quantitative approach. The same approach could be visible in Gomber et al., (2017) and Thathsarani & Jianguo, (2022), and many other studies which are pertaining to Digital Financial inclusion in various contexts.

Based on the proposed conceptual framework it is expected to follow a quantitative approach which is decided to be the suitable method to utilize the

selected variables to solve the research problem

3.4 Population and Sample

The researcher intends to investigate the aforementioned relationship within the Banking sector in Sri Lanka. Hence the listed banks in the Colombo Stock Exchange (CSE) will be considered in the sample. Therefore, as per the GICS classification of CSE, 16 banks have been selected for the sample of the study.

3.5 Data

As per the conceptual framework, secondary data relating to digital financial inclusion, information asymmetry, and financing decisions need to be collected and analyzed to determine the solution for the research problem. Hence it is decided to gather the above data for 8 years (2014 – 2022) while eliminating the abnormal shocks in the economy such as COVID-19, Easter attack & etc. Data could be gathered through annual reports of publicly listed companies and published reports of TRCSL.

Table 1: Variable operationalization

Variable	Measured by
Digital Financial Inclusion	Digital Financial Inclusion Index (Shen et al., 2020)
Information Asymmetry	the number of public announcements about the firm and the trading intensity (Dierkens, 1988)
Financing Decisions	Debt IPOs, Equity IPOs and Equity introductions (Bessler et al., 2011)

Digital Financial Inclusion Index

DFI involves the deployment of digital means to reach financially excluded and underserved populations with a range of formal financial services suited to their needs, delivered responsibly at a cost affordable to customers and sustainable for providers (Shen et al., 2020). So this index pertains to measuring the DFI comprehensively while considering the digital means in addition to the traditional FI factors. Accordingly, this index comprised 14 indicators grouped into four dimensions of DFI; Availability - measures citizens' access to traditional/digital financial products from the supply side of the market, Usage - the extent to which citizens use traditional/digital financial products (from the demand side), Affordability - customer's ability to withstand the price of financial products so that agreements are achieved between the supply and demand sides to promote inclusive finance, and Financial Literacy and Ability dimension directly affects citizens' choice and usage of digital financial products.

3.6 Data Analysis

The study embarks on exploring the intricate relationship between digital financial inclusion and financing decisions within the framework of Sri Lankan banks. Therefore, study proposes to test the partial It is expected to investigate the mediating effect of information asymmetry using the panel data models and also to include diagnostic tests to ensure the robustness of the findings.

4. IMPLICATIONS

4.1 Financial Institutions and practitioners

The utilization of digital finance tools in the banking industry has extended numeric implications to the existence and sustainability of banking businesses. Also, it is vital to identify how this DFI would impact distinct factors such as enterprise risk, enhancement of social capital, network, investor confidence and so on (Yang et al., 2022; Xu, 2022; Wang, 2022). Apparently, the banking institutions in Sri Lanka may benefit from understanding how digital financial inclusion affects financing decisions. This insight could direct them in adapting their strategies, launching product offerings, and establishing technological infrastructure to align with the changing landscape stimulated by the digital innovations.

4.2 Investors and Stakeholders

Xiaofang & Jianzhou (2021) have discussed that digital inclusive finance can promote entrepreneurial activities by alleviating liquidity constraints, improving risk response-ability, promoting human capital accumulation, and enhancing social capital. Investors and other stakeholders in the Sri Lankan banking sector could use the research findings to make informed decisions when it comes to analysing risk and returns, trading and profitability intentions. Understanding the impact of digital financial inclusion on financing decisions of banks can influence the investment behaviour of these investors and their risk assessments.

4.3 Policy/Strategy Implications

As the core of this study pertains to finding how DFI would impact on financing decisions, the insights from the study would benefit the policymakers of the companies in formulating suitable financing strategies while attentive towards the other aspects such as information asymmetry and investor perspectives. One way of controlling the information asymmetry by managers has been proposed as choosing the level of direct communications with capital markets (Ang & Cheng 2011). Also, will be able to address the problem of security undervaluation backed by this particular reason.

5. CONCLUSION

In conclusion, this sets the stage to investigate the relationship between digital financial inclusion, financing decisions, and information asymmetry within the context of Sri Lankan listed banks. The study is grounded in the Pecking Order Theory, which posits that firms have a hierarchy of financing preferences, and that information asymmetry plays a crucial role in shaping these preferences.

The proposed research will employ a rigorous empirical methodology, drawing on data from a sample of listed Sri Lankan banks. Through quantitative analysis, it will examine the relationship between digital financial inclusion and financing decisions, with the mediating effect of information asymmetry, thereby contributing to the existing body of knowledge in finance and offering practical insights for decision-makers, financial institutions, and stakeholders.

As we are now entering an era with extensive adoption of digital technologie this study can be considered as timely and relevant.

We look forward to the empirical phase of this research, which will enable us to validate the theoretical foundations laid out in this concept paper and provide actionable recommendations for the banking sector.

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A Study on the Impact of Digital Transformation on Job Roles of Accounting Professionals: Evidence from Sri Lanka

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ABSTRACT

The study aims to identify the impact of digital transformation on the job roles of accounting professionals in terms of the functions of the role, the objective of the role, specific duties and responsibilities assigned to the role, and the knowledge and skills required to perform the job role.

The study attempts to answer the following question: How has digital transformation impacted the job roles of accounting professionals in Sri Lanka?

Accordingly, 25 Sri Lankan accounting professionals whose organizations have been subjected to digital transformation during their tenure were interviewed to identify the impact of digital transformation on their job roles.

The study revealed that the use of blockchain technology, use of big data, artificial intelligence, and the use of cloud computing are the most prominent digital transformations that have impacted the accounting profession in Sri Lanka. Further, the study revealed changes in accounting job roles including job tasks, job tools, and required skills as a result of digital transformation.

Keywords - Digital Transformation, Accounting Professionals, Job roles

1. INTRODUCTION

Watty et al. (2014) and Hoarau (1995) argue that despite being a global profession there are drastic variations in the accounting profession and the job roles of accountants across countries due to the differences in accounting standards followed, differences in the entry qualifications, the differences in the accounting education systems etc.

The global digital transformation and the evolution of technology during the Industrial 4.0 revolution have resulted in the integration of digital technologies into all business processes across multiple industries.

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As per Gulin et al. (2023) the accounting profession is one of the most traditional professions which has been subjected to drastic changes due to digitalization.

The salient literature identifies the transformation from manual accounting systems to automated accounting systems empowered by new technologies is one of the most significant change that has occurred in the accounting profession in the history. This digital transformation of accounting has significantly impacted the job roles of accounting professionals in terms of the functions of the role, specific duties and responsibilities assigned to the role, and the knowledge and skills required to perform the job role as per the salient literature conducted in different countries (Kossek, 2016; Gnatiuk et al., 2023; Taib et al., 2022).

However, there is a lack of research studies conducted in the Sri Lankan context with regard to the impact of digitalization on the job roles of accounting professionals.

Hence, it's worthwhile to explore the impact of digital transformation on the job roles of accounting professionals in Sri Lanka.

This study primarily aims to identify the changes in the job roles of accounting professionals led by digital transformation in Sri Lanka.

Henceforth, the following research objectives are derived and answered in this study.

1. To identify the digital transformations which has impacted the accounting profession in Sri Lanka.

2. To identify the significant changes in the duties and responsibilities assigned to the accounting professionals in Sri Lanka due to digitalization.

3. To identify the changes in the job tools used by accounting professionals in Sri Lanka.

4. To identify the significant changes in the knowledge and skills required from accounting professionals in Sri Lanka due to digitalization.

Accordingly, 25 Sri Lankan accounting professionals whose organizations have been subjected to digital transformation during their tenures were interviewed to identify the impact of digital transformation on their job roles.

2. LITERATURE REVIEW

2.1 Accounting Profession and Job Roles of Accounting Professionals

Del-Pozo-Antúnez (2021) defines accounting as a meaningful profession that is dedicated to the provision of quality information in respect of organizations and entities to markets with the intention of facilitating resource allocation in markets and stewardship of the organizations or entities.

As per Sánchez et al (2019) the main activity of an accounting professional is associated with the preparation, presentation, audit, and communication of financial information of entities to their interested stakeholders.

Further, Sánchez et al. (2019) categorize the accounting profession as an Active Job that has strong demands and a wide range of autonomy which makes the profession

demanding and a profession with high pressure.

As per Leitner-Hanetseder et al (2021) there are many job roles at different levels in the accounting profession ranging from bookkeeper to financial accountant to data analysts and these job roles have been evaluated over time.

Awang et al (2022) suggests that evolution of the accounting profession over the time line could be classified into five stages namely manual stage, mechanized stage, automated stage, robotic stage, and artificial intelligence assisted stage based on the technical and technological components used in each era of evolution.

2.2 Digital Transformation in Accounting

Past studies establish that the digitalization of accounting practices and integration of accounting into sophisticated information systems as one of the most prominent and radical changes faced by the accounting profession in the history of modern accounting (Gherman et al., 2021; Kossek, 2016; Gnatiuk et al., 2023; Taib et al., 2022).

The salient literature states that digitalization has resulted in major revolutions in accounting including amendments to accounting standards and accepted accounting principles, amendments to the financial reporting process, changes to the scope of financial reporting and non-financial reporting practices (Savić & Pavlović ,2023).

Boyle (2021) states that continuous accounting powered by in-memory and cloud-scale computing has replaced the

repetitive manual accounting process conducted by accountants for decades and this digital transformation will continuously evolve, and the enterprise systems will be fully integrated with Artificial Intelligence in the future.

The salient literature establishes that cloud computing, continuous accounting, blockchain technology, big data and data analytics, and artificial intelligence are the most significant technologies that have led the revolutionary digitalization of the accounting profession (Leitner-Hanetseder et al., 2021; Awang et al., 2022; Gulin et al., 2019).

2.3 The impact of Digital Transformation on the duties and responsibilities of Accounting Professionals

The extant knowledge in the area establishes that the digitalization of accounting profession has impacted the job roles of accounting professionals and the job roles have evolved from traditional bookkeepers and accountants to advisors and consultants (Gulin et al., 2019; Coman et al., 2022).

Geok & Fernandez (2022) establishes this evolution of job roles as a transition from accounting professionals performing mundane repetitive tasks to accounting professionals undertaking more strategic advisory roles in the organizations.

Khanom (2020) further establishes that due to digital transformation many accounting tasks including book keeping, payments, month end routine journal entries, invoicing has been automated and systems have replaced accounting professionals who were handling these routine jobs.

Further, the salient literature states that with the continuous radical changes in the profession fueled by digital transformation accountants are expected to continuously upgrade their technological abilities to thrive in the market (Sabuncu, 2022; Awang et al., 2022).

2.4 The changes in the job tools used by accounting professionals due to digital transformation.

Taib et al (2022) establishes that the digital transformation in has resulted in a change in the job tools used by accounting professionals. It's further highlighted that traditional manual accounting tools have been replaced by tools based on modern technologies including Internet of Things, Big Data, Data Analytics, and Blockchain.

Berikol & Killi (2021) argue that there was a radical change in the tools used by accounting professionals to perform their job roles due to digital transformation. The main changes highlighted by Berikol & Killi (2021) include the transition from paper-based primary sources to e-sources, computerized accounting systems replacing manual accounting systems, the introduction of Integrated Accounting Information systems enabled by Artificial Intelligence, and the introduction of cloud storage systems and data mining techniques to mine the accounting data stored in the cloud storage systems.

2.5 The significant changes in the knowledge and skills required from accounting professionals.

The salient literature establishes that with the wave of development in the accounting profession due to the digital transformation accounting professionals are required to continuously improve their knowledge on accounting information systems, computerized accounting applications, data analytics, the newly developed branches of accounting, fintech regulations, and other new technologies relevant to accountants (Prawitasari, 2022; Taib et al., 2022; Berikol & Killi, 2021).

Further, the prominent researchers in the area has highlighted the increasing need for the accounting professionals to improve the ICT competencies, Data analysis competencies, and strategic decision making competencies as the job role of accounting professionals have transformed from a traditional operational level job role to a more managerial and a strategic level job role with the digital transformation in the profession (Leitner-Hanetseder et al., 2021; Awang et al., 2022; Gulin et al., 2019).

Moreover Fettry et al (2019) suggests that as per the perception of accounting professionals it's the duty of professional accounting bodies to ensure that accounting professionals are provided with opportunities to improve their technological skills, and to improve the curriculum to reflect the changes in the accounting profession resulted by digital transformations.

3. METHODOLOGY

A qualitative research method was employed and accounting professionals were used as unit of analysis. The study employed purposive sampling to identify accounting professionals in Sri Lanka

whose employing organizations have been subjected to digital transformation during their tenure.

Accordingly, 25, Sri Lankan accounting professionals whose organizations have been subjected to digital transformation during their tenures were interviewed using a semi structured interview guide to identify the impact of digital transformation on their job roles.

Table 1. summarizes the participant details of the 25 respondents.

Table 2: Respondent Details

Person	Accounting Job Role	Years in the Accounting Profession	Industry in which the organization operates in
A	Financial Analyst	10	FMCG
B	Management Accountant	5	Production
C	Bookkeeping Clerk	25	Logistics
D	Financial Reporting Manager	22	Banking and Finance
E	Forensic Analyst	11	Holding Company of a Business Conglomerate
F	Tax Advisor	12	Tax Advisory
G	Accounts Receivable Clerk	20	Retail
H	External Auditor	16	Audit Advisory
I	Project Accountant	6	Construction
J	Accountant	8	Plantation
K	Cost Accountant	9	Manufacturing
L	Finance Manager	10	Education
M	Petty Cash Officer	12	Retail
N	Chief Financial Officer	18	Apparel
O	Junior Accountant - Credit	5	Manufacturing
P	Financial Analyst	17	FMCG Retail
Q	Senior Executive	9	Banking and Finance
R	Risk Officer	6	Insurance
S	Internal Auditor	6	Hotel
T	Assistant Finance Manager	6	Pharmaceuticals
U	Accounting Information Systems Executive	8	Holding Company of a Business Conglomerate
V	Financial Controller	25	Hotel
W	Management Accountant	13	Manufacturing

X	Fund Accountant	5	Banking and Finance
Y	Cash Officer	18	Retail

The collected data was subjected to a thematic analysis to identify the common themes raised by the respondents.

4. FINDINGS AND DISCUSSION

4.1 Digital Transformations

The digital transformations experienced by the accounting professionals interviewed includes the usage of block chain technology, usage of computerized cloud accounting packages, usage of Business Intelligence tools (Datapine, Yellowfin BI, Power BI , and Tableau) for analytics, usage of Big Data for analytics and decision making, and the usage of AI tools.

A few extracted statements from the respondents are given below.

"Our organization adopted cloud accounting in the year 2019. The adoption of cloud-based accounting was the first phase of the many digital transformations we underwent. We are now actually using Block Chain technology to store the data in the clouds. Additionally these collected data is mined using Big Data analytics to get insights about the many markets that we are operating in" [U].

"In the past we used basic tools and software such as Ms Excel, Sage Intacct, Net Suite and etc. With the development of Business Intelligence tools, the management of the organization realized the need for investing in a more sophisticated analytics tool and invested in Microsoft Power BI which provides real time information and analytics in a more visually appealing manner" [A].

"We, the forensic accountants of the entity used to rely on manual methods and simple software to detect financial frauds and recognize patterns in crimes. But with the introduction of Block Chain Technology now the transactional data is recorded in our systems in a manner which makes it impossible to be manipulated" [E].

These findings are supported by the salient literature where the prior research has also recognized the use of blockchain technology, use of big data, artificial intelligence, and the use of cloud computing as the most prominent digital transformations that have impacted the accounting profession in many countries across the world (Leitner-Hanetseder et al., 2021; Awang et al., 2022; Gulin et al., 2019).

4.2 The changes in the duties and responsibilities of accounting professionals in Sri Lanka due to digital transformation.

Accounting professionals has experienced a shift in the assigned duties and responsibilities due to digital transformation where mundane repetitive duties and responsibilities undertaken by accounting professionals in the past have evolved and the accounting professionals are currently playing more strategic advisory roles in the organizations due to digital transformations.

Indicated below are a few extracted statements from the interviewees.

"In my 22 year tenure in the area of financial reporting I have seen the accounting profession being subjected to numerous changes driven by digital transformations. In the early 2000s' financial accountants were given mundane tasks of recording transactions and reporting financial statements. But with the new digital technologies in the accounting profession the financial accounting process has been automated. Now, we don't spend time on mundane repetitive tasks due to the new systems even the financial statements are automatically generated. With the reduction of the time spent on routine work we are now focusing more on providing strategic solutions to the top management" [D].

"I have spent 22 years as a book keeping clerk in a leading logistics organization in Sri Lanka. Those days there were many book keeping clerks in the organization as our work was mainly manual and it was time consuming. But with the introduction of digitalized accounting systems now I am the only book keeping clerk in the organization. Most other companies no longer have book keeping clerks employed and it seems as if the job position book keeping clerks are almost not in existence due to digital transformation" [C].

These findings are backed by the findings of prominent researchers (Gulin et al., 2019; Coman et al., 2022; Khanom, 2020) in the area where it is established that duties and responsibilities of accounting professionals have evolved into strategic roles from traditional mundane roles and several duties and responsibilities of

accounting professionals have completely been replaced by machines .

4.3 The changes in the job tools used by accounting professionals in Sri Lanka.

The main changes experienced by the accounting professionals due to digital transformation in terms of the job tools includes the e-source document based bookkeeping systems, cloud accounting documentation, AI based analytics tools, Integrated Accounting Information Systems.

Given below are a few extracted respondent statements from the interviewees.

"When I initially joined the company 25 years ago all the work was paper based. In the late 2000s' the company started using computerized accounting software and later on moved to an ERP system. Most recently the entire accounting and reporting process was digitalized and we no longer use any paper even though our source documents are e-documents" [C].

"Being a financial analyst for over 17 years at a FMCG Retail company I have had the task of conducting various analysis to understand customer spending patterns, demand patterns in order to provide reliable forecasts to the senior management. I used to spend a lot of time using Ms Excel and SPSS to conduct various analysis and these analysis consumed a lot of time as the tools were not sophisticated. However, recently our organization invested in an Integrated Accounting Information System which is powered by the block chain technology and has an inbuilt data analytics component powered by Artificial Intelligence which

has reduced the hours I spent on conducting various analysis" [P].

These findings are supported by the salient literature where the prior research has also recognized the introduction of the e-source document based book keeping systems, cloud accounting documentation, AI based analytics tools, Integrated Accounting Information Systems in place of traditional accounting tools as a change in tools brought by digital transformation (Taib et al., 2022; Berikol & Killi, 2021).

4.4 The changes in the knowledge and skills required from accounting professionals in Sri Lanka due to digital transformation.

The main changes experienced by the accounting professionals due to digital transformation in terms of the required knowledge and skills include the increasing need for the accounting professionals to improve the soft skills including communication skills, and negotiation skills, the need for the accounting professionals to be tech-savy and competently use ICT skills, and the increasing demand for the accounting professionals to be continuously updated on accounting information systems, computerized accounting applications, data analytics, the newly developed branches of accounting, fintech regulations, and other new technologies relevant to accountants.

Given below are a few extracts of the respondent statements.

"I have been into management accounting for over a decade. When I was the Assistant Management Accountant 13 years ago the Management Accountant at the time and our team spent majority of our time on calculations where we used calculators to do calculations and maintained physical documents. But now as the Management Accountant I spend minimal time on calculations as the computerized models and dashboards as well as the system generated reports has reduced the need for lengthy manual calculations. Furthermore, now I play a more managerial role where I spend more time on coming up with suitable managerial decisions. With the implementation of these new systems our team had to undergo various trainings to sharpen our ICT skills as well" [W].

"The landscape of the accounting profession has drastically changed during the past two decades in Sri Lanka due to the various digital transformations taken place. So many new branches of accounting has developed with the digitalization and I always encourage my staff members to continuously update their IT skills, analytics skills, fintech knowledge, and to stay in touch with the new developments in the profession through engaging in continuous professional development training programs. Otherwise accounting professionals would not be able to survive in the industry in the long run" [V].

These findings are supported by the salient literature where the prior research has also recognized the need for the accounting professionals to be tech-savy and competently use ICT skills, and the increasing demand for the accounting professionals to be continuously updated on accounting information systems, computerized accounting applications, data analytics, the newly developed branches of

accounting, fintech regulations, and other new technologies relevant to accountants (Leitner-Hanetseder et al., 2021; Awang et al., 2022; Gulin et al., 2019).

However, the increasing need for the accounting professionals to improve the soft skills mainly the communication skills, and negotiation skills has not been identified by the prior literature as changes in the accounting profession due to digital transformation.

5. CONCLUSION

The study aimed to identify the impact of digital transformation on the job roles of accounting professionals in terms of the functions of the role, the objective of the role, specific duties and responsibilities assigned to the role, and the knowledge and skills required to perform the job role.

Accordingly, 25 Sri Lankan accounting professionals whose organizations have been subjected to digital transformation during their tenure were interviewed to identify the impact of digital transformation on their job roles.

The study revealed that the use of blockchain technology, use of big data, artificial intelligence, and the use of cloud computing are the most prominent digital transformations that have impacted the accounting profession in Sri Lanka.

Moreover, the study revealed that accounting professionals has experienced a shift in the assigned duties and responsibilities due to digital transformation where mundane repetitive duties and responsibilities undertaken by accounting professionals in the past have evolved and the accounting professionals

are currently playing more strategic advisory roles in the organizations due to digital transformations.

Further, it was revealed that the main changes experienced by the accounting professionals due to digital transformation in terms of the job tools includes the e-source document based bookkeeping systems, cloud accounting documentation, AI based analytics tools, Integrated Accounting Information Systems.

Finally, it was revealed that the main changes experienced by the accounting professionals due to digital transformation in terms of the required knowledge and skills include the increasing need for the accounting professionals to improve the soft skills including communication skills, and negotiation skills, the need for the accounting professionals to be tech-savvy and competently use ICT skills, and the increasing demand for the accounting professionals to be continuously updated on accounting information systems, computerized accounting applications, data analytics, the newly developed branches of accounting, fintech regulations, and other new technologies relevant to accountants.

All the research findings except the need for the accounting professionals to improve soft skills are backed by the salient literature as impacts of digital transformation on the job role of accounting professionals. The finding of the need for improvement in soft skills of accounting professionals could be added to the existing body of knowledge after further verification through future studies.

The research findings could be employed by professional accounting bodies in

designing professional development programs to suit the industry demands in the digital era of accounting.

The research was limited to 25 Sri Lankan accounting professionals representing various sectors, and various positions and due to the limited number of respondents these findings may not be generalized to all the accounting professionals in Sri Lanka. Future research could be conducted based on a broader sample and future studies could be conducted to evaluate the need for soft skill development of accounting professionals due to digital transformation.

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Workwear Preferences of Women Executives in the Sri Lankan Apparel and Banking Sectors

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Abstract

Workwear of women in management positions differs significantly from that of women in non-management positions. Greater attention must be paid to the attire of the former group because even minor changes in dressing style can have an impact on other people's perception of the competence of women in managerial positions. There is no information presently about the workwear preferences of women executives in the Sri Lankan corporate environment. In view of it, this study was conducted to determine the workwear preferences of female executives employed in the Sri Lankan corporate environment. A questionnaire survey was conducted among some generation Y executive staff of the apparel and banking sectors. Shop visits were also made to study the currently available workwear categories, and the price range. According to the findings, 88 percent of female bank executives' dress code is business formal, while 81.7 percent of women apparel executives' dress code is business casual. Most of the women executives in the apparel sector (59.7 %) and banking sector (45.7 %) seemed to value the aesthetic qualities (style, color, and fabric) of workwear. Semi-fitted clothing was preferred by most of the women executives in the apparel sector (69.6 %) and the banking sector (55.2 %). Women bank executives preferred to wear a skirt with a blazer (58.1 %) over other product categories while the majority of women apparel executives preferred crop tops or blouses with pants (67.8%). Women apparel executives chose linen (69.3 %) over other types of fabric whereas cotton was preferred over linen by women bank executives (68.6 %). Darker shades were favored by women bank executives (72.7 %), while lighter shades proved to be the most popular among women executives in the apparel sector (86.2 %). The findings of this study will be beneficial to the workwear designer brands as it will guide them to introduce innovative

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workwear and upgrade their designs by having a better understanding of the sartorial preferences of women executives in the corporate sector.

***Keywords* - Corporate environment, Preference, Sri Lanka, Working women, Workwear.**

1. INTRODUCTION

Workwear is "the clothing that can be worn in professional settings" (Indeed Editorial Team, 2021) and that being so, it could play an important role in determining the employee's membership and hierarchical level within an organization (Rafaeli, et al., 1997). Appropriate workwear can be used to manage and create a favorable impression of the employee by others, enabling her to achieve her objectives in the workplace (Peluchette, et al., 2006). Traditionally, workwear used to be of a rather formal nature, and mainly consisted of suits. Gradually, many evolutionary changes were made to workwear. The workplace appears both professional and modern in the 2020s, with employees seeking a more relaxed type of workwear that is focused on practicality and comfort. This is because clothing practices can have material consequences for individuals in terms of either helping or hindering their performance at work (Indeed Editorial Team, 2021; Nickson & Warhurst, 2005).

1.1 Workwear of women executives

The industrial revolution, which took place in the 18th and 19th centuries, brought about changes in women's traditional attitudes and values by providing them with employment opportunities (Turner, 2018). They came forward to work in different spheres and in all categories of jobs. During the period 1980-2016, most countries witnessed an increase in the number of employed women as well as their proportion in the workforce (Ortiz, et al., 2017).

Workwear plays an important role by enabling women employees to project their personality and raise their confidence level within the workplace (Sampson, 2016). However, clear distinctions exist between the workwear of women employees in management positions and that of women in non-management positions since the attires of employees are dictated by their position in the hierarchy of the organization (Rafaeli, et al.,1997; Tolani, 2018). According to Howlett et al. (2015), even a minor change to the dress style can have an impact on the perception of an observer regarding the competence of women occupying managerial positions.

1.1.1 Objective

Economically active women comprise 33.4 percent (2,918,304) of the total labor force of Sri Lanka (Department of Census and Statistics, 2020). Of them, 17 percent are holding managerial/ executive level positions in public and private sector organizations (Wanninayake, 2017). An individual's dress code and physical appearance are among those factors that contribute to his/ her personality; other factors too such as social skills and presenting the right image (professionalism and competence) can create a positive image. All such plus points confer psychological benefits to individuals and enhance the self-perception of their capabilities and make them more confident

employees in the workplace (Kellerman & Laird, 1982; Solomon & Schopler, 1982). Although attire plays a big role by contributing to all these positive qualities, no research evidence exists on the workwear preferences of women executives in the Sri Lankan corporate environment. Therefore, this study aims to correct this situation by identifying the workwear desires of Sri Lankan women executives, particularly those employed in the apparel and banking sectors.

2. LITERATURE REVIEW

2.1 Evolution of women's workwear

Over the years, women's workwear has undergone many changes, reflecting women's attitudes and beliefs. Figure 1 illustrates how women's workwear has evolved over time.

2.2 Women's workwear categories

Females pay greater attention to clothing styles (Drake & Ford,1979; Minshall, et al., 1982; Musa & Roach ,1973). Different clothing styles have been introduced as formal attire and as business casual attire for the office environment.

- Business formal attire is a professional outfit that is designed to impress (Wood, 2019). Business formal attire includes standard dresses comprised of a variety of suits, sports coats, jackets, ties, and dress shoes (Lee, 2003; Lindeman, 2004). It is recommended to wear skirts or pants with a formal blouse or a shirt top with stockings, and closed toe, or heeled leather shoes. Darker shades are recognized as being more formal than lighter shades.

- Wearing a suit is not necessary for business casual attire but neither does it allow jeans and t-shirts (Wood, 2019). Women typically wear collared shirts, blouses, tops, vests, casual jackets, skirts, pants, or a sweater with dress pants and dress shoes or boots (Heathfield, 2020). Conservative dresses and skirts are also acceptable. Blouses and shirts with skirts or tailored pants with heels or flats are recommended too as business casual attire (Half, 2016).

According to Wood (2019), business formal attire is about impressing others, and it depends on conservative clothing to portray the wearer as a professional. Business casual attire is just a step-down, traditional formal attire that encourages employees to wear comfortable, lightweight clothing to work (Heathfield, 2020). Employees' preferences for formal wear are becoming less common and turning more towards casual these days (Half, 2016). Business formal attire is used to command respect and proclaim status, whereas business casual attire is used to develop closer connections with others (Rafaeli, et al., 1997).and turning more towards casual these days (Half, 2016). Business formal attire is used to command respect and proclaim status, whereas business casual attire is used to develop closer connections with others (Rafaeli, et al., 1997).
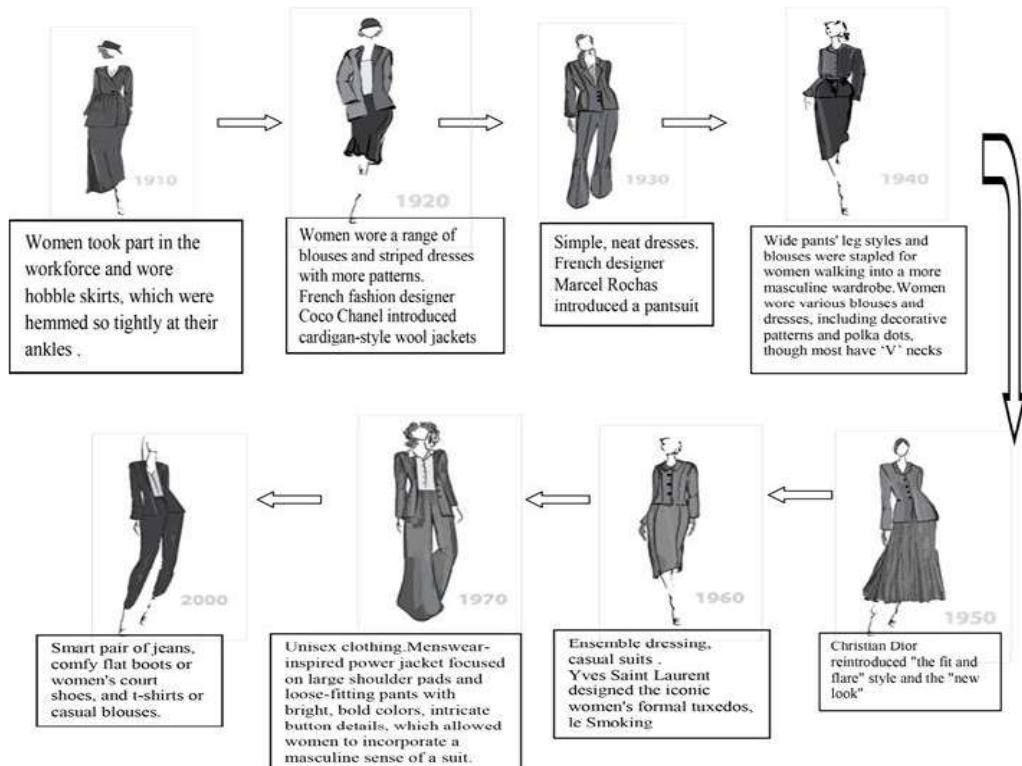
Figure 1: Evolution of women's workwear (Contributed Post, 2020; Greenberg, 2017; Napolitano, 2016)

3. METHODOLOGY

Two data gathering methods were used in this study.

- Questionnaire survey

  Since the study could not possibly deal with all categories of women executives in the vast corporate sector, it was decided to restrict its scope to the apparel and banking sectors as they were identified as ideal for conducting the research. Hence, the focus narrowed down to thirty-five apparel industries and fifty branches of banks located in and around the Colombo district. The total population of women executives in the apparel and banking sectors was estimated as 1050, assuming that each of these companies employed twelve women executives of generation Y, between the ages of 26 and 40. The sample size was determined as 217 at the confidence level of 90% and with a margin of error of 5%.

  Questionnaires were distributed online. 217 completed questionnaires were received for the analysis. The data gathered from the online questionnaires were analyzed using Microsoft Excel, and the findings were presented in the form of pie charts and graphs.

- Shop visits

Five Shops in and around Colombo were visited to observe the prevailing workwear categories, designs, and respective price ranges in the local market. The observations were recorded on a sheet of paper.

4. FINDINGS AND DISCUSSION

4.1 Overview of the available workwear in the local market

It was observed that both business casual and business formal workwear were available in all five shops. There were more semi-fitted blouses, pants, jackets, coats, crop tops, and skirts than loose-fitted garments. A small number of fitted frocks, fitted denim trousers, and leggings were seen in the business casual wear category. In the business formal category, the shops displayed various jackets, overcoats, pants, frocks, and skirts. A higher presence of fitted garments than semi-fitted garments could be observed in this category. A limited number of loose fitted garments were also displayed in the business formal category.

All the shops except shop A were selling business wear at a price range of Rs.1000-5000. It was rare to find a product in the above Rs.5000 range in either the business casual or business formal categories. However, shop A and shop D did stock products in both categories selling for above Rs.5000. As observed, the fabrications were made of cotton, linen, viscose, denim, and sheer materials. Brands selling items in the Rs.1000-5000 and above Rs.5000 range made use of two-tone fabrics, crepe materials, Valentino, silk, and sheer printing materials. Most brands also emphasized the style, color, and price rather than the garment's fabrication and comfort.

4.2 Overview of the respondents to the questionnaire

Out of the 217 women executives who responded to the questionnaire, 49.8 percent were in the banking sector (108), while 50.2 percent were in the apparel sector (109). Overview of the respondents to the questionnaire is presented in Table 1.

Table 1: Overview of the respondents to the questionnaire

		Bank (%)	Apparel (%)
Age (years)	25-30	32.4	41.7
	30-35	57.4	54.8
	35-40	10.2	3.5
Working experience (years)	1-3	30.5	15.7
	3-5	22.9	36.5
	5-7	33.3	37.4
	7-10	5.7	8.7
	>10	7.6	1.7

Table 2: Perception of present work attire

		Banking sector		Apparel sector	
		Business casual	Business formal	Business casual	Business formal
1.	The type of work attire recommended as the dress code policy of the organization?	13 (12%)	95 (88%)	89 (81.7%)	20 (18.3%)
2.	The work attire that can confer a classic, confident, and professional appearance?	28 (25.9%)	80 (74.1%)	14 (12.8%)	95 (87.2%)
3.	The work attire that can confer a cool, tolerant, and easygoing appearance?	95 (88%)	13 (12%)	102 (93.6%)	7 (6.4%)
4.	The work attire that can make you feel more productive and competent?	97 (89.8%)	11 (10.2%)	93 (85.3%)	16 (14.7%)

4.3 Present work attire

Abiding by an appropriate dress code and presenting a smart physical appearance can serve to enhance an individual's personality and present the right image to others by conveying an air of professionalism and competence. This can also generate positive psychological benefits for the woman executive by enhancing the self-perception of her occupational attributes (that is, build confidence) in the workplace (Kellerman & Laird, 1982; Solomon & Schopler, 1982).

As per the results shown in Table 2, 88 percent of women executives in the banking sector chose business formal as their dress code policy while 81.7 percent of women executives in the apparel sector picked business casual as their dress code policy. Women executives of the banking sector as well as the apparel sector agreed that they would be able to acquire a classic, confident, and professional appearance by wearing business formal work attire. They feel that not only would this help them to attain a cool, tolerant, and easygoing appearance but also make them more productive and confident in the workplace. Thus, this

study's findings are consistent with those of previous studies (Peluchette, et al., 2006; Hannover & Kühnen, 2002).

The questionnaire also probed into how much money the women executives typically spend on work attire at present; the findings are shown in Figure 2. According to Figure 2, majority of women executives responded to the questionnaire

in both the apparel sector (60 percent) and the banking sector (58.3 percent).

They reported spending Rs.1000-3000 per garment when shopping for work attire. However, 5 percent of women executives in both the apparel and banking sectors said they spent more than Rs.5000 per garment for their present work attire.

Consumers evaluate a product by studying both extrinsic cues (price and brand name), as well as intrinsic cues (color, style, and fabric) (Hsu & Burns, 2002; Labhard & Morris, 1994; Wu & Delong, 2006). Intrinsic cues are more important for product evaluation than extrinsic cues since they can be changed without altering the physical product's appearance and properties (Zeithaml, 1988).
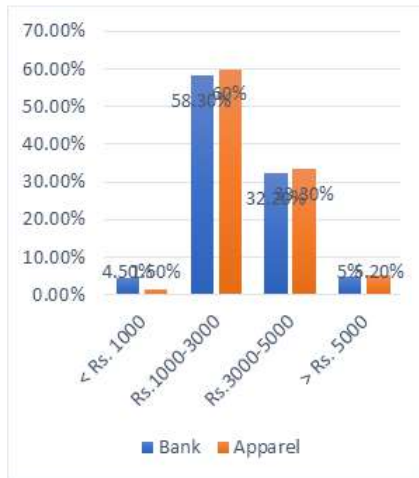
Figure 2. Money spent on work attire.

Therefore, the factors that are considered important are assessed with greater care when purchasing business attire. The findings are presented in the bar chart in Figure 3. According to this information, the majority of female executives in both the apparel (59.7 percent) and banking sectors (45.7 percent) value the aesthetic qualities (style, color, and fabric) of work attire most. Functional qualities such as comfort are
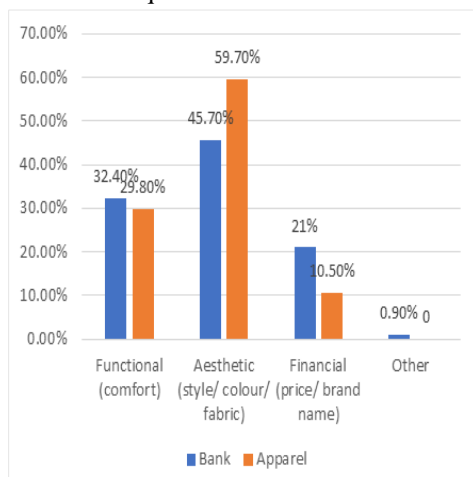
Figure 3. Factors considered important when buying business attire.

more important to 32.4 percent of bank executives and 29.8 percent of apparel executives. Price is the most important aspect to 21 percent of bank executives and 10.5 percent of apparel executives.

4.4 Perception of the workwear products in the market

The questionnaire survey tested the women executives' satisfaction with the currently available workwear products. Figure 4 presents the results. Majority of the women executives working in both sectors were satisfied with the available colors, overall quality, size range/ fit, fabrics, and prices. However, only 39 percent of women executives in the apparel sector and 24.6 percent of women executives in the banking sector were satisfied with the designs. Further, the executives in both the apparel (32.1 percent) and banking sectors (43.5 percent) were satisfied with the trends in the local market.

4.5 Preferences relating to workwear

The questionnaire survey attempted to determine the preferences of the women executives with respect to the product types, fabrics, colors and fit of business attire. The findings presented in Table 3 show that most of the women executives in the apparel sector (69.6 percent) and banking sector (55.2 percent) preferred semi-fitted clothes. A marked difference was that 38.1 percent of women banking executives preferred to wear fitted work attire, but only 18.3 percent of women executives in the apparel sector seemed to prefer fitted work attire.

Figure 4: Satisfaction with the available workwear products

Further, more than half of female banking executives preferred to sport a skirt with a blazer (58.1 percent), so that this combination outnumbered other product categories. In contrast, most female apparel executives were partial to crop tops or blouses with matching pants (67.8 percent). However, a considerable number of women executives in the banking sector as well as the apparel sector preferred frocks. The figures for these sectors were 49.5 percent and 48.7 percent, respectively.

According to the findings, female apparel executives have a strong preference for linen (69.3 percent) over other fabrics, but cotton and denim fabrics are popular with them too. Cotton is favored by female bank executives (68.6 percent) who have a slightly stronger preference for it over linen (61 percent). The favored color range of women bank executives consists of darker shades (72.7 percent) while the color range that appeals most to women executives in the apparel sector comprises the lighter shades (86.2 percent).

the banking sector while business casual attire is the dress code policy of women executives in the apparel sector.

Table 3. Preferences in work attire

Preference		Banking	Apparel
Fit	Fitted	38.1%	18.3%
	Semi-fitted	55.2 %	69.6%
	Loose fitted	6.7%	12.2%
Product types	Frocks	49.5%	48.7%
	Skirts with blazer	58.1%	20%
	Pants with blazer	23.8%	11.3%
	Pants with crop tops/ blouse	10.5%	67.8%
	Other	28.6%	20.9%
Fabrics	Cotton	68.6%	47.4%
	Linen	61%	69.3%
	Denim	9.5%	38.6%
	Viscose	7.6%	6.1%
	Sheer	31.4%	14%
	Other	21%	4.4%
Color	Lighter shades	27.8%	86.2%
	Darker shades	72.7%	13.8%

5. CONCLUSION

The following conclusions were drawn from the findings.

- Business formal attire is the dress code policy of women executives in

- Business formal work attire can give the women executives a classic, confident, and professional look whereas business casual attire can help the women executives look cool, tolerant, and easygoing.

- Female executives in the apparel and banking sectors place the greatest emphasis on the aesthetic qualities (style, color, and feel) of work attire. They are also concerned with functional qualities such as comfort and fit.

- Majority of women executives in both the banking and apparel sectors seem to be pleased with the available colors, overall quality, size range, fit, types of fabric, and prices.

- Women bank executives preferred semi-fitted skirts with blazers or frocks in darker colors made of cotton and linen.

- Women executives in the apparel industry preferred semi-fitted crop tops or blouses in lighter colors made of linen or cotton, with matching denim pants.

5.1 Implications of this research

The findings of this study will benefit the workwear designer brands in Sri Lanka that are presently catering to the women's workwear segment by attempting to fulfill the customers' desires. The findings of this study will assist the workwear brands to produce and market more innovative products by clearly identifying the workwear preferences of women working in the corporate environment. Meeting the workwear needs of these professionals will contribute indirectly yet positively towards improving their performance in the workplace. Overall, the findings of this study will help to upgrade the product offerings in the local market by guiding the workwear clothing brands to devise carefully aimed design solutions through understanding the consumer preferences better.

5.2 Future research

The findings of the research cannot be generalized, as this study was limited to Colombo. The results may vary with different sets of samples. Therefore, future research should be conducted with a broader selection of age groups, professions, and geographical locations where there are large numbers of working women.

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The Role of Experiential Learning in Shaping Entrepreneurial Intentions

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ABSTRACT

Entrepreneurship has been a popular concept for many decades, given the significance it holds in steering nations towards better levels of economic opulence. Entrepreneurial intention holds copious gravity in driving entrepreneurship among individuals of a nation, for it is often identified as a dominantly influential cognitive factor in actuating entrepreneurial activities. Amidst the numerous factors that shape the entrepreneurial intentions of individuals, education, and learning have been considered for scholarly work on a wider scale. Even though the concept of education and learning has been a focal point of attention in prior scholarly studies, it is clear that little attention is paid to the concept of experiential learning and its association with entrepreneurial intention. As such, this study aims to determine the role of experiential learning in shaping the entrepreneurial intentions of individuals. The study conceptualizes experiential learning to be impacting entrepreneurial intentions through developing entrepreneurial self-efficacy, whilst considering concrete experience, reflective observation, abstract conceptualization, and active experimentation as elements of the experiential learning cycle. The proposed conceptualization of the study theoretically grounds its holistic argument on Kolb's Model of Experiential Learning.

***Keywords** - entrepreneurship, self-efficacy, entrepreneurial intention, learning, experiential learning*

1. INTRODUCTION

Entrepreneurship which is often referred to as a dynamic process involved in the identification, evaluation, and exploitation of business opportunities (Shane and Venkataraman, 2000), is argued over its possibility to be taught in classroom settings or otherwise (Bliemel, 2014). The inherently dynamic nature of entrepreneurship insinuates the necessity for practical skills and competencies, for those who intend to pursue a career as an entrepreneur (Motta and Galina, 2023). A popular argument in entrepreneurial literature related to the above is that practicality-based skills and competencies could hardly be taught in

traditional classroom settings or traditional teaching mechanisms, instead could be molded via more practical pedagogical approaches as well as increased student interactions in the learning process (Bandera et al., 2018; Bell, 2019).

As a learning mechanism that promotes and focuses on the said practical learning and student interactions, experiential learning has been acknowledged by scholars in previous studies (Nabi et al., 2017; Michailova and Wilson, 2008; Rae and Carswell, 2000). Experiential learning is a learning mechanism where the learner plays an extremely active role in knowledge construction facilitated via a process of experiencing, reflecting, thinking, and actioning (Kolb, 2014). As such, shows a close connection towards entrepreneurship which is a dynamic process having an overall inclination towards practical problem-solving and decision-making (Shane and Venkataraman, 2000). Furthermore, experiential learning provides a platform for individuals to build up their creativity levels as well as facilitate the enhancement of self-reliance and self-confidence (Gautam et al., 2016), which in turn is insinuated to impact intentions of individuals towards entrepreneurship, by making them ready to face the unpredictable future circumstances successfully (Kuratko et al., 1997; Sanchez, 2011). In fact, the exposure gained via experiential learning usually enables an individual to perceive and understand the socioeconomic challenges in the external environment with self-confidence, which will, in turn, facilitate positive intentions towards entrepreneurship (Bell and Bell, 2020; Othman and Abdullah, 2016).

Even though ample studies have been conducted to determine how education on entrepreneurship impacts entrepreneurial intention (Hussain and Norashidah, 2015; Bae et al., 2014), while considering the mediation impact of entrepreneurial self-efficacy, little attention has been rendered in determining how experiential learning poses and impact towards entrepreneurial intention and entrepreneurial self-efficacy (Elnadi and Gheith, 2021; Ferreira, 2020). Furthermore, studies considering experiential learning as a multidimensional construct based on Kolb's theoretical model of experiential learning, have been hardly used by scholars (Taneja et al., 2023; Falloon, 2019) in determining its relationship with entrepreneurial self-efficacy and entrepreneurial intention.

Therefore, the purpose of the present study is to develop and propose a conceptual model to determine the impact of experiential learning as a multidimensional construct, on entrepreneurial self-efficacy and entrepreneurial intention, based on Kolb's model of experiential learning. As such, the study contributes towards an overall understanding on how experiential learning could be used in merit of triggering entrepreneurial intentions of individuals.

The rest of the paper is arranged as follows. The next section is a literature review related to the constructs under the proposed conceptualization. Proposition development supported by extant related literature precedes the literature review section. Moreover, in the subsequent section, the proposed conceptualization is portrayed followed by the theoretical and managerial implications related to the study. The paper marks its end with a brief commentary on

future research directions followed by a concise conclusion.

2. LITERATURE REVIEW

Experiential Learning

The concept of experiential learning has evolved for many years, incepting from the basic approaches related to learning (Taneja et a., 2023). Learning has been discussed using various approaches such as the behaviorist approach, cognitivist approach, and constructivist approach, in scholarly studies (Kolb, 1984). The behaviorist approach's focus was on learning's influence on situations rather than experiences, which made the approach less popular among scholars (Ferreira, 2020). The cognitivist approach was rendering emphasis on learning as a mechanism of gathering and analyzing information (Belanger et al., 2022). The constructivist approach was accepted by scholars to a greater degree, for it paid attention towards aspects such as traits related to learning, self-awareness of learners as well as reflection mechanisms in the process of learning (Taneja et al., 2023).

Experiential learning is a concept that originated based on the Lewian Model (1935). As such, experiential learning was originally coined as a process of personal experiencing followed by abstract conceptualizing. Experiential learning has been recognized by researchers in earlier studies as a learning mechanism that encourages and concentrates on practical learning and student interactions (Nabi et al., 2017; Rae and Carswell, 2000). In fact, it is identified as a learning mechanism in which the learner actively participates in the generation of knowledge through a process of experiencing, reflecting, thinking, and actioning out the needful (Kolb, 2014). Furthermore, experiential learning tends to illuminate a close relationship to entrepreneurship, which is a dynamic process with an overall preference for practical problem-solving and decision-making (Shane and Venkataraman, 2000). Experiential learning has further been traced as a source allowing individuals to increase their levels of creativity whilst facilitating the development of self-reliance and self-confidence (Gautam and Singh, 2015).

Entreprenurial Self-Efficacy

Entreprenurial Self-efficacy is the confidence possessed by an individual on how well he or she is capable of successfully discharging tasks as an entrepreneur (Boyd and Vozikis, 1994; Baum et al., 2001). It is an important determinant shaping the intentions of an individual towards becoming entrepreneurs (Krueger and Brazeal, 1994). In fact, entrepreneurial self-efficacy has been identified as a factor influential towards the strength of entrepreneurial intentions as well as how likely is it for entrepreneurial intentions to be converted to entrepreneurial actions (Boyd and Vozikis, 1994).

Scholars have previously suggested that a concept of entrepreneurial self-efficacy, which is identified as a construct exclusive to the domain of entrepreneurship (Chen and He, 2011), is unnecessary and that self-efficacy should be left as a general construct. However, since entrepreneurs ought to have a diverse portfolio of talents, which appears to be impossible to track by a general term particular to entrepreneurship known as

entrepreneurial self-efficacy (Markman et al., 2002), has supported the validity of a term of self-efficacy specific to entrepreneurship. Furthermore, experts disagree about the concept's dimensionality, whether it is multidimensional or not (Wilson et al., 2007; Zhao et al., 2005). According to McGee et al., (2009), entrepreneurial-self efficacy is an area that has the potential to be better investigated in future research, particularly as a predictor of future success.

Entreprenurial self-efficacy tends to show an association towards education and learning (Chun-mei et al., 2014). The knowledge and skills inculcated in individuals via different education and learning mechanisms are argued to boost confidence levels of individuals about themselves and their ability to face situations successfully (Zhao et al.,2005). Prior research discusses the importance of factors such as self-confidence and entrepreneurial competencies playing a vital role in the determination of entrepreneurial self-efficacy levels (Kurczewska et al., 2020), which subsequently lead to the determination of entrepreneurial intentions.

Entrepreneurial Intention

Entrepreneurial intention has been identified as the major cognitive component that will motivate individuals' entrepreneurial actions (Fini et al., 2009). According to Fayolle (2000), intention has been defined as an individual's will to formulate an intended action. This desire to be an entrepreneur is regarded as the most influential factor in the formation of business initiatives (Ajzen 1987; Luthje & Franke, 2003). Entrepreneurial intentions have been given

meaning in various ways by prior scholars. It is identified as a factor associated with human mind which is capable of driving an individual towards specific actions related to entrepreneurship (Bird, 1998). Another interpretation on entrepreneurial intention is that it illuminates the intensity of an individual to embrace new business opportunities (Hisrish, 1990).

Entrepreneurial intent is in fact, further identified as a person's intention to establish a business or become self-employed (Ellen et al., 2011; Pruett 2012). Furthermore, it refers to the state of mind of an individual which causes a person to become entrepreneurial (Linan & Rodriguez, 2004). Being a topic in contemporary discussion, entrepreneurial intention is argued to be impacted by a wide variety of factors such as personality (Zhao et al., 2010; Vecchio, 2003), gender (Wilson et al., 2007; Nguyen, 2018), family background (Alsos et al., 2011; Drennan et al., 2005), institutional factors (Fishbein and Ajzen, 2010) as well as cognitive factors such as self-efficacy (Markman et al., 2002).

Theoretical Underpinning

Kolb's Model of Experiential Learning

Kolb's Experiential Learning Model describes learning by giving strong emphasis on experience as a factor and emphasizes learning as a process of knowledge creation via collecting and transforming experiences (Kolb, 1984). As per this theory, effective learning is facilitated only in instances where a learner is exposed to all four stages proposed by the Kolb's experiential learning cycle: namely concrete experience (CE), reflective observation (RO), abstract

conceptualization (AC) and active experimentation (AE). The first phase of the cycle (CE) relates to the strong feel an individual is obtaining regarding a task, via the active engagement on the respective learning task. The second phase (RO), is the stage where the learner who was previously exposed to the feeling or experience, subsequently sets back and contemplates and reflects on the experience or the feeling. At this stage the learner initiates discussions with peers regarding the feeling or experience related to the learning object. Communication if often identified as the key success factor at this stage of experiential learning, for communication allows an individual to trace any deviations of self-understanding in comparison to understanding received by peers on the learning object. The third stage of the cycle, (AC), involves in building connections. The connections are built with the conclusions about experiences gained, with prior knowledge gained as well as with discussions of related facts and theories with peers. When a learner reaches towards the third stage, he is shifted from a reflective stage to a conceptualization stage, where learners create connections among learned concepts and start generalizing related aspects based on the conceptualizations. The final stage of the model, (AE), is the stage where knowledge application starts. The prior knowledge gained via the initial three stages is now applied to new experiences, hence is identified as the practical phase of the Kolb's model.
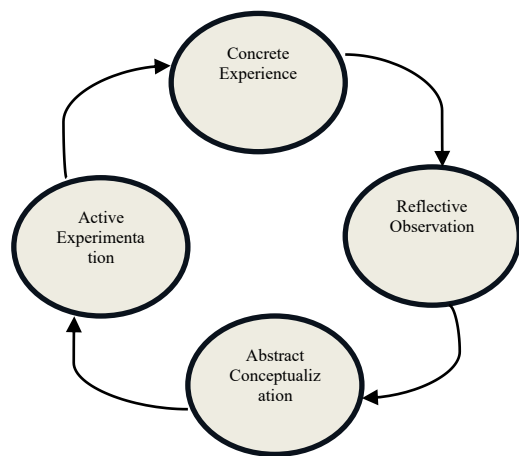
Figure 1. Kolb's Experiential Learning Cycle Source: Kolb (1984).

Development of Propositions

Experiential Learning and Entreprenurial Self-efficacy

Experiential learning is often identified by scholars as a learning mechanism that encourages and concentrates on practical learning and student interactions (Nabi et al., 2017) where the learner actively participates in the generation of knowledge through a process of experiencing, reflecting, thinking, and actioning out the needful (Kolb, 2014). Individuals have the opportunity to enhance their belief in their own entrepreneurial abilities through observational learning, which enables them to acquire similar experiences (Lin et al., 2023). As such, learning which is experiential in nature tends to trigger a positive sense of confidence in the minds of individuals given the practicalities to which they are being exposed (Chen et al., 2015). Therefore, it is proposed that:

P1: Experiential learning impacts entrepreneurial self-efficacy

Entreprenurial Self-efficacy and Entreprenurial Intention

According to the social cognitive theory, there is a clear indication that the development of entrepreneurial self-confidence plays a crucial role in shaping one's inclination toward entrepreneurial aspirations (Bandura, 1997). Individuals who possess higher levels of self-confidence are more likely to be motivated to embark on risky career paths, such as initiating their own business ventures (Brockhaus et al., 1986). The perception individuals have of their own abilities plays a significant part in influencing their career decisions (McGee et al., 2009; Zhao et al., 2005). Hence, entrepreneurial self-confidence acts as a significant catalyst for fostering entrepreneurial intentions, as it drives individuals toward pursuing an entrepreneurial career (Linan and Chen, 2009; Renko et al., 2021). Therefore, it is proposed that:

P2: Entreprenurial self-efficacy impacts entrepreneurial intention.
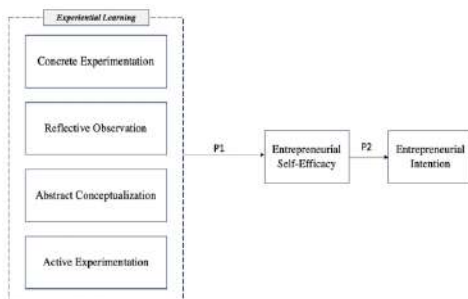
Proposed Conceptualization

Source: Author

Theoretical Implications

The present study considers experiential learning as a multi-dimensional construct, based on Kolb's Model of Experiential

Learning, and posits that these multidimensional elements collectively impact the entrepreneurial self-efficacy of individuals, which in turn impacts individual's intentions towards entrepreneurship. The extant base of scholarly studies related to entrepreneurial intention seems to have shown little focus on experiential learning's multi-dimensional nature, even though experiential learning has been taken as a stand-alone construct, in determining its associations with entrepreneurial intention. In this vein, the present study proposes a conceptualization that adds theoretical value to the stream of entrepreneurial studies, by broadening the scope of theoretical insight shed on the concept of experiential learning and its association with entrepreneurial self-efficacy and entrepreneurial intentions of individuals.

Managerial Implications

This paper illuminates several managerial and practical implications, primarily related to the insights it reveals about multiple dimensions of experiential learning and entrepreneurial intention. The study proposes that when learning experiences facilitate an individual's exposure to specific circumstances (*feel /concrete experience*), unfold a platform to contemplate, reflect, and discuss the gained experience (*watch / reflective observation*), encourage to creation of links between the experience gained and previous or familiar knowledge (*thinking / abstract conceptualization*) and provides an opportunity to apply the learnings from experiences (*doing / active experimentation*), entrepreneurial self-efficacy is triggered which subsequently triggers positive intentions towards

entrepreneurship. This could be considered a key takeaway for education policymakers of countries interested in boosting the overall entrepreneurial activity levels of countries. As such, experiential learning mechanisms could strategically be infused into the overall education system of countries, incepting at educational policy levels. This can be done by the educational policymakers, via the inclusion of methods and mechanisms related to experiential learning in the school curriculums. If experiential learning could be fostered from primary levels of education in the school system through well thought and structured, modules, subjects, activities, etc., better-expected results in terms of triggering entrepreneurial intentions could be gained, which would subsequently lead to heightened levels of entrepreneurial activities among the future generations of a country.

Future Research Directions

The proposed conceptualization of this paper sets interesting future research directions. Since the model proposed by this paper is not empirically validated, future researchers could consider its empirical validation in suitable contexts. Furthermore, the multidimensional model of experiential learning and its association with entrepreneurial self-efficacy could be examined as an antecedent factor for aspects such as career intention and career orientation, in future studies.

3. CONCLUSION

This paper conceptualizes experiential learning as a multidimensional construct based on Kolb's Model of Experiential Learning and argues that these dimensionalities collectively impact the intentions of individuals towards entrepreneurship, through its impact on entrepreneurial self-efficacy. In fact, it sets direction and focus towards being exposed to experiences, contemplating about exposed experiences, linking such experiences to previous knowledge, and providing opportunities for experience application as the core of experiential learning, which is argued to be influential towards entrepreneurial self-efficacy as well as to be strong triggers of entrepreneurial intentions of individuals.

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The Impact of Work – Life Balance on Executives' Job Satisfaction: Special Reference to Private Bank of Sri Lanka

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ABSTRACT

Work-life balance (WLB) has emerged as one of the major problems that many employees worldwide are currently dealing with. It has been acknowledged that maintaining a work-life balance is a problem that matters to both individuals and organizations strategically. The purpose of this study was to determine the significant impact that work-life balance has on job satisfaction in executive-level workers of the Private Bank of Sri Lanka. Banking industry is a more responsible and crucial industry to work because of that differs from other careers. By doing this study, tested the impact of the independent variable which is work life balance with three dimensions (Workplace culture, work pressure, Flexible hours) to the dependent variable, which is job satisfaction. The study conducted among 269 executive level employees in Private Bank of Sri Lanka. Through the finding of this research, it was proven that. There is a significant impact of work life balance on executive employee job satisfaction of Private Bank of Sri Lanka. The study, therefore, recommends Private Bank of Sri Lanka's management to develop and implement work-life balance strategies that improve employee job satisfaction, and these strategies should be implemented at all employee levels.

Keywords **- Job Satisfaction, Work-life Balance, Workplace Culture, Work Pressure**

1. INTRODUCTION

1.1 Background of the Research

Human Resources Management (HRM) is the effective and efficient utilization of human resources to achieve goals and objectives of an organization. Henceforward, each business is exceptional to use its human resources in coherent and operational method to achieve the expected goals and objectives (Opatha, 2009). Work-Life Balance (WLB) is becoming

distinctive vocabulary in HRM, and it has turn into a top priority for employees in every organization. Work-life balance is a key concern in everyday discourses (Greenhaus & Allen, 2011). WLB has a significant impact on how employees perceive their workplace and their personal lives. When managing highly competitive knowledge workers, the boundary between work and life could be crucial. (Scholarios & Marks, 2006). Individuals subjectively measuring balance the work and the leisure of their life (Guest, 2016). Is in contract with prevailing view that considered balance to be equivalent to low role conflict (Duxbury & Higgins, 2001), to high role enrichment or to an equal division of time and attention amongst the several roles that compose an individual life system (Marks & MacDermid, 1996). Furthermore, the concept of balance between personal and professional life emerges since the responsiveness that an individual's career life and private life may have incompatible difficulties. Balance between personal and professional life is founded on the evidence that one and all should have extensive life in which relevant amounts of time is given to the personal welfare and family concern (Doherty & Manfredi, 2006). There are three dimensions of WLB balance which have been taken into consideration to do the further investigations including

Workplace Culture, Flexible hours and work pressure. A License Commercial Banks (LCB) and Licensed Specialized Banks (LSB) are governed the financial system and for the highest share of the total assets financial system in banking sector in Sri Lanka. Banks play a critical role in local financial system, as they are characteristics of assets (Central Bank of Sri Lanka, 2023). Therefore, individuals who work at banks have higher risk and more responsibility and they are working under pressure (Kumari, 2012). In nature bankers did not have flexible working hours, because the banking sector is one of the essential sectors. Because of that, to balance their work and life organizations have to put extra effort. This research is aimed to examine the impact of WLB on executives' JS in Private Bank of Sri Lanka.

1.2 Problem Statement

In comparison to other industries, the banking industry is seen to be extremely competitive. Generally, a banker's work is believed to be very demanding, and the business must take appropriate efforts to ensure that its staff is content. Long working hours, excessive stress, and job expectations are the reasons for employee job unhappiness, which have an impact on worker efficiency and effectiveness in the organization (Adikaram, 2016). Work-life

stability will benefit workers, allowing them to be satisfied with their careers (Aflah & Mirza, 2020). Banks in Sri Lanka are normally open from 9.00 in the morning to 5:00 p.m. Furthermore, since there is no time restriction at first, workers are compelled to work long shifts owing to unexpected workloads, and workers are obliged to work rapidly in workplaces under strict deadlines, which is also a difficulty relative to other jobs. As a result, numerous employees recently raised worries regarding work-life balance and work pressure (Adikaram, 2016). Even though various studies about WLB and job satisfaction have been undertaken throughout the world, only a few studies on a similar issue have been taken out in the Sri Lankan context, particularly in the banking industry Therefore, this study examines the Impact of WLB on executives JS in Private Bank in Sri Lanka in spite of the importance of WLB to achieve worker occupational fulfillments.

1.3 Objectives of the Study

General Objective

- To examine the impact of work life balance on job satisfaction of executive employees in Private Bank of Sri Lanka.

Specific Objectives

- To examine the impact of workplace culture on job satisfaction of executive employees in Private Bank of Sri Lanka.
- To examine the impact of work pressure

on job satisfaction of executive employees in Private Bank of Sri Lanka.
- To examine the impact of flexible hours on job satisfaction of executive employees in Private Bank of Sri Lanka.

1.4 Significance of the Study

Through the establishment of practical strategies for maintaining a balance between employees' flexibility at work and in their personal lives, this study will assist organizations in achieving their goals and objectives and this study will help organizations to use several ways to support employees WLB. Live to work, or Work to live? It is a question that numerous members of the modern workforce are asking themselves. Hence, this study is significant to employees. It is important to society, management of organization, economy, and government to identify the value of work life balance practices on employee job satisfaction.

2. LITERATURE REVIEW AND THEORETICAL DEVELOPMENT

2.1 Work life balance

The literature on work-life balance offers a wide range of results that have been investigated and published globally in recent years. Human resource management is becoming more concerned with the causes and effects of this clash between these two points of view, particularly in relation to the work-family divide (Doherty & Manfredi, 2006). Work life balancing (WLB) is a practical concept that aligns workers' attention, exertion, and energy between their occupations and other important aspects of

their lives (Shantha, 2019). Businesses monitor and boost productivity in an effort to stay competitive. (Suriani, Nurul, & Khairunneezam, 2017). WLB is a significant element in the intrinsic components of work satisfaction. Workers put in more effort at work in order to be recognized and rewarded more highly (Yadav & Dabhade, 2014). Maintaining a work-life balance involves more than simply setting aside time for work and leisure activities; it also involves managing many tasks and obligations and reducing conflict between these two domains. (Isa, Kumarasamy, and Pangil, Mohd, 2015). Companies have long understood that in order to support a WLB, employees' lives with their families must be valued and performed at a high level on a regular basis.

2.2 Job satisfaction

According to Aflah and Mirza (2020), job satisfaction is a measure of an employee's happiness with their work, independent of the employee's preference for the vocation or specific aspects of the job, such as the kind of work or supervision. Cognitive, affective, and behavioral aspects of the person may be evaluated. When someone says they are more satisfied with their job, it implies that they take pride in their work and love their employment. Job satisfaction is defined as any set of psychological, physiological, and environmental factors

that lead someone to genuinely state, "I am satisfied with my job" (Hoppock, 1935). Although JS is influenced by numerous external circumstances, it is still an interior issue that pertains to the employee's feelings. That is JS presents a set of factors that cause a feeling of satisfaction. JS stands for a collection of attitudes that employees have regarding their work, whether they are favorable or unfavorable. Meanwhile, a worker who joins an organization carries with them needs, wants, and experiences that shape expectations that they had previously discounted. JS is a measure of how well expectations match actual rewards. JS is intricately linked to that individual's behavior in the workplace.

2.3 Workplace Culture

Workplace culture is a multifaceted concept that encompasses the shared values, beliefs, attitudes, and behaviors within an organization. It plays a crucial role in shaping the work environment and influencing employee experiences. Work-life balance, on the other hand, refers to the equilibrium between professional responsibilities and personal life. The interplay between workplace culture and work-life balance is significant, as the former can either support or hinder the achievement of the latter.

Several scholars have explored the

relationship between workplace culture and work-life balance. One notable study is "The impact of organizational culture on work-life balance (Kalliath, 2010).The authors emphasize that a positive workplace culture fosters an environment where employees feel supported in managing their work and personal lives, ultimately contributing to better work-life balance. As mentioned by (Sirgy, 2001) , a new measure of quality of work life (QWL) based on need satisfaction and spillover theories" (Social Indicators Research) highlights the importance of a positive work culture in enhancing employees' overall quality of work life, which includes aspects of work-life balance.

2.4 Work pressure

Work pressure, as a dimension of work-life balance, refers to the amount and intensity of demands and expectations placed on an individual in the workplace. It encompasses factors such as workload, deadlines, and the overall pace and stress associated with one's job responsibilities. The concept is integral to understanding the challenges individuals face in balancing their professional and personal lives. Work pressure has been widely recognized as a significant factor affecting the well-being of employees and their ability to achieve a satisfactory work-life balance. Several studies and scholarly

articles contribute to the understanding of work pressure and its implications for individuals and organizations. A study by Greenhaus and Beutell (1985) proposed the widely accepted model of work-family interface, which includes the concept of work pressure as a key element affecting the balance between work and family life (Greenhaus J. H., 1985).Furthermore, research by Frone (2003) explored the relationship between work-family conflict and various job-related stressors, including work pressure. The study emphasized the need for organizations to address work pressure and create supportive environments to promote a healthier work-life balance (Frone, 2003).

2.5 Flexible Hours

Flexible hours empower employees with a sense of control and autonomy over their work schedules. This autonomy can contribute to a better work-life balance by enabling individuals to align their work hours with their personal preferences and responsibilities (Golden, 2006).The ability to adapt work hours to personal needs can reduce stress and burnout. This adaptability helps individuals manage competing demands from work and personal life, potentially enhancing overall well-being (Hill, 2001).

3. RESEARCH METHODOLOGY

In the current study, the researcher used the logical method to reach a reasonable conclusion. This study can be categorized under the ontology philosophy, and it is conducted as a cross-sectional study and a deductive approach was used. The present research is a quantitative study because it gathered data from a self-administered questionnaire and the data analysis procedure was done quantitatively. Because the researcher aims to investigate the impact of the work life balance on job satisfaction. The individual is the object of analysis in this work. The time horizon is cross-sectional because the present research was performed by collecting data all at once to answer the issue. The operational workers are focused as the unit of the analysis. The study's population was identified as 850 executive-level employees, in the selected Private Bank of Sri Lanka and 269 executive-level employees were chosen as the study's sample using a simple random sampling method refers to the Morgan Table.

3.1 Conceptual Framework
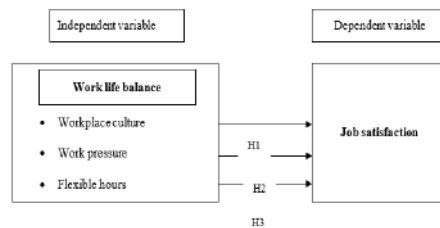
Figure 1: Conceptual Framework
(Author Developed,2023)

3.2 Hypothesis of the Study

H1: There is a significant impact of workplace culture on the Job satisfaction in executives in Private Bank of Sri Lanka.

Existing research claimed that the relationship between workplace culture and work-life balance (Kalliath, 2010) and this hypothesis is developed to test the impact of workplace culture on the Job satisfaction in executives in Private Bank of Sri Lanka.

H2: There is significant impact of work pressure on Job Satisfaction in executives in Private Bank of Sri Lanka.

Existing research claimed that work pressure may impact to employee's job satisfaction (Ali & Farooqi, 2014). A hypothesis is developed as follows based on the findings of the existing research studies.

H3: There is significant impact of flexible hours on Job Satisfaction in executives in Private Bank of Sri Lanka.

Existing research claimed that the relationship between the flexible working hours and job satisfaction (Hill, 2001) and this hypothesis is developed to test the

impact of flexible working hours on the Job satisfaction in executives in Private Bank of Sri Lanka.

4. DATA ANALYSIS AND DISCUSSION

4.1 Profile of Sample

The researcher got 270 replies from operational workers. Out of 270 respondents, Will regard to gender, the percentage of male is 71.3% and female is 28.7% separately. Concern on category, the information showed that the vast majority of responders were under 36-45 years old, 45.2% and the next highest age category is between 26-35 years old, 32.7%, next 45 years & above and a small portion of participants were between 18-25 years old. In terms of experience in the Bank, 46.7% of respondents have experience between 6-10 years, 32.4% have 11-15 years, 11.4% employees have between 16-20 years' experience, the rest of other 9.6% have 1–5 years' experience. 9.2%. Their marital status higher position is married appeared as 89% and unmarried 11%. In this responds 85.7% of participants have dependents and 14.3% participants did not have dependents.

4.2 Reliability Analysis

This study is used to evaluate the measurement models' consistency and reliability. Under this, reliability tests were examined, and factor analysis was used to assess the veracity of the topics shared in the surveys.

Table 1: Reliability Analysis

Variable	Cronbach's Alpha
Workplace culture	0.816
Work pressure	0.803
Flexible hours	0.754
Jon satisfaction	0.887

Source: Analyzed Data, 2023

A reliability test was conducted to confirm the internal consistency and applicability of the measurements used in the study. To ensure the reliability of the instrument, the general test is Cronbach's Alpha value. Therefore, the reliability of the four variables is tested by using Cronbach's Alpha test. The above results lead to the conclusion that respondents' replies to every item in a measure will be consistent. As a result, the tools that were used to measure each variable in this study are reliable.

4.3 Validity Analysis

Table 2: Exploratory Factor Analysis

Variable	KMO value	Bartlett's value
Workplace culture	0.803	0.000
Work pressure	0.761	0.000
Flexible hours	0.748	0.000
Job satisfaction	0.916	0.000

The method of exploratory factor analysis is used to condense data into a more organized group of summary variables and to investigate the underlying theoretical framework of the phenomenon. After checking content validity and face validity to further conformation can use Exploratory factor analysis. In this study 4 variables also

examined by this analysis, for that use KMO and Bartlett's Test values, it should be above 0.05 in KMO test and less than 0.05 in Bartlett's test.

4.4 Multiple Regression Analysis

Table 3: Regression Model

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.727[a]	0.529	0.518	.36671

Source: Analyzed Data, 2023

model summary table explain the influence on dependent variable. To describe this table most suitable value is Adjusted R square value, based on the results adjusted R square value is 0.518 it means that 51.8% of variance in job satisfaction is explained by workplace culture, work pressure and flexible hours as dimensions of work life balance.

Table 4: ANOVA Table

ANOVA						
	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.769	3	0.923	19.005	.000[b]
	Residual	13.014	268	0.049		
	Total	15.782	271			

Source: Analyzed Data, 2023

ANOVA table if the corresponding sig. value is less than 0.05 can conclude at 95% confidence interval regression model is statistically significant. Therefore, test results appear as sig. value as 0.000 then the regression model is statistically significant.

Table 5: Regression Model-Coefficients

Model	Unstandardizd Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.724	.301		9.053	.000
Workplace Culture	.196	.061	.192	3.225	.000
Work pressure	.197	.027	.288	4.855	.000
Flexible hours	.242	.041	.182	2.325	.000

Source: Analyzed Data, 2023

When evaluating the five independent factors, the significance values must be less than 0.05 to be accepted as significant, and the value of beta is positive, indicating a positive effect. Job satisfaction is positively impacted by workplace culture (beta value: 0.192, sig. 0.00). It has found that there is positive impact of work pressure on job satisfaction (beta value: 0.288, sig. 0.00). It has found that there is positive impact of flexible hours on job satisfaction (beta value: 0.182, sig. 0.00). There is statistical evidence to claim that executives work life balance positively and significantly impact on their Job satisfaction. Therefore, three hypotheses are accepted.

5. DISCUSSION OF FINDINGS

The purpose of this study was to determine whether WLB had an impact on JS. Based on regression analysis and hypothesis

analysis there is a significant impact between WLB and JS. By hypothesis analysis can conclude that WLB and JS have significant impact, on executives in Private bank in Sri Lanka. In this study three dimensions of WLB were tested individually with JS. According to suggest results three dimensions of WLB has a significant impact on JS. Finding of the study indicate that workplace culture, work pressure and flexible hours have impact on the job satisfaction. Ultimate findings prove that work life balance directly impact to job satisfaction.

7. CONCLUSION

The primary goal of this research was to determine the effect of work life balance on job satisfaction in executive-level employees. The position was proven to have a good and substantial impact on job satisfaction under the workplace culture, work pressure and flexible hours .This research determined the knowledge related to the work life balance and its impact on job satisfaction. Moreover, this research provided facts to prove that there is a strong impact, yet this research has limited to only one sector and hence more research has to be conducted on the other sectors as well. The achievement of a work-life balance significantly improves job satisfaction. Employees experience lower stress levels, higher productivity, and greater general wellbeing when they are able to manage their time and commitments both at work and in their personal lives. A positive work-life balance enables people to put their needs and relationships first, which increases job satisfaction and degree of dedication to their work. Employers are more likely to establish a healthy work environment and retain brilliant workers if they understand the value of work-life balance and offer flexible work arrangements and support networks for their employees. In the end, funding work-life initiatives improves both the organization's productivity and long-term performance in addition to its workforce.

8. DIRECTIONS FOR FUTURE RESEARCH

The main aim of this study was to identify the impact of work life balance on executive-level employee job satisfaction in Private Bank of Sri Lanka. Further research studies should consider alternative methods, such as longitudinal study among non-executive instead of cross-sectional survey design to measure these variables.

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Impact Of Implementation of Green HRM Practices on Job Performance of Executive Level Employees: With Reference to The Leading Apparel Manufacturing Company in The Colombo District

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ABSTRACT

The Green HRM concept is still emerging and at its infancy age, although organizations have started to realize and recognize the importance of these practices and to align their organizational and strategic goals with eco-friendly HR practices. The study aims to discuss the impact of the implementation of GHRM practices on executive job performance. The problem of the study was derived by considering the gap between the theoretical gap and empirical gap regarding the impact of green practices on employee job performance. This study was conducted using a sample of 56 executive-level employees in the selected apparel manufacturing company. Simple random sampling techniques were used and a well-structured questionnaire with a five-point Likert scale was distributed among participants for data collection. The unit of analysis was individual, and the study was cross-sectional. The data were analyzed using SPSS 26 for validity, reliability, and relationship testing. According to research findings, the main finding is there is a significant impact on the implementation of GHRM practices on the executive job performance of selected apparel manufacturing companies and there is a moderating effect of green lifestyle on the relationship between GHRM practices and executive job performance of selected an apparel manufacturing company. Limitations of the study are that it doesn't consider the impact of organizational level and the study was cross-sectional in nature.

Keywords - **Environmental Sustainability, Green HRM Practices, Green lifestyle, Green human resource management, and Job performance**

1. INTRODUCTION

1.1 Background of the Research

Sustainability is perhaps the most important challenge being faced by every organization in the world including Sri Lanka. International Institute for Sustainable Development presented a business definition of sustainable development in its report, in 1992 as follows: "Adopting business strategies and activities that meet the needs of the enterprise and its stakeholders today

while protecting, sustaining and enhancing the human and natural resources that will be needed in the future." Within the Sri Lankan contemporary business and Human Resource Management (HRM) context, enterprises struggle to persist and succeed in the dynamic business environment by adopting the most innovative business and environmental trends. Due to the rapid development and fluctuations in the natural environment, organizations have to adopt more sustainable eco-friendly business and HRM practices and accomplishments.

According to worldwide consensus, it has initiated to appear around the need for proactive ecological management. Moreover, modern society is functioning in a world where the environment is struggling to persist. The term green human resource management means doing business in an approach that reduces waste, protects energy, and commonly promotes sustainability and environmental health (Renwick, Redman, and Maguire, 2008). Environmental concern has become a serious concern now under HRM and there is an emerging field of HRM titled Green Human Resource Management. Sustainable HRM is the utilization of HRM tools to help embed a sustainability strategy in the organization and the creation of an HRM system that contributes to the sustainable performance of the firm. Sustainable HRM, "is that part of Human Resource Management which is concerned with planet-related matters, society-related matters, and profit-related matters. It aims to maximize environmental, social, and economic performance. (Opatha and

Arulrajah, 2014). According to Prasad (2013), the term green human resources management is used to denote the involvement of an organization towards the HR policies and practices that are aligned with a comprehensive corporate ecological schedule of protection and preservation of natural resources. GHRM is concerned with the systematic and planned alignment of typical human resource management practices with ecological objectives of the organizations. Zaid and Jaaron (2018), Green personal behaviour means the degree to which individuals take necessary actions towards becoming green in personal life (Opatha, 2019). According to Opatha (2019) people who have higher knowledge about greening and a positive attitude towards greening, highly engage in green personal behaviors. (Opatha, 2019). The promotion of employee green behaviour will increase the value of the organization as an environmentally responsible organization (Bohlmann et al., 2018). Green HRM encompasses two major elements: environmentally friendly HR practices and the preservation of the knowledge capital. Present study, focus on Green HRM as a strategic initiative by the corporate to promote sustainable business practices. (Jenny Dumont,2016). Muster and Schrader (2011) showing how job performance of employees was improved in companies with GHRM practices. But there is no research done in Srilanka to study the impact of human resource management and individual job performance. This study aims to enhance the awareness of the green human resource practices in Sri Lanka organizations and

investigate how the implementation of GHRM practices impact towards the employee job performance.

1.2 Problem Statement

Implementing GHRM practices in the workplace may improve employee's job performance. This study shows that the implementation of GHRM has an effect on an employee's lifestyle and also on their job performance and suggests that organizations can contribute to the environment and also maintain employees' good performance. (Paro Ragas, Angub Tantay,2017).

Most of companies in Sri Lanka, are struggling to implemented GHRM Practices within their companies, still they don't have a clear idea of GHRM Practices and its importance to their performances. This finding was in line with Muster and Schrader (2011) showing how the job performance of employees was improved in companies with GHRM practices. However, there is no research done in the Sri Lankan context to investigate the impact of GHRM activities on job performance. It seems that there is an important gap in the theoretical and empirical knowledge available, especially in Sri Lanka about the impact of GHRM practices on the employee job performance of executive-level employees in Western province. Thus, the problem statement of the study is, to identify the impact of the implementation of Green HRM Practices on the executive job performance of selected apparel manufacturing companies in the Colombo District.

1.3 Research Objectives

Main objective

- To find out the impact of the Implementation of Green HRM Practices on the executive job performance of selected apparel manufacturing company in the Colombo District.

Specific Objectives

- Is there any significant relationship between the implementation of GHRM practices and the executive job performance of selected apparel manufacturing company in the Colombo District?

1.4 Significance of the Study

The term "green human resource management" seems to be a novel concept to the majority of Sri Lankan people including academics and professionals in HRM. Of course, some people have never heard about this concept and some people who have heard about the concept are not clear about what it is. (Opatha, 2013). Generally studying GHRM Practices, why it is important, and how they impact individual & organizational performance is very important. A green lifestyle is applying green behaviors to one's daily practices. A green lifestyle may impact workplace green practices and to job performance of the employees. There is no published research showing empirical evidence about the impact of the implementation of GHRM practices on employee job performance and how a green lifestyle moderates the impact

of the relationship between green practices and the job performance of Sri Lankan organizations. Scholars in Human Resource practice can use the study as a reference for further research on the topic or related topics. This study will also help in developing existing theories by coming up with new dimensions. The findings of this study may be useful for enhancing awareness of GHRM of the relevant employees in the relevant manufacturing firm and implementing new policies and rules relevant to the GHRM.

2. LITERATURE REVIEW

2.1 Evolution of Green Human Resource Management.

The term 'green human resource management' can be identified as a newly evolved concept to the majority of Sri Lankan people including academics and professionals in human resource management. Of course, there may be people who have never heard about this concept, and some people who have heard about the concept may not have a clear idea about what is it. (Opatha2013, Vol. 01, No. 01) when exploring the origination of the green human resource management concept, it perhaps originated in 1996 from the contribution by Wehrmeyer (1996) who edited a book titled Greening People Human Resources and Environmental Management (as in Jackson, Renwick, Jabbour, & Muller-Camen, 2011). There is an upcoming trend in GHRM outside Sri Lanka when go through the literature. Therefore, there are some developments and the volume of

scholarly work focusing on green HRM remains small, making clearly the field of green HRM young and there are many gaps to be filled theoretically and empirically as well (Jackson et al., 2011). Research on Green HRM done in Sri Lanka is an upcoming trend.

2.2 Green Human Resource Management

Therefore, the term "Green HRM" seems to be a novel concept to the majority of Sri Lankan research settings including professionals and academics in HRM. green HRM is an emerging field of research in organizational studies after the 1990s. Hence, the objective of this literature review is to explore and record green human resource management practices of organizations based on the existing theoretical and empirical literature.

Green HRM refers to all the activities involved in the development, implementation, and ongoing maintenance of a system that aims at making employees of an organization Green. It is the side of HRM that is concerned with transforming normal employees into green employees to achieve the environmental goals of the organization and finally to make a significant contribution to environmental sustainability. It refers to the policies, practices, and systems that make employees of the organization Green for the benefit of the individual, society, natural environment, and the business. The purpose of Green HRM is to create, enhance, and retain Greening within each employee of the organization so that he or she gives a

maximum individual contribution to each of the four roles, i.e., preservationist, conservationist, non-polluter, and maker. (Opatha,2013, Vol. 01, No. 01).

When examining the theory related to GHRM practices, it consists of two essential fundamentals which are environmentally friendly HR practices and the preservation of natural knowledge. It involves undertaking environment-friendly wits towards greater efficiency, lower costs, and better employee engagement and retention. This helps the organization to reduce negative environmental effects and to improve positive environmental effects.

According to Opatha and Arulrajah (2014), the ultimate purpose of green HRM is to create, enhance, and retain green employees within an organization who give his/her maximum individual contribution to sustainability and green human resource management.

2.3 Sustainability and its importance.

Sustainability is perhaps the most important challenge being faced by every organization in the world including Sri Lanka. International Institute for Sustainable Development presented a business definition of sustainable development in its report, in 1992 as follows: "Adopting business strategies and activities that meet the needs of the enterprise and its stakeholders today while protecting, sustaining and enhancing the human and natural resources that will be needed in the future."

"Sustainable development is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs". (1987, as in Rompa, 2011).Three major conditions should be achieved to accomplish sustainable development. economic growth, environmental protection, and social equity. Therefore, a sustainable future needs to be economically viable, environmentally sound, and socially equitable. "The primary goal of sustainability is to ensure that whole systems remain healthy to improve overall chances of well-being of individuals, societies and organizations" (Opatha, 2019, p.2).

Environmental-related issues are one of the most complex and significant managerial challenges of the twenty-first century (Rugman and Verbeke, 1998). They include climate changes, natural resource depletion and destruction, and reduction of biodiversity and ecosystem integrity. excessive fuel combustion affects the global climate with the production of greenhouse gases and localized production of acid rain, low-lying ozone, and mining and production of fuels destroy biodiversity and ecosystem, and the reduction of biodiversity results in greater vulnerability of the planet to ecological stresses. (Fournier and Westervelt,2005).

2.4 GHRM Practices

2.4.1 Environmental Sustainability and Green Health

Environmental preservation is now a growing trend in society. Organizations are being pressured by different sources to practice this trend as it will have an impact on society (McGuire and Germain, 2015).

GHRM is when business organizations implement HR policies, programs, processes, and techniques that bring environmental impact and sustainability practices to the organization (Dutta, 2012; Nijhawan, 2014; Arulrajah et al., 2015). It is the role of HR to train and empower employees to practice environmental sustainability by integrating environmental practices into HR policies. (Ragas &Tantay,2016). Different researchers describe Green HRM in different ways, but somehow their intentions are the same for the sustainability of Human resources and their environment.

GHRM is when a company adopts HR strategies, programs, procedures, and methods that deliver the organization's environmental effect and sustainability procedures (Dutta, 2012; Nijhawan, 2014; Arulrajah, Opatha & Nawaratne, 2015). GHRM could be incorporated into countless HR procedures (Nijhawan, 2014). These GHRM procedures may lead to higher efficiencies, reduced expenses, better staff involvement (Mathapati, 2013), better environmental effects (Arulrajah, et al, 2015), and higher organizational efficiency (Wong, Tan, Ng, & Fong, 2013).

Here are some environmental-friendly solutions to stay Green i.e.: Green Printing, Green Manufacturing and Disposal of Staff ID cards, Job sharing (sharing a full-time job between two employees), Teleconferencing and virtual interviews, Recycling, Telecommuting, Online Training, Reducing employee carbon footprints by the likes of electronic filling, Green HR involves

reducing carbon footprint via less printing of paper, video conferencing and interviews, Energy efficient office spaces, Green Payroll, Car Pooling, Public Transport, Company Transport, Flexi-Work, and e-filing.

Following are the few dimensions coming under Environmental sustainability and green health.

Switching to laptops over desktop computers (laptops consume up to 90% less power compared to desktops, implementing green-themed games to promote environmentally friendly behavior and staff togetherness, using the web or teleconferencing to reduce traveling and the use of gas-emitting vehicles, making employees aware of pollution reduction using education and training and recycling cans and bottles used by the employees or those coming from the pantry.

2.4.2 Waste segregation

Waste management is an overall approach to prevent waste and it combines a range of collection and treatment methods to handle all materials in the waste stream in an environmentally effective, economically affordable, and socially acceptable way (McDougal, 2001). Waste management in organizations is not only concerned with the output of the operations that damage the environment but of great essence is the input of resources as well as the totality of systems and processes involved in the operation of production facilities (Kirk, 1998). Kirk (1998) indicates that proper waste management practices are of much value to

a firm's operational performance in that: they improve efficiency in service delivery, reduce the organizations' operational cost through efficient operations, reduce time spent to offer service, and enhance quality of service, and productivity. As a result, the organization's image is improved in the eyes of the public enhancing the company's competitive advantage (Kirk, 1996).

2.5 Employee Job Performance

The implementation of green HRM by an organization can affect the organization in achieving competitive advantages. Pandey (2013) stated that the implementation of green HRM by an organization could improve the performance results of its employees. Job performance is the behavior of employees in doing their jobs (Jankingthong and Rurkkhum, 2012). In a study conducted by Delmas and Pekovic (2013), they found that when companies adopt environmental standards, they tend to have higher labor productivity. According to Borman and Motowidlo (1993), as cited in Jankingthong and Rurkkhum (2012), these behaviors include how much they contribute and shape the organization. Referring to the environmental responsibilities to the employees, getting positive feedback from the supervisor or managers helps to boost employees' knowledge, skills, and abilities, and at the same time it helps to increase the motivation of the employees (Tan et al., 2019). It can also be presumed, however, that the business can shape the environmental perception of the employee. Employee job performance is measured through Task competency, flexibility

&efficiency, professional development, and work efficiency. Task competency - Competence means having the ability to do something well. Capable of performing a task or job effectively. It refers to easily identifying problems and creating solutions, being able to initiate actions to solve problems, and being able to meet work deadlines, etc. (Paro Ragas and Angub Tantay,2017).

Flexibility & Efficiency- Efficiency is the fundamental reduction in the number of wasted resources that are used to produce a given number of goods or services (output). Economic efficiency results from the optimization of resource use to best serve an economy. It refers to communicating professionally with my colleagues and supervisors, working without supervision, exhibiting leadership skills, and accomplishing tasks with efficiency. (Paro Ragas and Angub Tantay,2017)

Professional Development- Professional development refers to instructors developing and improving their skills to better meet the needs of the employees. It refers to consulting others for their opinions/insights about possible solutions to problems and how I can improve myself and find ways to improve myself and my job performance etc. (Paro Ragas and Angub Tantay,2017).

Work Efficiency- Working efficiently results in a higher produced volume from the same amount of resource input. It refers for able to fully concentrate on my work & ignore distractions, able to breathe in my workspace as it is organized, clean, and

orderly, and use my time effectively. (Paro Ragas and Angub Tantay,2017).

3. RESEARCH METHODOLOGY

3.1 Conceptual Framework

The framework is developed based on the AMO theory of acceptance and use of technology presented in the literature review. Since the research follows the deductive strategy, the conceptual framework has been developed and aligned with theoretical and empirical justifications. The model provides a framework for research design and data analysis.
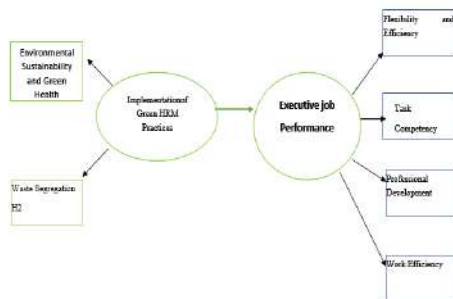
Figure 2 illustrates the conceptual framework.

Source: Adopted from AMO theory in HRM (Appelbaum et al., 2000) Ragas, Tantay, & Sunio (2017). Green lifestyle moderates GHRM's impact on job performance.

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3.2 Hypothesis of the study

The conducted literature review found that contextual factors of effort expectancy and performance expectancy were affected by the individual-level adaptation of GHRM practices (Fitz-enz, 2013). The following hypotheses were developed based on the conceptual framework.

H1- There is a significant impact of the implementation of GHRM practices on the executive job performance of selected apparel manufacturing company.

H2- There is a relationship between the implementation of GHRM practices on the executive job performance of selected apparel manufacturing company.

4. RESEARCH METHODOLOGY

In the current study, the researcher used the random sampling technique to reach a reasonable conclusion. The purpose of this study is hypothesis testing (analytical and predictive). The research approach for this study is quantitative. Research Strategy for the proposed study, survey method. The required data for the study was collected over four weeks from executives in the printed format & through Google Foam. The time horizon of the study is cross-sectional. Using both data sources to collect data (primary and secondary data). The study's population was identified as 68 executive-level employees, in the selected apparel manufacturing company of Sri Lanka, and 58 executive-level employees were chosen as the study's sample using a simple random sampling method referred to the Morgan Table.

An existing research structured questionnaire was used as the data collection method because primary data will be required for this project.

5. DATA ANALYSIS AND DISCUSSION

5.1 Profile of Sample

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.717a	.514	.504	.33068

The researcher got 56 replies from executive workers. Out of 58 respondents, Will regard to gender, the percentage of males is 53.57% and females is 46.43% separately. Concerning category, the information showed that the vast majority of responders were under 31-40 years old, 35.7% and the next highest age category is between 21-30 years old and 4% of responders were in the above 50 years old. In terms of experience in the apparel manufacturing company, 33.9% of respondents have experienced between 1-5 years, 19.6% have 6-10 years, 28.6% of employees have in less than one year, the rest of other 17.9% have more than 10 years of experience. Their marital status higher position is married appeared as 71.4% and unmarried portion is 28.6%. In this response 85.7% of participants have dependents and 14.3% of participants did not have dependents.

Variable	KMO value	Bartlett's value
Green HRM Practices	0.863	0.000
Employee job performance	0.821	0.000

5.2 Reliability Analysis

This study is used to evaluate the measurement models' consistency and reliability. Under this, reliability tests were examined, and factor analysis was used to assess the veracity of the topics shared in the surveys.

Table 1: Reliability Analysis

A reliability test was conducted to confirm the internal consistency and applicability of the measurements used in the study. To ensure the reliability of the instrument, the general test is Cronbach's Alpha value. Therefore, the reliability of the two

variables is tested by using Cronbach's Alpha test. The above results lead to the conclusion that respondents' replies to every item in a measure will be consistent. As a result, the tools that were used to measure each variable in this study are reliable.

5.3 Validity Analysis

Table 2: Exploratory Factor Analysis

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	.578	.460		1.255	.215
Green HRM Practices	.868	.115	.717	7.550	.000

The method of exploratory factor analysis is used to condense data into a more organized group of summary variables and to investigate the underlying theoretical framework of the phenomenon. After checking content validity and face validity to further conformation can use Exploratory factor analysis. In this study 4 variables were also examined by this analysis, for that use KMO and Bartlett's Test values, it should be above 0.05 in KMO test and less than 0.05 in Bartlett's test.

5.4 Multiple Regression Analysis

Table 3: Regression Model

	Instrument	Cronbach's Alpha	No of items
1	Green HRM Practices	0.878	
2	Employee job performance	0.863	12

Source: Analyzed Data, 2023

According to the above analysis, R square is 0.514 which means that 51.4 percent of variance in employee job performance by GHRM Practices. This positive impact is highly significant as sig. value is .000 and this value is less than .01. Thus, it is possible to accept the alternative hypothesis. "There is a significant positive impact from GHRM Practices on employee job performance."

Table 4: ANOVA Table

ANOVA[a]

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	6.233	1	6.233	56.998	.000[b]
Residual	5.905	54	.109		
Total	12.138	55			

Source: Analyzed Data, 2023

ANOVA table if the corresponding sig. value is less than 0.05 can conclude that the 95% confidence interval regression model is statistically significant. Therefore, test results appear as sig. value as 0.000 then the regression model is statistically significant.

According to the above analysis, R square is 0.514 which means that 51.4 percent of variance in employee job performance by GHRM Practices. This positive impact is highly significant as sig. value is .000 and this value is less than .01. Thus, it is possible to accept the alternative hypothesis. "There is a significant positive impact from GHRM Practices on employee job performance." Therefore, there is statistical evidence to claim that the GHRM Practices of an organization positively and significantly impact its employee job performance. The relevant regression equation is,

Employee job performance= .460 + .115* GHRM Practices. This means one unit of GHRM Practices will increase employee job performance by 0.115.

6. DISCUSSION OF FINDINGS

The main objective of the research is to identify the impact of the implementation of Green HRM Practices on the executive job performance of selected apparel manufacturing company in the Colombo District. Based on the AMO theory and theoretical framework is used to test the relationship between the GHRM Practices and employee job performance. According to the findings, it is implied that there is a significant impact of the implementation of GHRM practices on the executive job performance of selected apparel manufacturing company in the Colombo district.The main findings of the research are, it is substantiated that there is a significant impact of the implementation of Green HRM Practices on the executive job performance of selected apparel manufacturing company in the Colombo District. The existence of GHRM Practices has resulted to the 51.4% to the executive job performance of a leading apparel manufacturing company in Colombo district.There is a strong relationship between GHRM practices and executive job performance in selected company. The Pearson correlation between the two variables of executive-level employees is 0.717.

It was found that there is a positive relationship between GHRM Practices and

employee job performance of executive-level employees in a leading apparel manufacturing company in the Colombo district. The correlation between these variables was 0.717. which are significant at the 0.000 level. This correlation was found to be strong as it is more than the lower bound of strong correlation (0.5).

According to the results of simple regression analysis, GHRM was found to have a positive impact on employee job performance with the strength of a b value of 0.687. The multiple regression analysis also revealed that GHRM Practices had a strong effect on executive job performance (the Beta value of 0.568at Sig. t = 0.000). Hence, GHRM Practices were found to be a predictor of executive job performance. From the curve fit analysis, the researcher was able to identify that there is a significant impact of the implementation of GHRM Practices on employee job performance in selected leading apparel manufacturing companies. According to the regression analysis, R square is 0.514 which means that 51.4 percent of variance in employee job performance by GHRM Practices. This positive impact is highly significant as sig. value is .000 and this value is less than .01.

7. CONCLUSION

According to the findings of this study, there is a significant impact of GHRM Practices on executive job performance. Considering the knowledge gap regarding greening as an impediment to green practices. According to Chen and Lai, (2014), it is proposed that regular training courses need to conduct to enhance the employee's and manager's environmental knowledge and awareness (Bansal and Roth, 2000). Organizations should provide relevant training that is required to become normal employees into green employees. According to Paille and Raineri (2016) the Personnel are more likely to engage in green behaviors when they perceive adequate support from the organization. Organization should provide proper assistance for employee green-related initiatives and efforts. At the same time, creating a green culture will be beneficial in improving environmental-related knowledge and awareness. In fact, green HRM is important not only at the organizational level but also at the employee or individual level. An employee has a private life in addition to work life and therefore he or she is an employee at the work life domain and a consumer at the private life domain. Environmentally friendly behavior in both life domain is facilitated. These are the few green human resource management implications that practice in the apparel manufacturing sector are the use natural water rather than refrigerated water for drinking, use both sides of the paper for writing and photocopying, put plants in the working cubicles, include the environmental dimension as duty in the job description, make the new employees familiar with greening efforts of the organization and implement the disciplinary system to punish employees who violate the rules of green conduct. Proper leadership for green HRM practices will be also important as leadership is the main source of employee motivation

for environmental change initiatives (Paglis and Green, 2002: Kim et al., 2016).

8. DIRECTIONS FOR FUTURE RESEARCH

This study is limited to investigating the significant impact of GHRM Practices on the executive job performance in a leading apparel manufacturing company in the Colombo district Sri Lanka. There may be another variety of factors that also determine the executive job performance of the selected company. That is one limitation of the research. Another limitation of the study was researcher was not concerned about the impact of GHRM Practices on operational-level employees in selected company. Another important limitation is that this analysis will be cross-section in nature. Additional research is suggested to be carried out longitudinal to evaluate the impact of the variables over time. Longitudinal studies using quantitative and qualitative techniques are required to understand the changes in the three variables over time. Here, the researcher assumes that all the variables that affect executive job performance remain constant. Another limitation of the research study was researcher only concentrated impact of GHRM Practices on executive job performance. Apart from that limitation is research study is based on the individual level analysis.

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Exploring the Factors that Contribute to the Discontinuity of Family-Owned Small Businesses in Sri Lanka

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ABSTRACT

Family-owned small businesses form a significant part of Sri Lanka's economic landscape, contributing to the country's growth and development. Among the total of 2,493 family-owned businesses in the world, 36% fall into the category of small businesses. However, many face challenges regarding business continuity and longevity. This study explores the reasons behind the discontinuation of family businesses. This study employed a Qualitative Research approach by gathering data through in-depth semi-structured interviews with ten small business owners who are conducting their family businesses in various industries in different geographical regions.

The collected data were analyzed through the Thematic Analysis and three prominent themes of Succession Planning, Family Dynamics and Lack of Professionalism were noted and supported by corresponding codes.

The findings from this research will provide valuable insights into the role of family dynamics, succession planning and lack of professionalism in shaping the future of family-owned small businesses. The study aspires to make a meaningful contribution to the existing literature on family business management and the ultimate goal of facilitating the continuous sustained functioning of family-owned small businesses in Sri Lanka.

***Keywords* - Family-owned small businesses, business discontinuity**

1. INTRODUCTION

Sri Lanka is a vibrant island nation that boasts a rich tapestry of businesses that span in a diverse economic landscape with a blend of tradition and modernity. Within this diverse Sri Lankan business landscape, family businesses play a pivotal role serving as the backbone of the country's entrepreneurial spirit. Family businesses are

the most prevalent model of business ownership around the world making their impact on the economy substantial. Over seventy per cent of the global gross domestic product is accounted for by the impact of family businesses (Osunde, 2017).

According to the Central Bank of Sri Lanka and the Department of Census and Statistics, small businesses in Sri Lanka are defined as those with fewer than 25 employees. The Global Family Business Survey - Covid 19 edition reveals that 36% of family businesses in Sri Lanka have less than 20 employees, while 17% of them fall within the range of 21 to 50 employees (KPMG, 2021). These statistics underscore the substantial prevalence of small-scale family businesses in Sri Lanka.

According to Churchill and Hatten (1987), a family-owned business is an entity that is expected to be passed down to the next generation after the founder. Family businesses have been a key driver of economic growth and prosperity and yet, the sustenance of family-owned businesses in general is considered to be a significant challenge. Regardless of the scale of the business, most family-owned businesses struggle to exist, with micro and small businesses in particular struggling more than others (Kuruppuge & Gregar, 2017). Only around sixty percent of the family businesses get passed down to the second generation and even lesser numbers get passed down to the third and fourth. Challenges that are unique to family businesses including issues related to business transformation, succession planning, varying opinions of families and even generational gaps are the

main reasons for the discontinuation of family businesses (PricewaterhouseCoopers [PwC], 2019).

Despite the increased interest in family business, the field is still understudied and requires robust and theoretically sound models (Birdthistle & Hales, 2023). The reasons as to why family members exit family businesses and why those businesses do not get passed down to the next generation are rather under-studied areas within this discipline (Brännback & Carsrud, 2011).

According to the Global Family Business Survey - Covid 19 edition (KPMG, 2021), the data reveals that 42% of family businesses are currently operated by the first generation of the family. Additionally, 36% of these businesses are in the hands of the second generation, while the continuity of family businesses drops significantly to just 14% by the third generation. Furthermore, only 8% of family businesses manage to endure into the fourth and subsequent generations. These findings underscore a notable decline in the continuity of family businesses as they transition through generations.

The main objective of this study is to explore the reasons for the inability of family-owned small businesses to sustain themselves in the long run. Thus, the paper aims to find out the different aspects of the discontinuation of family businesses after a few generations and to determine the reasons behind the lack of longevity.

Research Question

Why do not family-owned small businesses last long in Sri Lanka?

Research Objective

Investigate the reasons for the discontinuity of family-owned small businesses in Sri Lanka.

2. LITERATURE REVIEW

Family businesses are an integral element in the economy of any country. They make a significant contribution to the GDP and they provide a substantial amount of employment opportunities to the global workforce (KPMG, 2021). Approximately ninety percent of Small and Medium Scale Enterprises in Sri Lanka are family-owned businesses, out of which the majority are micro and small-scale (Kuruppuge & Gregar, 2017).

Davis and Tagiuri (1982) have defined small businesses as entities where "two or more family members influence the direction of the business through the exercise of management roles, kinship ties or ownership rights". According to Habbershon et al. (2003) they are, "unique, inseparable, synergistic resources and capabilities arising from family involvement and interactions".

A unique characteristic of family-owned businesses is that they are expected to be passed down to the next generation after the founder (Churchill and Hatten, 1987). However, there are certain challenges that are unique to family businesses including issues related to business transformation, succession planning, varying opinions of families and even generational gaps that lead to the discontinuation of family businesses after a certain time period or after a certain generation (PricewaterhouseCoopers [PwC], 2019).

A. Succession Planning

One of the most crucial but often overlooked factors that guarantees the continuity and growth of a family owned business is a succession plan. Throughout history, there had been many instances where businesses had to shut down almost immediately after the demise of the founder. Therefore, the need for succession planning remains a core factor that decides the long-term viability of the family business and should not be disregarded (Karsono & Apto, 2014).

In a survey conducted by PwC (2021), they found out that only thirty-four per cent of the respondents had documented and communicated their succession plan. Mokhber et al. (2017) in a study conducted in Malaysia found that not only succession planning but also the preparation level of the successors was also crucial for the continuation of family businesses to the next generation.

B. Impact of Cultural and Social Factors

The way businesses are managed is a strong reflection of the cultural environment in which the business operates in (Nanayakkara, 1985). In Asia, businesses are strongly linked with families (Khana & Yafeh, 2007). Family is considered as the basic unit of the society in Sri Lanka. Family members are given priority in decision making as families share resources, take care of its members and perform various functions for the benefit of its members (Institute for Health Policy, 2010).

C. Organizational issues

Just like any other business, family businesses also have some challenges that are commonly linked to business failure or shut down. Lack of access to capital, heavy competition, poor strategic management, entrepreneur's lack of vision are some common challenges faced by SMEs that might lead to business failure (Jayasekara et al., 2020). Some other organizational issues that could result in family business failure that could result from the external environment of the entity are natural disasters, market dynamics, and the business location (Karsono & Apto, 2014).

In a study conducted in Cameroon, Takwi (2020) identified lack of training, family conflicts, issues regarding succession, financial problems and management and control related issues to be the reasons for family business failure and closure. A Chinese study emphasized that human traits including greed, arrogance and family disintegrations including disputes over inheritance could also lead to the downfall of even the most successful family businesses (Karsono & Apto, 2014).

Even though much research has been conducted all over the world, literature on family businesses is still in its infancy stage (Birdthistle & Hales, 2023). Hence, this study tries to explore the reasons behind the discontinuation of family businesses in Sri Lanka and to add to the body of knowledge.

Perhaps the easiest way to comply with the conference paper formatting requirements is to use this document as a template and simply type your text into it. When using this as a template, you do not need to worry about page layout, fonts, etc. The main body of the paper should be organized into sections, Introduction, Methodology and Experimental Design, Results and Discussion, Conclusion, Acknowledgement, and References. The abstract (already accepted) should be included at the beginning.

3. METHODOLOGY

The study uses the Qualitative approach to address the research study to answer the research question of why family-owned small businesses not last long in Sri Lanka and to achieve the research objective.

The data was collected through in-depth individual interviews enabled to respondents provide much more detailed explanations for the questions asked. The interviews were conducted as individual interviews with the 10 owners of family-owned small businesses which are conducting in different industries based on the Convenience Sampling Method by representing the diverse geographical areas in Sri Lanka. This study employs the Thematic Analysis in order for Braun and Clarke (2006) to analyze the rich data. It emphasizes the dynamics influencing the longevity of family-owned small businesses in Sri Lanka.

4. RESULTS AND DISCUSSION

The study, "Exploring the Factors that Contribute to the Discontinuity of Family-Owned Small Businesses in Sri Lanka," drew upon data from ten individual interviews conducted with family-owned small business owners. It was possible to identify the three findings on the themes and sub-themes/codes that emerged.

The initial theme, "Succession Planning," was identified based on codes related to challenges in smooth transitions and the presence of a generation gap. The second significant finding, "Family Dynamics," was derived from codes pertaining to issues such as family disharmony, resistance to change, and the effects on non-family employees. The third key finding, "Lack of Professionalism," was established through codes indicating the absence of professional and academic business education within the context of family-owned small businesses.

Each finding can be substantiated by the narratives elicited from the interviews, as follows

A. Succession Planning

In family businesses, when identifying and grooming individuals to take over key positions, they tend to prioritize those who are directly tied to the family. Those positions are typically reserved for the upcoming generations of the family. However, as per the insights gathered from interviews, family succession planning has the potential to diminish the sustainable longevity of family businesses.

Roughly thirty percent of the interviewees highlighted their reluctance to hand over their business to the next generation in their family through succession planning. In the cultural context of Sri Lanka, parents often push their children to get to better places than their parents. Even families conducting family-owned small businesses push their children to excel in their academics and expect to groom them to lead their lives in a standard career path.

"Our children were not interested in taking over our restaurant after us. My elder son is studying in Australia and will never come here for residency. My daughter has shifted to her husband's place after her marriage and is focused on family and focused on her husbands business in apparel business. And now there's no one to run our restaurant anymore. So, my wife and I decided to retire peacefully without worrying about the business". (KI 4)

The above statement is from the owner of Sathsara hotel Mrs. Nilanthi which does not operate any longer. He further mentioned that he inherited the small hotel from his father and she and her husband developed it as a restaurant and earned money to educate his children but now he doesn't have anyone to hand his business over.

The below statement is from Mr. Kumara Piyadasa the owner of Kumara Auto Service. When asked what his expectations are about handing over the business to the next generation, he said,

"I do not have any idea to pass down my business to my son. I do not want to make him another vehicle automobile service provider. I am investing all my money in his education. I want him to be able to get into a career that offers a stable and fixed income at the end of the month." (KI 1)

The above indicates that the owners of the family-owned small business do not have much preference to hand over their business to the upcoming generation of the family. The reason was they have had to face income fluctuations from their businesses from time to time which made it difficult for them to face certain economic emergencies.

They long to have a stable income flowing into their bank account continuously each month. Thus, they groom their children along a path that would secure a fixed income. This attitude of the family-owned small business owners diminishes the longevity of the businesses.

Another aspect emphasized by the respondents was Relationship Transition. The older generation of the family business had been able to maintain sound relationships with certain business stakeholders like customers, suppliers and employees. However, when the business transitioned to the next generation via succession planning, the junior generation struggle to maintain the stakeholder relationships in the same manner.

Mr. Amila who owns a restaurant called "Amba Sewana" shared his comment about stakeholder relationships. He took over the business from his father after completing his education and continually received guidance from his father on how to manage the business.

"I feel that I am not good at working with employees and customers and I feel that my father did it better than me. Employees in the business are also very close to my father and they are sharing everything about the business with my father. When some long-term customers visit us they also ask about my father." (KI 5)

The smooth functioning of the stakeholder relationships is vital for the sustainable survival of a business. The weaknesses of transferring the stakeholder relationships and younger generations' inability to maintain smooth social relationships also affect the longevity of family-owned small businesses.

When family businesses are transitioned from an older generation to a younger generation, the gap between the two generations is also a vital factor. Sometimes the younger generation may be more straightforward and they get the advantage of that. However, oftentimes lack of experience, radical perspectives and superior attitudes of the younger generation may pose limitations on the business longevity.

"I am going to hand over my transport business to my son soon. But I don't have a good feeling about his approach. Even at the moment, he is actively involved with me in business activities. But I think some of his decisions are so unconventional. For instance, he suggests modifying our buses with a new coat of paint and giving a name for the bus service as "Dumburu Lamissi". He also wants to install a new sound system for the bus with a distinctive horn system." (KI 6)

The above comment is from Mr. L. Premasiri who has a public transport service as Lahiru Power Line. It indicates his negative perception of his son's ideologies.

Generation Z and Millennials are digital natives, having grown up in a world increasingly shaped by technology. Their digital expertise surpasses that of older generations. Therefore, the older generations are now faced with the need to keep up with technological advancements to attract new customers and to avoid being outdated (Pasztor & Bak, 2021).

The below is from Mrs. Dilrukshi who is the owner of a Cake business regarding the technological challenges faced by older generations when they are working with the younger generation.

"My son has created a Facebook and Instagram account for my cake business to obtain orders and to showcase my cake creations. And he consistently pushes me to update those with my latest work. But I struggle to remember the specific way I want to update the photos there. And sometimes I receive the cake orders via these social media accounts but I am uncertain about handling those online orders." (KI 2)

The younger generations who belong to Gen Z are in the digital age with direct access to technology. They are comfortable with digital devices and social media. However, the elder generations belonging to Gen X might not have a good sense of growing technology. These generational differences create a gap between their business decisions and thinking. This generational gap between older and younger generations in small-scale family businesses makes each other incompatible.

b. Family Dynamics

A distinctive characteristic of family-owned businesses is that they are owned, managed, and staffed by the members of the same family. The business is shaped by both positives and negatives of family culture, values, decision-making, roles and responsibilities, communication styles, conflict resolution, conflicts of interest, emotional attachment and overall cohesion. While getting responses it was important to note that certain family dynamics affect the continuity of family-owned small businesses negatively.

Family disharmony is a natural occurrence in any family. Due to the nature of social relationships in the Sri Lankan family-centralized society, it could result in conflicts, power struggles and disagreements among the family members. This family disharmony has a significant negative impact on the business continuity of family-owned small businesses as conflict often triggers disappointment, discomfort and hurt feelings that could ultimately even drift families apart if handled improperly (Aye et al., 2017).

Mr. Amila who is the owner of "Amba Sewana" restaurant, inherited the business from his father. He is the youngest son in the family with three elder sisters. when asked about the involvement of his siblings in the business, he commented below.

"My sisters offer certain suggestions for the restaurant. But I believe that those are very unconventional and have no foundation. When they never visit my restaurant, how can they know what is going on there? I get so offended when they go on giving me suggestions for everything." (KI 5)

Conflict often occurs when the corporate culture of a family business which has been formed "by the personality, values, and beliefs of the founding generation" conflicts with the culture of the family units (Kleiman & Peacock, 1996).

"Since we have a good reputation in the area as "Amba Sewana" my elder sister and her husband want to open a new branch closer to

the city. They are ready to invest their capital in it too. But I think that our vibe does not match an urban environment. How can we use the same brand there as "Amba Sewana" once we start a new branch in the city? If we can find a place near a Mango Tree then it is okay. Otherwise, it could harm our brand name too." (This business has been named "Amba Sewana" since its proximity to a huge Mango tree.) (KI 5)

The family dynamics create a challenging situation where no direct acceptance or rejection of the decision of family members and leads to some business instability. The above incidents indicate that the conflicts and disagreements within the family context among the family members like parents and children and among siblings hurt the development and sustenance of the small-scale family businesses.

Resistance to Change is another family dynamic which makes a significant negative impact on business continuity in family-owned small businesses. Change is inevitable for business continuity since businesses are operating in a dynamic environment. But some families want to continue their business in the same vibe that their elder generation was operating.

The following response was provided by the owner of Vavita Stores which is a family-owned retail and wholesale shop with a rich history of over three generations and currently managed by the fourth generation of the family. Recently they made a substantial change in their business operation, shifting from a traditional retail and wholesale structure to super market structure. The owner of the business shared his insights on this transformation as follows.

"We felt the decline in customer attraction to our business over the past few years. Then we decided it was high time for some change. But there were certain delays because we had to ask permission from our parents before taking any decisions as they are still in touch with the business. It was a real struggle having to explain the scenario to them because it was a huge change compared to the way our family business was conducted over several generations." (KI 7)

As per the above, older generations appear to be resistant to make changes to their family business. They expect that the upcoming generations of the family will continue the business in the same manner, preserving the family dynamics and traditions that they have nurtured and protected over the years in business history.

But in some situations adhering to the above expectations of the elder generation regarding the family dynamics may pose challenges to safeguarding the business under some bad business climates. To ensure the survival of the business, from time to time it has to make crucial business changes. Resistance to change resulting from respecting the family dynamics does not guarantee the continuous functioning of the business operations in family-owned small businesses.

Another factor that has a strong impact on business performance is the relationship between the family and non-family business members (Mokhber et al., 2017)). Upon the insights gained from the respondents'

perspectives on family dynamics, it was observed that some small business owners were adamant about appointing their family members to key business positions in their family businesses instead of hiring an external non-family member.

But in certain situations, when the particular family member does not have the necessary competencies to effectively carry out the task relevant to the position it had hurt the business continuity.

Mr. Kumara who is an automobile service provider commented as follows.

"I know my wife doesn't have enough knowledge to handle operations in the oil mart attached to my business. She frequently inquires about the oil prices when customers visit the oil mart. When I am engaged with another task, I feel annoyed at her consistent inquiries. I am not sure about any other external person to hand over my cash locker since I have had some bad experiences with it. Upon those bad experiences, I cannot trust anyone than a family member." (KI 1)

Mrs. Wayala who is conducting a family-owned retail shop commented below.

"Sometimes I hand over the counter to my husband who is working in the depot near my shop. But when he is busy there, I close the shop and go to pick up my daughter from school."

When asked why they cannot hand over the cash counter to an employee she mentioned that;

"It is not something that I haven't done until this day. That was the way my father conducted the business when he was running this business."

As a family tradition, they are reluctant to hand over the key responsibilities in their family business to non-family persons. However, the inefficiencies displayed by those family members who get that responsibility may have a negative turn on the business operations. This practice can potentially hinder the continuity of family-owned small businesses.

Family business owners often confuse traditions with core values. Relying on certain traditions blindly might bring negative outcomes such as reluctance to change upholding old traditions. However, practices and traditions need to be revised from time to time in order to embrace change (Davis, n.d.).

C. Lack of Professionalism

An individual who strives to achieve high internal standards in terms of performance and ethics is considered a 'professional'. Their vision is not blurred by their personal needs and benefits, but rather they act for the betterment of the organization.

The lack of business professionalism indicates that individuals in family-owned small businesses do not adhere to the expected standard of professional behaviour and conduct like poor communication, inadequate business ethics, lack of accountability, neglect of professional development, and failure to follow the policies etc.

As per the interviews conducted with the small-scale family-owned business owners approximately 60% of them do not have

business professional or business academic background or foundation.

when asked on how they learned business or if they have academic background in business, the interviewers received the below comments.

"No, I have not learned about business from anywhere. I do it as I wish and as my understanding of what I feel good." (KI 8)

"No, since my childhood I observed how my father was doing it. Now I am emulating him." (KI 3)

"No, based on the positive and negative experiences I received, I learned how to do things the right way." (KI 9)

The absence of a formal academic or professional background in business hinders the business operations.

And for the questions asked by interviewers whether they believe that they need a formal education about businesses or whether they have any bad experiences resulting from their lack of professionalism, the interviewees commented below.

"Yes, if I had proper knowledge I would have done a better job" (KI 9)

"When I prepared a business plan to borrow a loan from the bank, I felt it would be better if I had a formal education about business." (KI 3)

"I could not obtain that knowledge. But my son is reading for a diploma in entrepreneurship and small business management to take over my business." (KI 6)

Since they lack academic and professional knowledge in the business context, they cannot ensure the smooth functioning of business operations, which negatively impacts the continuity of business operations.

Professionalization requires upholding family influences while being open to learning about new techniques and skills regarding ways of upholding quality, treating customers and employees and changing core values and traditions (Davis, n.d.).

5. CONCLUSION

This research focused on exploring the reasons for the discontinuity of family-owned small businesses in Sri Lanka.

Succession planning emerged as a pivotal factor contributing to the discontinuity of family-owned businesses. The lack of a well-defined and structured plan for transitioning leadership from one generation to the other was identified as a major cause. The absence of a successor or the unwillingness of the founding members themselves to pass on their business due to various reasons hindered the continuity of these businesses. Our findings imply the need for solid succession planning strategies and preparing the successors to take over the business well in advance and allowing them to train under the current generation before handing it to them.

Family dynamics was another factor that decided the fate of family-owned small businesses. The complex interplay of family relationships, culture, conflicts and varying ideas and thoughts of different generations

and even within the same generation often disrupted business operations and strained family bonds.

Addressing family conflicts is important in ensuring the longevity of family-owned businesses. Implementing mechanisms for conflict resolution, addressing any unresolved conflicts and facilitating open communication are crucial steps toward mitigating these challenges.

Lack of professionalism in family-owned businesses was the other factor that led to the discontinuation of businesses. Failing to adapt professional behavior causes major issues. Focusing on gaining proper academic and professional knowledge, skills and other abilities in the business context is essential for successful decision-making and even in maintaining relationships with stakeholders.

In light of these findings, it is evident that addressing the issues of succession planning, family dynamics, and professionalism is vital for family-owned small businesses in Sri Lanka to thrive and ensure their continuity.

Data Collection Method	Key Informant (KI)	Information about Family Owned Small Business			Information about the current owner of Family Owned Small Business				
		Name of the Family Owned Small Business	The Industry family owned small business is performing	Which generation of the family is currently managing the business?	The person who is currently overseeing the functioning of the business?	Gender	Age (Years)	Education level	Years of experience in business
Individual interview 1	KI 1	Kumara Auto Service	Auto mobile service and reparing industry	2nd Generation	Mr. Kumara Piyadasa	Male	55	GCE O/L	16
Individual interview 2	KI 2	K Cake Creations	Bakery Indsutry	1st Generation	Mrs. Dilrukshi Vijayaratne	female	42	Diploma	12
Individual interview 3	KI 3	Galathura Retail Shop	Retail shopping industry	2nd Generation	Mrs. Wayala Vilbert	Female	38	GCE A/L	8
Individual interview 4	KI 4	Sathsara Hotel	Café and Restaurant industry	3rd Generation	Mrs. Nilanthi de Silva	Female	58	GCE O/L	22
Individual interview 5	KI 5	Amba Sewana Hotel	Café and Restaurant industry	3rd Generation	Mr. Amila Bandara	Male	26	Diploma	5
Individual interview 6	KI 6	Lahiru Powerline	Public Transportation industry	3rd Generation	Mr. L. Premasiri	Male	63	Grade 8	32
Individual interview 7	KI 7	Vavita Stores	Retail and wholesale indsutry	4th Generation	Mr. Kalana Hettiarachci	Male	32	GCE A/L	8
Individual interview 8	KI 8	Mashi Designs	Domestic Apperal industry	3rd Generation	Ms. Jiwa Munidasa	Female	61	Grade 8	35
Individual interview 9	KI 9	Saloon Dilani	Beauty saloon industry	2nd Generation	Mrs. Renuka Dissanayake	Female	68	Diploma	42
Individual interview 10	KI 10	Dilan Gems	Gems Industry	4th Generation	Mr. Dilan Weerasighe	Male	38	Bachelor's Degree	12

APPENDIX

The table below provides an overview of participants' profiles, specifically detailing the family-owned small businesses they are engaged in. Additionally, it outlines the demographic characteristics of each participant who took part in individual interviews as data collection process.

Table: Participants' Profile

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Impact of Communicative Competence in English on the Enhancement of Entrepreneurial Skills of Sri Lankan Women Entrepreneurs who Own Small and Medium-Scale Enterprises

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ABSTRACT

English and communication skills are given a high value as the most vital soft skills which are needed in the service-oriented economies in South Asian countries in enhancing the competitiveness of entrepreneurs, particularly in business process outsourcing and improving the potential of the youth who gain access to the economic sphere. In the Sri Lankan economic context, proficiency in English is attributed a significant value due to its status as the lingua franca in the global economy and it can positively contribute towards the government's goal of becoming an export-oriented and global logistic hub. The research focused on investigating whether communication competency in English can have an influential impact on assisting small and medium-scale female entrepreneurs to reach the pinnacle of success and access the global market without stagnating at a lower level. The research was conducted as secondary research: a literature review. Since this research encompasses the areas of gender, language, entrepreneurship and international trade, the feminist theories, second language acquisition theories, entrepreneurship theories and internationalization theories were applied in developing the analysis. 37 secondary resources such as peer-reviewed journal articles, books, annual reports of international organizations and training manuals from 1995-2020 were referred. Mastery of the international language, most importantly communicative competence in English is an essential requirement in gaining entrance to the international market in the era of globalization. Proficiency in the English language enhances employability and contributes to socio-economic

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development. In enhancing national development through endorsing participation in the global economy, competency in English is highly demanded. If an individual has not gained proficiency or has limited competency in a specific foreign language which plays a domineering role in a social context, it will negatively impact the business venture of that individual. If women entrepreneurs encounter that difficulty, their repressed existence in society will have to face that as an obstructive challenge. Contrary to that, if the individual is proficient and knowledgeable in that recognized foreign language, that will immensely benefit that person. Thus, providing training to enhance their communicative competence in English is identified as an essential requirement since that assists women entrepreneurs in addressing the current needs and trends of the market, seizing the existing market opportunities and utilizing technological strategies for the development of their businesses.

Keywords **- Women Empowerment, English Language Competency, Women Entrepreneurs**

1. INTRODUCTION

Women empowerment has become a globally popularized and accepted concept since most countries in the world acknowledge that women empowerment and gender equality are required to achieve and maintain the sustainable development of a state (Lagarde, 2019; OECD, 2008). Women within their journey of empowerment have to encounter diverse social barriers which prevent them from reaching their goals and in certain situations, they are deprived of opportunities to access education, employment and economic stability (Dabla-Norris & Kochhar, 2019; Jamali, 2009; OECD, 2008). Within this conflicting situation, women entrepreneurship can be brought forth as an encouraging factor for women to move into society with a solid foundation to become economically independent and empowered (Attygalle et al, 2014; Dwivedi & Mishra, 2013; OECD, 2017).

Women-led business ventures are limited only to certain minor sectors such as agriculture, catering, tailoring, food processing, beauty etc. Furthermore, female business ventures tend to struggle below the level of male-owned businesses in relation to size, productivity, profitability, and the potential for expansion (OECD, 2017). The majority of Sri Lankan women entrepreneurs are engaged in micro-enterprises which operate in the informal economy, for example, sectors like food processing and textile (Attygalle et al., 2014). Only a few of them could transfer their micro-level businesses to the macro level. Thus, their mobility has become limited to a lower level in the local sphere.

In promoting the smooth transition of women entrepreneurs from micro home-based enterprises in the informal sector towards the formal sector in the global market, (OECD, 2017), especially in establishing relationships with global trade partners, language skills are considered a fundamental requirement (Ferro & Ribeiro, 2016; Johnstone et al, 2018). Especially, in establishing business relations within the global market and communicating with

foreign trading partners, using a common language stimulates the trade between the two countries and enhances the transparency of their business transactions (Ferro & Ribeiro, 2016). Further, in mastering the demands of the globalized business world, becoming proficient in communication technologies and improving effective business interactions, competency in the English language is considered essential.

Sri Lankan women entrepreneurs remain confined to their small and medium enterprises, especially in rural areas. They encounter difficulties in moving into the international sphere due to the lack of communication competency in English since that deficiency diminishes the desirability of their business projects within the global market (British Council, 2020). As Gonzi, Coonan, & Bianchi (2018) mentioned, the lack of or limited proficiency in a highly required foreign language can obstruct an individual's business while increasing the vulnerabilities of women. On the other hand, gaining competency in a global language can produce immeasurable advantages.

The research focused on investigating whether communication competency in English can have an influential impact on assisting small and medium-scale female entrepreneurs to reach the pinnacle of success and access the global market without stagnating at a lower level. According to a study conducted in Mysore on 'Influence of English language on women entrepreneurs in Mysore' (Mallika, Motaharinik, & Shahryari, 2014), women entrepreneurs gained the ability to excel in their business ventures through the mastery of communication competency in English.

Further, as the interviewees stated, they could manage both their personal lives and entrepreneurial pursuits as a result of their competency in English language and communication skills.

A case study conducted in the North-East of Sri Lanka to identify the constraints encountered by women entrepreneurs in the war-torn area (Ayadurai, 2005) observed that small and medium-scale female entrepreneurs in that region need to be provided with structured training on entrepreneurship. Yet the training conducted by International non-governmental organizations and CWDR1 were not productive since women entrepreneurs in the Northeast area were found to be incompetent in the English Language. This result indicated the necessity of skill training that should be provided to the women entrepreneurs in the Northeast area to overcome this barrier (Ayadurai, 2005). As Johnstone et al (2018) mentioned, language ability is considered one of the essential requirements for establishing new business ventures in the modern social context where globalization and internationalization have been intensified. Further, in entering the global market, the cost which is associated

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[1] CWDR-The Centre for Women's Development and Rehabilitation (CWDR) in the Northeast of Sri Lanka is one of the many organizations that was established to take care of the immediate and long-term humanitarian and rehabilitation needs of the women and children affected by war. One of the initiatives of this organization was to create women entrepreneurs to help sustain family income for survival.

with that, especially which arises from the entrepreneurs' unfamiliarity with the context of the foreign culture reduces their advantageous opportunities. However, within the digitalized international market where online business has become a prevalent trend, entrepreneurs with language competency and communication skills find the liability of foreignness less challenging.

2. METHODOLOGY AND EXPERIMENTAL DESIGN.

The research methodology was designed and conducted as secondary research: literature review. This study attempted to explore the impact of communicative competence in English on the enhancement of entrepreneurial skills of Sri Lankan women entrepreneurs who own small and medium-scale enterprises. Since this research encompasses the areas of gender, language, entrepreneurship and international trade, the feminist theories, second language acquisition theories, entrepreneurship theories and internationalization theories were applied in developing the analysis.

As the sources of secondary data collection, peer-reviewed journal articles, books, reports of the local government authorities, foreign governments and international bodies (UNO, OECD, ILO, Council of Europe, British Council, IMF) and business reports and periodicals were referred. Further, research databases such as JSTOR, Emerald, SSRN etc. that provide scholarly literature were referred to and utilized. Thus 37 secondary sources from 1995-2020 were referred.

The key words such as the impact of English on women entrepreneurs, English in the modern business world, relationship between second language learning, gender, identity and power, the role of language in international trade, strengthening women entrepreneurs through English, English in Sri Lankan labour market and English for women entrepreneurs in developing countries were used in finding the valid and relevant literature.

The significant research findings of the previously conducted primary research were utilized to develop the analysis and synthesis. In selecting and adopting the secondary data, their reliability, applicability and adequacy were considered.

Based on these theories and the findings of the selected secondary sources, the factors which directly and indirectly influence the internationalization of women-owned small and medium-scale enterprises and their empowerment to perform competently in the competitive globalized business environment were explored and discussed.

3. RESULTS AND DISCUSSION

Mastery of the international language, most importantly communicative competence in English is an essential requirement in gaining entrance to the international market in the era of globalization. That assists entrepreneurs in dealing with the demands of the competitive globalized business world (Nurcahyo, Harahap, & Gharnaditya, 2015). Entrepreneurs in the SME sector in Asian countries encounter several difficulties in accessing the global market as exporters due to their incompetency in the English language. Mastering communication technologies, usage of the internet and adopting e-commerce business models have

become problematic for them due to the lack of English language skills (Moertini, 2012; Nurcahyo, Harahap, & Gharnaditya, 2015). English has been defined as the language of business, knowledge and technology in Sri Lanka. English has been given special status in more than seventy countries and it plays the role of official language. When a language becomes the official language of a country, it becomes the medium of communication in the major domains of the state and is considered the second language as well (Crystal, 2003). In Sri Lanka, the English language has achieved this status and learning English as a second language or foreign language has become imperative since it facilitates financial success and international understanding (Wijeratne, 2015). Islam & Shukran (2018) in the study 'Women Empowerment: The English Language is Killer or Contributor?' corroborates the fact that proficiency in the English language enhances employability and contributes to socio-economic development. In enhancing national development through endorsing participation in the global economy, competency in English is highly demanded (Hamid, 2011; Islam & Shukran, 2018). Further, in Nigeria, the effective implementation of the education policy and language policy caused English Language proficiency to play an imperative role in enhancing the economic empowerment of the youth while in India English is perceived as a tool of decolonization in enabling individuals to access the global economy (Islam & Shukran, 2018). Proficiency in English Language empowers women by providing them with a wide range of opportunities and confidence in achieving social and professional capital.

Lack of education, experience and training opportunities have been highlighted as a major restraint amidst the numerous barriers that women entrepreneurs encounter in their business ventures (Cardella, Hernández-Sánchez, & Sánchez-García, 2020; Raghuvanshi, Agrawal, & Ghosh, 2017). This causes them to be incompetent in identifying the trends in the business world, needs and gaps in the markets and demands for the products (ITC, 2015).

Liberal feminism emphasizes providing equal rights and opportunities for women since they should be treated equally to men. The theory argues that the discriminations, prejudices and biases which exist against women in restricting their access to educational opportunities, resources and experiences must be eliminated (Ali, 2018). The theory posits that if women had equal access to the wider range of opportunities that are provided for men, they would excel in their business performances as men (Ali, 2018; Akter, Radicic, & Rahman, 2019)

The study conducted by Ayadurai (2005) on 'An insight into the "constraints" faced by women entrepreneurs in a war-torn area: a case study of the Northeast of Sri Lanka' emphasizes that the limited access to education and training programmes negatively affects women entrepreneurs in the Northeast of Sri Lanka restraining their ability to enhance their technical, managerial and entrepreneurship skills. Though International Non-Governmental Organizations took measures to conduct several training programmes in this region, those programmes occurred in an

unstructured and irregular manner. The most critical issue that impacted those programmes' effectiveness was women entrepreneurs' incompetency in the English language since trainers of INGOs used English as their medium of instruction. Due to all these reasons, women entrepreneurs in the Northeast of Sri Lanka suffer from a dire necessity to enhance their entrepreneurial skills while improving their English language competency (Ayadurai 2005).

E-commerce has become popularized in the business world with globalization and the rapid growth of the internet and business-to-business e-commerce is widely employed for entrepreneurial pursuits. Small and medium enterprises in developing countries tend to adopt B2B e-commerce and employ third-party marketplaces/ website marketplaces to access the global market (Moertini,2012). Yet, in Indonesia, it has been observed that though SMEs have endeavoured to access global B2B e-commerce through marketplaces, poor communication competency in English and the inability to use business English in the professional context have hindered their path in successfully merging with the global market (Moertini,2012).

According to the resource-based view of the internationalization theories (Akter, Radicic, & Rahman, 2019), apart from the physical resources such as materials, lands and financial resources, intangible assets such as knowledge, competencies, attitudes, skills and business networks are given a high value. Further, it has been identified that the availability of these resources within a business enables its internationalization process. Within the same theoretical paradigm, the competency-based theory explains that the competency of an organization/ business is its ability to identify and utilize the competencies to expand the production potential of the business. Especially, the competencies of the leaders or owners of the business are the major factors which contribute to the improvement of the competencies of the whole business. Further, the inadequacy of the competencies has a direct impact on the businesses in reaching the global market and gaining optimal results (Kállay, 2012).

In Sri Lanka, a minor percentage of female participation in small and medium enterprises occur due to limited access to financial resources, lack of financial literacy, social prejudices towards the role of women entrepreneur, social and cultural restrictions and limited opportunities for networking and communicating with external resources etc (Attygalle at el., 2014). For women entrepreneurs who own small and medium-scale enterprises, gaining access to business networks and enhancing their ability to obtain a wide range of information are vital and necessary guidance needs to be provided to attain those essentials.

In expanding their businesses towards the international market, the networks can be identified as a strategic resource since they assist entrepreneurs in developing their knowledge of the emerging trends in the international market and the strategic modes of entry to the international market (Moreira, Marques, Braga, & Ratten, 2019). The network theory of internationalization emphasizes the vitality of networks developed through personal relationships since those networks are considered as the

major channel through which entrepreneurs gain access to the international market (Akter, Radicic, & Rahman, 2019).

In Sri Lanka, several local female entrepreneurs who could reach overseas markets through networking observed that seminars, workshops and training in customer relations development are advantageous in entering local and foreign markets (Wijerathnam & Perera, 2013). Thus, providing training to enhance their communicative competence in English is identified as an essential requirement since that assists women entrepreneurs in addressing the current needs and trends of the market, seizing the existing market opportunities and utilising technological strategies for the development of their businesses (Nurcahyo, Harahap, & Gharnaditya, 2015).

English Language education holds the potential to enhance socio-economic development while leading women to develop their employability skills (Islam & Shukran, 2018). If an individual has not gained proficiency or has limited competency in a specific foreign language which plays a domineering role in a social context, it will negatively impact the business venture of that individual. If women entrepreneurs encounter that difficulty, their repressed existence in society will have to face that as an obstructive challenge. Contrary to that, if the individual is proficient and knowledgeable in that recognized foreign language, that will immensely benefit that person (Gonzi, Coonan, & Bianchi, 2018). The aforementioned argument can be applied to the women entrepreneurs in the Sri Lankan

context, especially, to those who have not mastered the English language or who have limited proficiency in English.

Language, identity, and power are interrelated concepts which can have a potent influence on individuals (Nic Craith, 2007; Norton & Toohey, 2011). Accordingly, individuals invest in learning a second language which holds dominant status with the motive of gaining access to the resources and cultural capital (Norton, 2000). The poststructuralist theory affirms that language learners who learn the dominant language are provided with the opportunity to gain powerful positions within society and access powerful networks (Norton & Toohey, 2011)

Communicative competency in the international language is considered fundamental in facilitating women entrepreneurs with access to the global market since from the inception of the internationalization of an enterprise, the entrepreneurs need to negotiate with business partners and maintain commercial ties through the medium of the international language.

The ethnographers of L2 communication explore the phenomenon where learners take endeavour to achieve their communication goals by enhancing their communicative competence in the second language (Mitchell, Myles, & Marsden, 2013). Communicative competence is considered the primary principle of the communicative language teaching approach and it emphasizes the significance of four major areas: strategic competence, sociolinguistics competence, discourse competence and linguistic competence. Thus, the

communicative competence model addresses competence in oral and written communication and focuses on eliminating the gap that exists between the individuals' knowledge of the language and their ability to use it practically. Further, communicative competence emphasizes the significance of having cultural knowledge when using the language of that particular culture since that enables the individuals to use language appropriately according to the sociocultural context (Lavadenz, 2010/2011). Accordingly, in applying the communicative competence model in the study, it can be observed that communicative competence in the English language is a prime qualification that Sri Lankan women entrepreneurs should possess and along with that learning the culture where English presides as the main language of communication is vital for them to develop a linkage between the language and culture. Consequently, this will enable them to access the international market and promote their products using the English language more applicably.

In establishing and maintaining business relationships in the international context, usage of the common language which is shared by the countries of the trading partners will ease communication (Ferro & Ribeiro, 2016; Tenzer et al.,2017). In relation to this, English, especially business English is considered the main medium of communication in maintaining business relations since it acts as a lingua franca. Within the commercial world of the international context, lingua franca is conceptualized as the commonly used language which is shared by all the parties involved and is different from their native languages. Most commonly, English is considered the lingua franca in the global commercial context (Tenzer et al.,2017). In accessing the global market, establishing business projects in foreign markets, attracting foreign direct investments, and encouraging trade and investment through bilateral trades require proficiency in the international language which is shared as a common language by the countries (Ferro & Ribeiro, 2016). In international trade, common language is considered a key element in attracting foreign direct investment (Oh Selmier, & Lien, 2011).

Accordingly, English as the international language and the most commonly used language in the global business context plays an imperative role in empowering women. It enables women entrepreneurs to gain a wide range of economic activities by expanding their business platform without limiting their entrepreneurial pursuits to the local business circle. (Ferro & Ribeiro, 2016; Islam & Shukran, 2018; Kokkonen & Koponen ,2020; Tenzer et al.,2017). In moving forward with their innovative and creative business ideas, women entrepreneurs in small and medium enterprises encounter diverse issues such as limited access to financial resources, gender bias and lack of technological skills. Amidst these factors, incompetency in English or lack of proficiency in English demotivate them, thus limiting their access to advantageous opportunities at the national and international levels. On the contrary, having proficiency in the English language develops the confidence and personality of the individual while enhancing their effective

communication skills. When Sri Lankan women entrepreneurs are enriched with English language competency, they will gain the potential to fight against obstructive influences by utilizing their language skills as a tool of power. Furthermore, it will enhance them to move forward from the stagnated position to which they are circumscribed.

5. CONCLUSION

English Language is identified as the lingua franca since it is widely accepted as the language of international business, economics, education, international communication etc. Due to its globally imperative role, the English language has the potential to expand learning opportunities and provide individuals with options as well as openings for enhancing their prospects. Furthermore, in facilitating individuals with a platform to enhance their proficiency in the English language, the social inequalities within the job market have to be eliminated or balanced (Gonzi, Coonan, & Bianchi, 2018). According to UN ESCAP[2] (2018), the women organizations which stand for women entrepreneurs in Cambodia, Indonesia, Malaysia and the Philippines have taken steps to conduct workshops, training programmes, coaching and mentoring sessions, skill training programmes and English language programs

[2] UN ESCAP- The United Nations Economic and Social Commission for Asia and the Pacific is one of the five regional commissions under the jurisdiction of the United Nations Economic and Social Council

to assist women entrepreneurs to success their business ventures. Proficiency in the English language creates a space to accomplish goals functioning as the key which holds the authority to access the global village and the international community (Mohammadian, 2014).

In the highly competitive globalized business world, mastery of English is required in dealing with the demands of the international market sphere and networking with foreign trading partners. Especially it is necessary to become proficient in oral and written communication in English (Nurcahyo, Harahap, & Gharnaditya, 2015). Communicative competence in English as a mode which facilitates global communication, provides the main linguistic capital for women entrepreneurs in small and medium-scale enterprises to become successful exporters since it has been observed that incompetency in English has become one of the major constraints that entrepreneurs encounter in accessing the global market.

Based on the research findings, the study emphasises the need to facilitate Sri Lankan women entrepreneurs in small and medium-scale enterprises with training opportunities to enrich their communication competency in English which plays an imperative role in assisting the local entrepreneurs to access and join the global market. Hence, a comprehensive English language programme which aims to enhance effective communication skills, professional writing skills and business English needs to be developed to enable women entrepreneurs to gain professional networking opportunities in the global context. Thus, communicative

competence in the English language will be an added value and main capital for women entrepreneurs in small and medium-scale enterprises to internationalize their business pursuits, establish commercial ties in the global market and groom their roles as successful exporters.

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Gender Disparities in Job Performance: An Empirical Examination with a Focus on Emotional Labor among University Academics

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ABSTRACT

This research delves into the intricate realm of emotional labour within the Sri Lankan University Education System, exploring its dimensions and impact on academics, with a particular focus on gender differences. Emotional labour, encompassing surface acting, deep acting, and naturally felt emotions, is examined as a crucial aspect of the teaching profession, often overlooked in academic research. In the context of the higher education system in Sri Lanka, where academics are not only educators but also researchers with multifaceted responsibilities, the study investigates the relationship between emotional labour and job satisfaction. The Conservation of Resources (COR) theory serves as a lens to understand how emotional labour contributes to emotional exhaustion among academics.

Despite emotional labour being extensively studied in service industries, its application in education, especially in Sri Lanka, remains underexplored. The research aims to bridge this gap by scrutinizing the emotional labour experiences of university academics and their implications for job satisfaction. The significance of this research lies in its potential to uncover the nuanced interplay between emotional labour, gender, and job satisfaction in the Sri Lankan academic landscape. The conceptual framework, based on empirical studies and theoretical foundations, posits hypotheses regarding the impact of surface acting, deep acting, and teaching gender on job satisfaction.

The anticipated results may shed light on how emotional labour influences the professional experiences of university academics, offering insights for future studies and contributing to the broader understanding of emotional labour in educational contexts. While the study acknowledges potential limitations, such as the challenge of obtaining a representative sample, it seeks to provide valuable implications for policymakers, educational institutions, and academics themselves. In conclusion, this research endeavours to unravel the intricate dynamics of emotional labour in the Sri Lankan higher education system, fostering a deeper comprehension of its implications on job satisfaction and

overall well-being among university academics.

***Key Words* - Emotional Labour, Teaching, Gender, University Education, Surface Acting, Deep Level Acting, Work Satisfaction**

1. INTRODUCTION

Gender differences in academia have long been an area of concern, with numerous studies studying various aspects of the problem. Emotional labour, the managing of emotions to fulfil the demands of the job, is one key factor that greatly affects the professional experiences of university academics. Academics' emotional labour can have a significant impact on their job satisfaction as they navigate the complexity of teaching, research, and administrative duties. The academic environment, which is frequently regarded as a haven of logic and objectivity, is not immune to the societal forces that define gender norms and expectations. Women have historically experienced systemic barriers in academia, ranging from lower representation in leadership positions to inequities in research funding and publication possibilities (Ceci et al., 2014; West et al., 2013). While progress has been achieved, gender discrepancies exist, and understanding academics' emotional labour provides a more nuanced view on these issues.

Hochschild (1983) defines emotional labour as the work, planning, and control required to exhibit appropriate emotions in a particular role. In academia, this includes the emotional responsibilities of teaching, mentoring, and participating in joint research. Job satisfaction is a multifaceted concept influenced by a variety of elements, and emotional labour plays an important part in creating academic experiences. According to research, women in academics may suffer specific job satisfaction issues because to the emotional labour connected with their roles (Smith & Brown, 2020). When compared to their male counterparts, the difficulty of managing emotions in the face of gendered expectations might contribute to increased stress, burnout, and perhaps lower job satisfaction among female academics. Recognizing the interconnectedness of identities is required to comprehend gender disparities in job satisfaction. While gender is an important role, other factors such as race, ethnicity, and sexual orientation also shape academic experiences (Chang et al., 2021; Jones et al., 2022). Intersectionality highlights the interconnectivity of various identity elements, emphasizing the need of doing a thorough investigation into how emotional labour contributes to job satisfaction across different groups.

1. LITERATURE REVIEW

Emotional Labour

Emotional labour has long been a divisive subject and a distinguishing attribute of the education sector; nevertheless, in light of the recent global pandemic and advancements in technology, its importance has emerged significantly. Therefore, academics face greater difficulty in maintaining a service-oriented profession (Hargreaves, 2000). It is well-known that teaching contains both emotional and cognitive aspects, including not only the act of teaching and designing the curriculum, but also the act of expressing or suppressing actual feelings, or expressing the appropriate emotion for the occasion, regardless of whether it is candid (Taxer & Frenzel, 2015). Furthermore, this process can be prolonged within the various context influencing on the individuals' capability of the cognitive process, such as cultural aspects, work-life balance, work intensification, career advancements, and many other factors, depending on the teaching gender with special reference to the Sri Lankan University Education System.

Components of Emotional Labour

In light of the foregoing literature, academics can divide emotional labour into three distinct categories: "surface acting," "deep acting," and "naturally felt emotions" (Kariou, Koutsimani, Montgomery & Lainidi, 2021). Specifically, Noor et al. (2011) describes "surface acting" and "deep acting" as two separate modes of emotional labour in which workers regulate their emotions in response to job-related expectations of emotional behaviour. Surface acting is changing one's outward emotional expression without actually feeling those emotions on the inside. Deep acting is defined as altering one's outward displays of emotion while also making an effort to internalise those emotions. Furthermore, Lyndon et al. (2021) claimed that the teaching profession is a service business where emotional labour is relevant due to the contact and communication between academics and students.

Despite emotional labour's widespread application in the service industry, it has acquired little academic research in the field of education (Grandey et al., 2013, Yang & Chen, 2021). According to Mahoney et al. (2011), academics reported feeling pressured to regulate their emotional experiences in the teaching process. This is because students evaluate and appraise the academics through student feedback, which is a crucial element of the performance evaluation of academics. Due to the fact that Morris and Feldman stated in 1996 that emotional performance has developed into an essential part of the teaching profession, this leads us to infer that emotional labour is highly exploited in the educational sector. This conclusion was reached after taking into account all of the previous literature reviews (Morris & Feldman, 1996). Academics are expected to exhibit specific emotional states, including joy and excitement, in their interactions with students and other people. Now that this research gap has been identified, researchers can begin to examine how the three main aspects of emotional labour, as well as the other key aspects related to this concept—emotional exhaustion and burnout—have affected the academics in higher education.

Emotional Labour of Academics in the Higher Education System

The time and effort spent on self-regulation to generate outcomes and conduct oneself according to the preferences of one's workplace is referred to as "emotional labour" (Lee and Madera, 2019). Therefore, with regard to the educational sector and emotional labour, particularly as a subset in the service industry where it is utilised extensively, academics in higher education are greatly consumed with emotional labour due to the service that they are giving with (Lyndon et al., 2021). The reason for this is that a lecturer's responsibilities extend much beyond simply giving lectures; they must also deal with a heavy workload, a need to conduct research, difficult students, the pressure to assume a position of leadership within their institution, and stringent professional requirements for promotions (Taxer & Frenzel, 2015; Lyndon et al., 2021).

The Academic Workplace in Sri Lanka: An Exploration of Emotional Labour

Several studies have been conducted, each focusing on a different part of the emotional labour that is involved in the position of a teacher in the education system in Sri Lanka. In the context of Sri Lanka, studies on job satisfaction of senior teachers at international schools (Apsara & Arachchige, 2016) and teachers at national schools (Arachchige, 2014) have been conducted under the emotional labour umbrella. Regarding the academics that take place within the framework of the university education system, there is a study (Thisera & Bandara, 2017) that has looked into the

impact that is based on the emotional exhaustion that is the result of emotional labour. Further a study on the emotional engagement of the academic staff working in the Private Education sector in Sri Lanka has been carried out, with the Abeyratna & Arachchige (2019) article serving as the basis for the study.

The Conservation of Resources (COR) theory can be applied, as stated by Thisera and Bandara (2017), to explain how emotional labour contributes to the variance in emotional exhaustion in the current study. This theory (a theory developed in Hobfoll's studies in 1989) investigates the interaction that takes place between a person and their surrounding environment, as well as the degree to which the demands of the environment are compatible with the resources that an individual possesses to meet those needs. The primary idea underlying the COR theory is that practically all individuals around the world are engaged in a constant effort to acquire, maintain, guard, and cultivate the valuable assets they already possess.

It is possible to determine that no subject area has been intensively revised or reviewed on the impact that university academics would have as a result of being emotional labourers in the higher education system. This is possible due to the fact that only a small number of studies have been conducted in the area of emotional labour, particularly in relation to the context of Sri Lanka.

Surface Acting and Deep level Acting

Two distinct types of research on the regulation of emotions in response to job-

related expectations of emotional behaviour were carried out in the study that was carried out by Noor et al. (2011). Within this study, the notions of surface acting, and deep acting were developed from the theorised works of Hochschild and Grandey. The study was carried out by Noor et al. (2011). The practise of changing one's outside emotional expression without making any effort to actually experience the feelings that are being acted out is what is meant by the term "surface acting." The term "deep acting" refers to the practise of altering an individual's outward displays of emotion while simultaneously making an effort to internalise those emotions.

Teaching Gender

Gendered teaching practices play a crucial role in shaping the educational experiences of students and the dynamics within academic settings. The literature on this topic can explore various aspects of how gender influences teaching behaviours, student-teacher interactions, and educational outcomes. Hochschild's (1983) major study on emotional labour popularized the term and highlighted its link to established gender roles. Women, who are generally identified with nurturing responsibilities, may confront distinct expectations in the workplace when it comes to emotional expression. Brotheridge and Lee (2003) investigated how occupational differences lead to variations in gender in emotional labour. Certain occupations may put men and women under different emotional strains, impacting their emotional expression and regulation mechanisms. Gender can also change the nature of faculty-student

interactions in higher education settings. According to Smith and Johnson (2018), female teaching members may face specific emotional labour issues when managing student expectations and gender stereotypes. Patel and Chang (2019) investigate how gender, work-life balance, and emotional well-being connect in higher education. Women in academics may encounter specific challenges in managing professional and family duties, which may have an impact on their emotional labour and overall job satisfaction.

Job Satisfaction

According to Edwin Locke's key work on the Range-of-Affect Theory, the perceived difference between what an employee values in their job and the actual conditions they encounter influences job satisfaction (Locke, 1976). The influence of expectations and perceptions in shaping job satisfaction is emphasized in this approach. Job satisfaction is commonly defined as 'the pleasurable emotional state resulting from the appraisal of one's job as accomplishing or facilitating one's job values' (Locke, 1969, p. 316). Ho and Au (2006) describe teachers' job satisfaction, or teaching satisfaction, in educational settings as "a function of the perceived relation between what one wants from one's job and what one perceives teaching as offering or entailing" (p. 172). Brown and Taylor (2020) examined the impact of emotional labour in shaping academic staff job satisfaction. The study focuses on the emotional demands imposed on academics and administrators, as well as how properly handling these demands might influence overall job satisfaction. Apart from

viewing job satisfaction based on emotional labour, Patel and Brown (2022) studied the influence of work-life balance in developing academic staff job satisfaction. Work-life balance gender expectations are looked into, offering light on how they contribute to varied levels of job satisfaction among male and female academic staff.

2. RESEARCH QUESTIONS & OBJECTIVES

Since emotional labour has been established in a variety of contexts in Sri Lanka, the purpose of this study is to examine how gender influences the emotional labour of academics in the Sri Lankan University Education System.

In order to answer the research question, the focus of this study and the researcher will be on gaining a knowledge of the ways in which university lecturers in Sri Lanka engage with their professions in terms of the emotional labour involved and how these differences vary according to the gender of the teaching position.

In order to provide a solution to the research question that was presented before, the following objectives can be established.

1. To determine the relationship between Emotional Labour and Job Satisfaction among university academics in Sri Lanka.
2. To determine the relationship between Emotional Labour and Job Satisfaction, with gender as a mediating factor, among university academics in Sri Lanka.

3. CONCEPTUALIZATION

3.1 Surface Acting of Emotional Labour and Teaching Gender

Yin (2015) reported gender disparities, revealing that male teachers exhibited a significantly higher propensity for surface acting, as evidenced by elevated scores compared to their female counterparts. This finding suggests a greater inclination among male teachers to employ surface acting strategies in the context of teaching. Surface acting has the potential to induce conformity among teachers to conventional gender norms in their emotional expressions. Specifically, female teachers may experience pressure to project heightened nurturing or empathetic qualities, while male teachers may feel compelled to exhibit increased assertiveness or authority. This reinforcement of gender stereotypes not only influences individual emotional displays but also contributes to the perpetuation of societal expectations regarding appropriate behavioural norms for each gender. Substantiating this, studies by Ogunsola et al. (2020), Wang et al. (2019), and Güler et al. (2022) suggest that such gendered emotional conformity, prompted by surface acting, may have implications for teachers' job satisfaction, organizational commitment, and student evaluations.

Teachers, functioning as influential role models for students, wield the capacity to shape students' perceptions of gender roles through their emotional expressions. Should teachers resort to surface acting to align with stereotypical gender expectations, there exists a risk that students will internalize these behaviours as normative for their respective genders. This process may

inadvertently constrain students' comprehension of the breadth of emotional expressions and diverse roles. This notion is supported by studies conducted by Farago et al. (2022) and Ogunsola et al. (2020). The presence of genuine emotional emotions is crucial in developing authentic connections between educators and learners. On the other hand, surface acting engenders a possible gap between the authentic emotions experienced by a teacher and the emotions they display openly. The presence of this incongruence possesses the capacity to influence the calibre of interactions within the educational setting, so presenting a possible hazard to the efficacy of communication and comprehension. Regarding gender-related discussions, this effect might be especially significant. Research conducted by Purper et al. (2023), Ogunsola et al. (2020), and Burić & Mornar (2022) provides indisputable evidence in favour of this viewpoint.

H1: There is a positive impact of Surface Acting on Teaching gender among the university academics.

3.2 Deep Level Acting of Emotional Labour and Teaching Gender

The practise of deep acting enables educators to communicate genuinely and effectively, and express emotions linked to the instruction of gender-related topics. In contrast to just adhering to cultural norms or stereotypes, educators who participate in deep acting may authentically manifest emotions that are consistent with their opinions and principles regarding gender equality and inclusivity (Keller & Becker, 2020), (Xie et al., 2022), (TÖRE, 2021). The

impact of a teacher's deep level acting that challenges traditional gender stereotypes varies depending on the cultural context. In certain instances, such as when a male teacher authentically expresses vulnerability or empathy, there is the potential to disrupt stereotypes linked to masculinity. This authentic expression may contribute to fostering more inclusive and progressive gender norms. This viewpoint is supported by studies conducted by Carlana (2018) and Michael Hansen et al. (2022).

H2 – There is a positive impact of Deep-level Acting on Teaching gender among the university academics.

3.3 Teaching Gender and Job Satisfaction

Brown and Taylor (2019), in his study, emphasized the unique obstacles that female academics experience in managing societal norms, which may have an influence on their emotional labour and, as a result, satisfaction with their jobs. Smith and Johnson (2020) while investigating the relationship between gender and work-life balance mentioned that female academics, who frequently juggle many tasks, may face difficulties in maintaining a suitable work-life balance, influencing their overall job satisfaction. Miller and Jones (2021) investigate how gender dynamics influence job satisfaction in academic leadership positions. According to the study of Miller and Jones (2021) on how gender dynamics influence job satisfaction in academic leadership positions, female leaders may face additional hurdles, negatively impacting their overall happiness and contributing to gender disparities in higher education leadership.

The gender of the teacher plays a significant role in shaping the dynamics of teacher-student relationships, particularly in the context of deep-level acting. When teachers express emotions that align with students' gender expectations, there is a potential for stronger connections and more positive relationships. However, diverging from traditional gender norms can also yield innovative and transformative teacher-student connections. This dual perspective is supported by studies conducted by Zhou (2022), Michael Hansen et al. (2022), and Ogunsola et al. (2020).

H3: There is a positive impact of Teaching Gender on Job Satisfaction among the university academics.

Emotional Labour and Job Performance/ Work Satisfaction

Hülsheger and Schewe (2011) found positive connections between Surface Acting and emotional exhaustion ($\rho= 0.44$) and depersonalization ($\rho= 0.48$) but negative relationships between Surface Acting and personal accomplishment ($\rho= 0.10$) and job satisfaction ($\rho= 0.33$). Deep Learning Acting was also found to be positively connected to both emotional tiredness ($\rho= 0.09$) and personal accomplishment ($\rho= 0.27$). The findings among teachers were broadly consistent with findings across a wide variety of jobs. Empirical studies on teachers' emotional labour have usually revealed that different emotional labours link differentially to teachers' job satisfaction (Zhang and Zhu, 2008; Yin, 2012; Sarraf et al., 2017). Sarraf et al. (2017), for example, adopted a second-order framework of emotional labour and

discovered substantial and negative connections between emotional labour and teacher satisfaction and performance.

H4: There is positive impact of Emotional Labor and Job Satisfaction among the university academics.

4 CONCEPTUAL FRAMEWORK

The following conceptual framework was constructed in order to proceed with this study. It was developed on the basis of the empirical studies and the theoretical explanations on emotional labour, as well as the problem that was recognised.
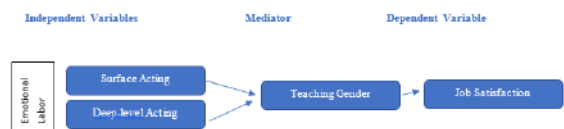
H1 – There is a positive impact of Surface Acting on Teaching gender among the university academics in Sri Lanka.

H2 – There is a positive impact of Deep-level Acting on Teaching gender among the university academics in Sri Lanka.

H3 – There is a positive impact of Teaching Gender on Job Satisfaction among the university academics in Sri Lanka.

H4 – There is a positive impact of Emotional Labour and Job Satisfaction among the university academics in Sri Lanka.

5 SIGNIFICANCE OF THE RESEARCH

According to Lindqvist et al. (2019), it was observed that it was vitally necessary to place precise boundaries with students about the subject of caring, particularly with regard to the disclosure of personal information. In order to have productive interactions with students, educators, like those in many other service professions, need to learn to control their intense emotional reactions. This is especially true in the academic setting, when displaying intense feelings can have a detrimental effect on the process of learning. Further, Zhou et al. (2019) extracted the conclusion of the conducted study from the organisational elements of lecture delivery, claiming that a playfulness atmosphere has a direct and positive influence on teaching creativity and job engagement. This was stated in the statement that a playfulness climate has a direct positive influence on teaching creativity and job engagement. In addition, in order to maintain an effective and sustainable teaching environment over the course of the study's duration, it is necessary to have a workplace that is both adaptable and interesting, with work tasks that are frequently unconventional.

In the research done by Castejon et al. (2018), one of the most intriguing questions that was investigated was how the academic success of students affected the amount of emotional labour they had to do in relation to their academics. It discussed research that found that early-career university graduates in the field of education had a stronger sense of responsibility, pay closer attention to their emotions, and make better use of their emotions, while having less control over them, and hence perform better academically. Therefore, the professional achievement of academics in relation to the integration of labour is partially predicted or explained by technical competencies as evidenced by academic performance. However, greater explanatory power is attributed to emotional competencies, despite the fact that this does not indicate that any general intelligence may have any significant effect in this scenario.

Teachers who had experienced a high level of burnout were substantially more likely to utilise the surface acting technique than teachers who had experienced a low level of burnout, as evidenced by the study conducted by Zaretsky & Katz (2019) and the arguments presented in the literature review section. Those academics who had only completed a diploma programme were found to make significantly more use of surface acting in comparison to those academics who held a master's degree. In addition, there were significant disparities between the levels of education held by

academics and the degree to which they utilised the deep acting type of emotional labour.

It is possible to employ adaptive humour as a coping strategy to safeguard oneself from bad feelings. This can be accomplished. It's possible that this was one of the elements that helped the sampled academics keep their self-confidence despite the difficulties they encountered on the job. Because of the favourable attitudes they held regarding their jobs, it is possible that they identified with their work and expressed the emotions that come to them easily while they are at work, which is more related to deep level acting. This is because of the positive attitudes they held regarding their jobs (Liao et al., 2020). Further, controlling one's emotions and expressions in order to fulfil the emotional requirements of one's job is connected to maladaptive forms of humour, which favour surface acting even though anger is a legitimate feeling (Torres-Marn et al., 2018). Maladaptive forms of humour are a contributing factor in the development of antisocial personality disorder. Failure to provide even the bare minimum of necessary emotional labour almost always results in work challenges and is harmful to the mental health of academics, where it may lead to emotional exhaustion and burnout on the job. The failure to provide even the bare minimum of necessary emotional labour almost always results in work challenges (Liao et al., 2020).

With all of the literature that was found, as well as the anticipated conclusion of this study, which will provide additional insight into societal, managerial, and knowledgeable aspects of this subject field, there is no doubt that the future studies will benefit from this research.

6 ANTICIPATED PROBLEM AND LIMITATIONS

It is predicted that one of the challenges of this research will be to collect a sample that is representative for the data analysis and will include participants of both genders. In addition, there is a possibility that the research may encounter a constraint when it attempts to capture institutions in which emotional labour has been utilised, yet these institutions will not be representative of the sample. The fact that this study includes both state and non-state universities means that the amount of academic work that students are expected to complete can differ greatly depending on the structure of the university; as a result, the findings of this study are restricted to some extent.

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Business Process Advancement Using Location Tracker and File Uploading Application

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ABSTRACT

ABC Finance PLC recognizes the strategic value of collecting geo-location data from its clientele, aiming to improve services and gain insights into customer demographics. The company plans to implement a solution for retrieving essential documents, such as national identity cards and proofs of billing, from customers while they are physically present. This initiative aligns with ABC Finance's goal to make informed decisions and tailor business activities based on the geographic locations of its customers. To achieve this, ABC Finance intends to collect and store customer location information in their product-specific databases. Currently, marketing officers visit clients at their homes or workplaces, using addresses and landmarks provided during service sign-ups. However, this method, while meeting the basic requirement of client visits, is viewed as outdated, time-consuming, and unpopular by law enforcement. During interviews, law enforcement raised concerns about the reliability of this approach. Address changes due to relocations or renaming of streets or buildings, alterations or removal of landmarks, and unforeseeable occurrences like natural disasters pose challenges to the accuracy of the data collected. Despite efforts to address these concerns, ABC Finance still lacks an efficient system for sharing documents across its branches. Additionally, the company faces obstacles in communication and document sharing. Currently relying on email and social media platforms like WhatsApp or Viber, ABC Finance encounters challenges due to a lack of IT skills, language barriers and poor internet connectivity, hindering effective communication and collaboration among branches. In conclusion, ABC Finance PLC's initiative to enhance operations through geo-data collection and document retrieval reflects its commitment to providing improved services tailored to customer locations. However, addressing challenges related to data accuracy and efficient document sharing will be crucial for the success of this strategic initiative.

Keywords — **location tracker, mobile application, file handling, prototyping**

1. INTRODUCTION

ABC Finance Lanka PLC (ABC) (will be referred as "the company" hereafter) has been in the corporate industry for more than a decade, and they have been providing financial services for more than a million people with their widespread branch network that operates nationwide with a pleasant and interactive financial experience. ABC Finance Sri Lanka has been in the corporate industry for more than a decade. In the wake of the information technology revolution, ABC has emerged as a market leader in their respective industries by providing consumers and employees with access to cutting-edge technological amenities, such as mobile banking services. The business has made the decision to compile geo-location information on its customers in the hope of expanding and enhancing the quality of the services they provide and achieving a deeper level of familiarity with their clientele. They are also in need of a solution to retrieve customers' documents at the time of visiting the customer, such as National Identity cards, drivers' licenses, billing proofs, and so on. The Company intends to use this information when making efficient decisions and carrying out a variety of activities and business operations that are specific to the location. As a component of this effort, they want to keep track of the location data of their customers and save it in the databases that they maintain separately. Technological solution has been proposed by the company to fulfil their above-mentioned requirements.

This solution consists of mainly three parts; a mobile application that is handed over to the employees of the company, a web-based application that serves as the administrative interface of the project and it is used by the respective authorities and higher management, and the database to store the gathered data of the customers. This report compiles the information gathered during the project that we worked on in conjunction with the company to develop an application to address the business's requirements.

1.1 Business Case

Officers from the company travel to the customers' homes as well as their places of employment to interact with them. They are making use of the addresses and landmarks that the customers provided at the time that they signed up for the services provided by the company. Even though this method fulfils the fundamental requirement of visiting the customer, getting to the customer by using the address and landmarks that were given is considered antiquated, time consuming, and an activity that the officers are hesitant to perform. During the interview, they discussed the following issues and reasons why they do not wish to participate in this activity:

1. The address provided may have changed for a variety of reasons, including the customer's relocation or the renaming of roads, buildings, or other locations; these are just a few examples.
2. It is possible that the specified landmarks have been altered or eliminated because of development

activities, private property claims, or natural reasons or catastrophes.

3. Even though all the issues described above have been handled, the company does not have a good mechanism to communicate papers among its branches. Instead, they rely on email or social media platforms such as WhatsApp or Viber. In addition, it was found that most of them do not utilize email services owing to a lack of knowledge regarding information technology and the English language, as well as concerns regarding bad connectivity.

1.2 Business Objective

To modernize the customer service processes and systems in a way that.

- Removes the need for officers to manually track down the customers when they are visiting again.

- Upload the documents and location to database while at the site.

- Display the location details at a dashboard view from the system.

1.3 Project Scope

1 The current process and its flaws/failures will be identified by interviews and observations.

2 The proposed system will allow.

- Field officers to search and navigate the customers' location through previously stored data.

- Capture images via the application

- Attach and upload documents via the application.

- Capture the location and store it in the database.

- Display the location details when searching for the customer by entering the NIC number.

- Display the location of selected areas or regions in a separate dashboard view (web based)

3 Provide more suitable and practical solutions for improvement.

4. Analyze and integrate the latest technological trends into the business.

5. Provide a better understanding of mobile communication to the employees.

2. LITERATURE REVIEW

The incorporation of technological advancements, such as location tracking and file uploading, into business processes has been an evolving focus of literature in recent years. The goal has been to promote efficiency, streamline operations, and enhance the overall quality of services. ABC Finance PLC's approach to embedding such solutions to address its unique challenges provides a case study to further this discourse.

2.1 Geo-location Data in Business Decisions

- Enhancing Service Quality: Research by Li & Zhou (2018) emphasizes that businesses gain a strategic advantage by collecting and analyzing geo-location data. This results in the provision of tailor-made services and optimized operational decisions, which mirror the findings suggested for ABC Finance PLC.

- Understanding Demographics: Rao & Minakakis (2019) highlight the significance of geo-location data in understanding consumer demographics. This helps businesses to segment their market, align their marketing strategies, and connect more meaningfully with their audience.

2.2 File Retrieval and Uploading Systems

- Efficiency and Security: A study by Smith & Fernandes (2017) underscores the drawbacks of traditional document-sharing methods like emails and social media platforms. They stress the need for dedicated file retrieval and uploading systems that ensure both efficient data sharing and data security.

- Adaptation Barriers: Despite the evident need for advanced file sharing systems, barriers such as poor IT skills, linguistic limitations, and unreliable internet connectivity persist. Green et al. (2020) explored these barriers, stressing the importance of user-friendly systems that minimize dependency on advanced IT skills.

2.3 Document Sharing and Collaboration in a Decentralized World

- Challenges of Reliability and Connectivity: The reliance on platforms such as WhatsApp and Viber for document sharing, as in the case of ABC Finance PLC, is not uncommon. However, Lee & Song (2016) argue that such methods are unreliable, especially for businesses, due to data breaches and privacy concerns.

- Integrated Platforms: Harper & Knox (2018) advocate for businesses to adopt integrated platforms, where location data and file uploading can be harmoniously integrated, ensuring real-time sharing and collaboration while also safeguarding customer privacy.

3. METHODOLOGY

3.1 Requirement Gathering

To determine the necessities of the project, investigations and observations were carried out in the form of interviews and meetings. During the investigation stage, interviews were conducted with the following interested parties:

- Operational managers - To acquire a comprehensive grasp of the continuing manual process and to analyze its shortcomings, as well as to discuss how the suggested system ought to operate and the requirements that it should fulfill. These individuals make up the group of people who are competent in managing the information that is sent in by means of the mobile application in an efficient manner. They can act based on this data and make decisions.

- Field officers — individuals in this category are the application's end users. They travel to the clients' homes or places of business and upload the documents or locations that are associated with those consumers

there. A handful of them participated in a straightforward meeting that was conducted in an informal manner (more like a chat) to gain a better understanding of how the existing procedure is carried out from their point of view. It was very evident that these officials did not have a good understanding of the project that was being suggested, and most of them did not have a good understanding of the technological features and foundations of the project either. Following the completion of the development phase and before the implementation of the project, a series of training courses will need to be carried out to ensure that the end users will be able to run the operation smoothly and without any problems.

- Customers - Interviews with customers of the company were conducted to assess the level of trustworthiness and happiness that customers have in relation to the company.

- Department of Information Technology - Members of the Department of Information Technology were interviewed to do a feasibility analysis on this project and to discuss the technical background of the project. It was made abundantly evident that the project could be completed, and as a result, the supervision of the team was required when it came to creating the project.

During the Interviews, the following functional requirements were identified. The proposed system is described in detail below.

- A mobile application for users to log in and perform the assigned task.

- A web application for users that performs administrative functionalities.

3.2 Proposed System

Figure 1- High Level Diagram

The above diagram explains, in a much more fundamental way, how the entire system functions. The procedure is as described below.

3.2.1 Mobile Application

- It is mandatory for the users to log in using the user credentials.

- After that, they will be taken to a screen where they will be asked to enter the NIC number of the consumer.

- On the same page, there is also a field for selecting the document category that you want to use. (Photo of the customer's residence, National Identification Card, Driver's License, Birth Certificate, and other documents related to invoicing, etc.)

- There are three icons on the same page, one to take an image, one to see an image, and one to attach a file.

- Selecting Capture image will transfer you to the camera, which will then open so that you can take pictures.

- When taking the picture, the location services of the device need to be activated so that the coordinates of the place can be saved alongside the picture after it is uploaded.

- The Attach file option navigates you to the Files folder, where you may select the document, you want to attach and attach it.

- The next icon will be a preview of the file. • After that, select the file to upload, and after that, navigate to the summary tab to verify the status.

- It is possible that the status will show as "uploaded" if the image is immediately uploaded. If not, the file was "not uploaded."

- To manually upload, you can do so by clicking the "upload" button.

The mobile application is proposed with four simple UI designs. They are listed below.

1. Login Screen - Users are greeted with a simple hello upon logging into the system. Validations are added to validate the user login so that there is no unauthorized access.

2. User Data Input Screen - Users must enter the NIC number of the customer. Then they must select the document category that they are uploading. Next, they have the option to either capture an image at that instant or to select a file from the devices' file manager. They

also can view the selected file or captured image in the icon below. Then they must click on the "SUBMIT" button to upload the file. Once the file has been uploaded a message is displayed to the user showing the file is uploaded successfully.

3. Select Document Type - Users are requested to fill in the NIC number and then select a category and upload a file. From these categories, Customer's location is captured when a file is uploaded under the CL-Visit-Photo-Residence category. The categories are given below:

- NIC #1 – front page of NIC

- NIC #2 – rear page of NIC

- DL #1 – front page of driver's license

- DL #2 – rear page of driver's license

- CL-Visit-Photo-Residence – image of the location with location

- CL – BankStatement – customer's bank statement

- CL – BillingProof - customer's any billing documents

4. Summary - The user's upload history is shown here with the details of the uploads. The category of the document, the coordinates of the location and the format of the document is shown.

3.2.2 Web Application

- It is mandatory for the users to log in using the user credentials.

- Through the web application, users can access the data that was uploaded by the field officers.

- This data may be filtered according to the field officer to assess the activities

of that officer and determine the best working staff, working patterns, and so on.

- The locations can be seen on the map.
- Users also have the power to delete incorrect or corrupted data, which can either be incomprehensible or provide information that cannot be relied upon

The web application is proposed with two simple UI designs. They are listed below.

1. Login Screen - Users can log into the system with their user credentials. Validations are added to validate the user login so that there is no unauthorized access.
2. Dashboard – Users can view the documents uploaded into the system along with their tagged locations. They can also remove unnecessary files from here.

3.2.3 Database
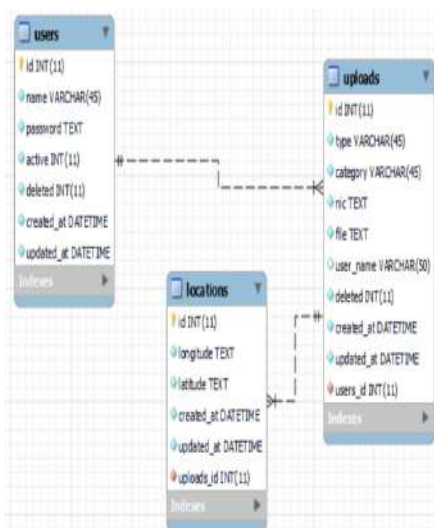
Figure 2- Extended ER Diagram

Most of the data is stored in three tables: the locations table, the uploads table, and the user's table. The users' table is where the information on the users, such as their names, user IDs, and passwords, are saved. The user IDs are being used as the primary key for this table. Details of the papers that are uploaded into the system are kept in a table called "uploads," which is in the database. This table's main key is the uploads ID, and it is connected to the users table by making the user-ID, which is the primary key of the users table, the uploads table's foreign key. The primary key of the users table is the uploads ID. The particulars of the locations are then recorded in the table designated as the location. This table's main key is the location-id, and the location itself is recorded in a format that consists of longitude and latitude coordinates. As a result, as was just demonstrated, the location table and the uploads table are connected to one another through the use of the uploads-id, which serves as the primary key for the uploads table, as the foreign key for the location table.

4. MAPPING WITH BUSINESS OBJECTIVES

As discussed above, to provide a smooth operation of their day-to-day tasks with advanced yet simple to use technological trends in a more efficient and fruitful way, the businesses can make use of this application. Furthermore, with the implementation of future development, the application is expected to provide even more usability and reliability to its users. Removes the need for officers to manually track down the customers.

1   Removes the need for officers to manually track down the customers when they are visiting again - With the Geo - location being captured, the need to locate the customers is simplified. Visiting them for business purposes is made easy thanks to the location coordinates being saved.

2   Upload the documents and location to the database while at the site - The uploads can be done real-time or if there are connection issues, which can be done manually.

3   Display the location details at a dashboard view from the system - The location and document details captured through the mobile application can be used for various business operations as per the business's needs.

1.   Future Work

As an advancement for the proposed Location Tracker and File Uploading System, we can improve the mobile application by adding a document/contract creation module and a receipt generation module that enables officers to collect payments by visiting customers. This mobile device can be connected to a handheld thermal printer via Bluetooth technology so that the invoice can be either printed or emailed to the customer. The web application can be improved into a dashboard that enables users to view and filter the data fed through the mobile application. This dashboard can be used to generate reports that show the growth of the business both physically and financially. It can also be used to track down regional data to gain an understanding of how the business performs in each region.

4.   CONCLUSION

During this Research study, the proposed Location Tracker And File Uploading System aim to achieve the competitive advantages such as real time business process monitoring, safe and secure document handling, accurate data collection of their business and customers, quick decision making in both short and term and long term while decreasing the rate of operation costs over the period.

In conclusion, ABC Finance PLC's strategic initiative to collect geo-location data and implement a streamlined process for document retrieval underscores the company's commitment to staying ahead in the financial services sector. The decision to leverage geographic information not only aims to enhance service quality but also signals a forward-thinking approach to understanding and catering to the diverse demographics within its clientele.

While the intention to optimize customer interactions through physical visits is evident, the company faces challenges associated with the reliability of location data. Address changes, alterations to landmarks, and unforeseen events pose potential obstacles to the accuracy of the information collected. Addressing these concerns will be pivotal in ensuring the effectiveness of the geo-location data for decision-making and service customization.

Moreover, the current reliance on traditional communication channels, such as email and social media platforms, exposes a technological gap within the organization. The language barrier, limited IT skills, and poor internet connectivity contribute to the inefficiency in document sharing among branches. Resolving these communication challenges will be vital not only for the success of the geo-data initiative but also for fostering seamless collaboration and information exchange within the company.

As ABC Finance PLC endeavors to modernize its operations and adapt to evolving industry standards, addressing these challenges has become imperative. By establishing robust systems for data accuracy and embracing efficient communication platforms, the company can unlock the full potential of its geo-location data initiative, leading to more informed decision-making, personalized customer interactions, and ultimately, a strengthened position in the competitive financial services landscape.

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Student Perception of a Tertiary Level ESL Classroom: An Analysis of a Padlet Mediated Asynchronous Written Corrective Feedback on Writing

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ABSTRACT

This research was done pertaining to the student perception towards Padlet mediated written feedback that was conducted on an asynchronous platform. While traditional lectures primarily prioritised passive learning, the emergence of computer assisted language learning (CALL) has evolved dialogical paradigms for the benefit of language pedagogy. Padlet is an application that serves a collaborative function to post information virtually in a synchronous or asynchronous manner. It serves as an educational platform to function interactively, thus creating a venue that is conducive for language learning. The use of Padlet in language learning is considered a modern pedagogical approach. Since Padlet falls under the paradigm of CALL, it was selected to analyse the effectiveness of the online based interactive teaching. The study involved an open-ended questionnaire that consisted of a qualitative approach. This research focused on thematic analysis with the purpose of identifying the patterns and themes from the responses collected. The main objective of the study was to examine the effectiveness of using Padlet as a tool for providing corrective feedback on writing. It was conducted for a group of first-year undergraduates at NSBM Green University, Sri Lanka. The sample consisted of 23 participants. Ten writing tasks were assigned to the participants to be posted on Padlet for which written feedback was provided on the Padlet itself in asynchronous format. The questionnaire was shared finally to observe the participants' attitudes towards Padlet as a learning platform for writing. The responses were analyzed through NVIVO software from which themes were generated. It was identified through the qualitative analysis of the questionnaire that the participants' attitudes towards the use of Padlet are favourable.

***Keywords* - Padlet, virtual learning, written feedback, perception**

1. INTRODUCTION

In an era where education is subject to digitalization, modern learners and teachers are driven towards more technology dependent modes of language learning and teaching. As the current generation of learners represents generation Z/ "digital natives" (Prensky,2001), teachers are tempted and/or instructed to use effective language teaching modes such as Computer Assisted Language Learning (CALL), Mobile-learning, Computer Mediated Communication (CMC), and Learning Management Systems. As Haythornthwaite and Andrews (2011) emphasize, in these novel learning and teaching settings, a teacher is not playing the typical role with sole authority and the students are not merely the recipients of knowledge/ "knowledge banks".

Innovative research has proven that technology in language teaching is more effective than using the stereotypical teaching approaches used previously. While traditional lectures primarily prioritized passive learning with the teacher as an authoritative instructor, the emergence of computer assisted language learning (CALL) has evolved dialogical paradigms for the benefit of language pedagogy, encouraging dialogical learning. However, it should be noted that drawbacks have also been observed when moving toward more technology dependent modes of language teaching mainly because some learners, though they are labelled as "digital natives" might still prefer the traditional classroom setting to CALL, as they lack digital literacy and competency.

In the field of CALL, "blended learning" has become a significant topic in the modern era of education as it encompasses novel trends in teaching and learning blended with both on-site and online platforms. The concept of "blended learning" could be viewed as an innovative teaching approach in relation to technology dependent modes of language teaching to manage classroom time effectively. Blended learning helps to combine onsite and online teaching so that the teacher is not under constant pressure to provide all the input in the onsite classroom. Additional activities, materials could be shared on online platforms so that the learners are motivated to explore more knowledge beyond the input provided in the class. The use of blended learning also corporates in managing the class time effectively while providing a solid input to the learners. Especially for teachers in tertiary education, the expectation to cover all intended learning outcomes of a subject module within a limited time frame would be easier when using technology dependent language teaching mechanisms especially in teaching writing skills to ESL leaners. Padlet is considered as an application that serves a collaborative function to post information virtually in a synchronous or asynchronous manner. It serves as an educational platform to function interactively, thus creating a venue that is conducive for language learning. The use of Padlet in language learning is considered a modern pedagogical approach. Since Padlet falls under the paradigm of CALL, it was selected to analyze the effectiveness of online based interactive teaching. By using a CALL tool like Padlet, the teacher could

provide asynchronous feedback on writing tasks and monitor the work of students smoothly. In a context where the effectiveness of Computer Assisted Language Learning (CALL) is criticized both positively and negatively, this research is conducted to examine the effectiveness of using Padlet as a language learning and teaching tool in an ESL classroom via the perspectives of the learners.

The notion of 'affordances' of technology for language learning is discussed by Levy and Stockwell (2006) in relation to computer mediated communication and how each type of CMC consists of modalities that have "the potential to constrain or enable the communication that occurs through them" (p.97). Affordances can be positive or negative (Gibson, 1977), and this concept was originally related to how environments provide affordances to living beings by Gibson (1977). The concept was later extended to discuss the opportunities and challenges a technological setting provides for language learning. A more recent definition of the concept in language learning leaves out challenges and presents it as "as the potential that teachers perceive in a particular technology tool that will support learning and teaching activities in their educational contexts" (Haines, 2015, p. 165). Therefore, this study is conducted to investigate the feasibility of incorporating Padlet as a tool for enhancing writing skills of ESL learners.

In addition, the research focuses on the aspect of "digital literacy" and "digital competency" in modern ESL learners.

Digital literacy can be interpreted in many ways, as shown by Spante et al. (2018), who state that "the concept digital literacy has been linked to many different agendas and perspectives, from technical "know-how" via cognitive skills to social practices and proactive engagement with digital content" (p.14). In the context of the selected sample for the research, it could be observed that even though the research participants belong to the generation of "digital natives", and though they are provided with ample access to the latest technology, they have a dearth in "digital literacy" and "digital competency", especially in relation to English language learning.

1.1 Research Objectives

- To examine whether Padlet is an effective learning platform for asynchronous written feedback
- To investigate the convenience of using Padlet for ESL learning

1.2 Research Questions

1. How effective is Padlet as a platform for asynchronous written feedback?
2. How convenient is to use Padlet as a tool for ESL learning?

2. METHODOLOGY

The sample selected for the study is a group of first-year undergraduates at NSBM Green University, Sri Lanka. The class, consisting of twenty-one learners, is a heterogeneous composition including both male and female students. The learners are rooted in different social strata, ranging

from lower middle class to upper middle class. According to Common European Framework of Reference for Languages, it was identified that the average language proficiency of the class belongs to A2 level in terms of writing skills in English, after conducting a placement test. As per the need analysis and the diagnostic test conducted, it is identified that the affective filter of the learners is relatively low in using English in written context in relation to using English in the spoken context. It is assumed that all the students in the sample are Digital natives based on the fact that they all belong to the same generation, i.e. born after year 2000 and are in early twenties. It is noted that though the learners have access to and are active on popular social media such as WhatsApp and Facebook, there is a dearth in digital literacy, technical devices, spaces and connectivity which extensively demotivate them in incorporating technology in language classrooms.

Padlet is a virtual platform that allows anyone the freedom to create a platform for themselves. Padlet is chosen as a writing medium because of significant reasons, including ease of access, attractive appearance, and ease of data access by the account owner can create learning classes in a more specific class group, and students can join the group (Kharis & Putri, 2019). Accordingly, it functions as a virtual board where people can post write ups, pictures, and even videos. It is a platform that is conducive to encourage writing provided its user-friendliness, visual appeal and other aesthetics. The study involved qualitative analysis of the

feedback provided by the participants. The participants comprised of twenty female students and one male student. They had been using Padlet for ten weeks wherein each week they were required to publish work in the Padlet and the teacher provided feedback in an asynchronous manner. The students had to undergo ten writing tasks where they shared their answers on the Padlet wall. After doing so, they updated the excel document that was uploaded in the Moodle so that the researchers knew written work had been done. A strict time for activity completion was not stipulated for the researchers assumed it would cater to students with different needs, learning styles and backgrounds (Deni & Zainal, 2018). The researchers logged into the excel document to mark the work submitted to Padlet per two days. This activity continued for ten sessions. The open-ended questionnaire focused on identifying aspects pertaining to user friendliness and the comprehension of instructions in a digital platform. The open-ended questions provided in the questionnaire were focused on the following research questions. As stipulated above, the first research question was focused on the effectiveness of the Padlet while the second question tried identifying its compatibility in relation to its usage. The open-ended questionnaire encouraged the students to share their opinions and suggestions of the Padlet usage and further improvement. Thus, this study looked at the digital fluency of the students and their willingness to work online, and their perceptions to

typing compared to handwriting. Once the data was collected, it was fed to Nvivo 12 software to organize content and develop themes. Accordingly, themes were developed with the analysis of the answers provided in the questionnaire.

3. RESULTS

When analyzing student feedback from the open-ended questionnaires, the responses were found to be of mixed reviews. The positive responses have resulted due to their preferences to use an online platform and their interest to typing, compared to handwriting. Padlet was introduced as an educational tool (Deni & Zainal, 2018). Some of the participants had even commented on how encouraging working with Padlet due to its appealing visual aesthetics. Though not many, despite the omnipresent nature of the digital world in the modern day, there were participants who stated they prefer to write by hand instead of typing. Padlet is a platform that comprises of sharing, writing and viewing functionality which seemed to support student engagement and collaboration and conversation (Garnham & Betts, 2018). It is a tool that grants complete freedom when posting content on its wall. The students can post under any name to identify themselves when posting their content and there was no barricade for the use of language. Despite the freedom provided, the students maintained responsible behaviour throughout the process; the researchers did not encounter any single post that had inappropriate language nor did they submit the content anonymously or with other names. They submitted their

work by mentioning their name and student identification number on the top as they had been instructed. That helped the instructors to identify the work done by each student in a convenient manner.

It was interesting to observe that all the students considered that Padlet had contributed to improve their writing skills. They believe that the Padlet activities paved the way for them to improve their knowledge pertaining to language structure.

- *I improved, because now I'm writing most of the time without google translator -P3*
- *I was able to know more grammar mistakes and words - P5*

The researchers were further intrigued to know that the Padlet tasks provided made them empowered. 86% of the participants were of the idea that Padlet is a very user friendly platform and that they would like to use it continuously.

- *Yes, I think Padlet is a user and friendly platform . We can easily handled this platform and it is an important platform for learning . We can use this platform for improving our knowledge as well as improving our grammar knowledge - P13*

The participants who were engaged in the tasks provided felt more confident with writing in English . They believe that Padlet created them the platform where they felt confident to share their content and even to learn from their mistakes. Padlet tasks provided them the opportunity to self-learn. Despite their work getting corrected, it

never made them discouraged. They were more encouraged to write further.

- *Yes .This Padlet task is so good because personally I could improve lot of my mistakes what I do when I am writing - P4*

- *Yes,I was able to correct grammar mistakes and learned new words, increased my knowledge, and got used to matching a sentence correctly - P5*

The participants had stated that working on Padlet provided them freedom of expression. The asynchronous feedback was given in such a way that the students did not feel offended. Instead, they were encouraged to continue their writing further while improving their mistakes. However, there were students who felt otherwise; while they do not represent the majority there were students who felt that Padlet platform did not provide them the privacy so that they were uncomfortable when posting their content.

- *I think, it will not be very favorable because everyone can see other people's answers.*

Further, there were participants who felt that writing on Padlet contributed to unauthentic writing, for everyone could see what others were posting. They stated that the transparency of all the work posted on Padlet wall contributed to unoriginal work.

- *I think, it will not be very favorable because everyone can see other people's answers. Then, in addition to their own opinions, there is a tendency to pay attention to the opinions of others - P12*

They had not posted their content with others' names but they would have felt more free if they were allowed to hide their identity. Although Padlet has been in existence for a long period of time it was interesting to know that it was a new learning paradigm for students. That made them curious and were further encouraged to work with Padlet.

- *No. This was a new experience for me. I think this Padlet task is better than writing by hand - P4*

- *This is the first time that I used it - P11*

This also contributed to the fact that students nowadays are more computer savvy. They are more digitally literate. That made them more enthusiastic to work with Padlet. There were students who stated that 10 tasks are not adequate, and that they are willing to do more since they had observed the tasks have helped them improve their writing skills. It further appeared that students of the view that Padlet is a very significant tool, provided how effective it had been in improving their English writing skills.

- *I suggest 2 paragrah submissions for a week. It is better for us. I do not think 10 tasks are not enough for us yet – P3*

- *I wish I could do more and I can't recommend this enough – P5*

Despite the preference of majority to use an online platform and the usual trend of youth being digitally literate, 14% of the participants insisted that writing on the Padlet wall made the writing tasks more inconvenient and that they would rather write their answers to obtain feedback from

their teacher. There were participants who were of the opinion that writing on online platforms was not encouraging. They were of the perception that writing by hand is the best method since that is the method they are used to and that they are willing to use this method of writing continuously even in the future.

- *I prefer handwriting because it helps improve recall memory and it provides more confidence. And also writing gives us time to slow down the thought process to think about the words, sentence patterns, and how to use language in a correct way - P11*

- *We do not practice our writing skills when we type words because we always try to follow the word suggestions comes from the Word application. When writing, I think we do not force it like when we type - P 20*

The teacher involvement is very instrumental in the success of a class (Whitton, 2009). In these activities, the teachers were involved in an asynchronous basis. They were provided feedback once the activity is posted and the excel sheet is filled. When analysing the student perception towards asynchronous feedback, the preference was more inclined towards synchronous feedback. 3 out of 21 students stated that they are comfortable with asynchronous feedback because they can write leisurely Without getting stressed on time constraints.

- *We can wait for our lecturer's response. Then after identifying the mistakes in it, it will be much*

easier for us when doing the next task. Because we are going to do the next one after knowing the mistakes of the previous one and identifying them - P17

- *I think it's good late the feedback . In that case we can identify our errors until the lecture feedback - P 13*

However, majority of the students, representing 86% of the participants insisted that they prefer synchronous feedback from the teachers. Further, they stated that they do not appreciate the flexible nature of the activities provided, for the students were not provided a strict time for submission. Thus, they insisted that the entire process of students submitting written work through Padlet and the teachers providing asynchronous feedback must be more regulated in terms of time constraints.

- *If there is allocate time to do a one task is better .as example "task 2 should done before 2nd August" - P8*

4. DISCUSSION

The first research question of this study was generated with the intention of identifying the effectiveness of Padlet in pedagogical work. The Padlet platform was used to assess the experiences the participants derived from the writing tasks. While there were a few negative remarks, the majority of participants were really excited to use this platform for writing activities. The areas that were highlighted when analyzing the responses were that they were content with the autonomy this platform provided

for them. While this was a new platform for some participants, they found that they are more empowered pertaining to writing and that they are provided with an opportunity to self-learn, not only by their mistakes but by seeing others mistakes as well. This empowerment and the confidence they found by doing these tasks could be a reason why they stated that they require furthermore tasks. The main reason for this positive feedback from the participants could be due to their familiarity with web-based technologies. In the modern day a majority of younger generation is digitally literate, and this could have influenced there are preference to use Padlet for the writing tasks.

The second research question was generated identify how convenient Padlet is for language learning. The responses comprised of both positives and negatives. The majority of responses were however positive; the positives were mostly in the areas of encouragement for writing and the freedom for expressing their thoughts. Along with that, the students were quite content with its user friendliness and the visual representation. The computer survey nature of the modern generation and their preference to work with computers also added to the list of benefits. Although in minority, the challenges encountered when working with Padlet should not be ignored; it was highlighted that using Padlet for classroom activities may render inconvenience for some users due to the lack of privacy. It was also suggested that the writings of the students lose originality since they get inspired by the work submitted by other students. And there were very few participants who directly claim

there are lack of preference to use web-based platforms for language learning tasks while some insisted on the willingness to write by hand except for typing.

While there are mixed emotions on the topic of Padlet usage for language learning, the majority of participants have stated that Padlet tasks contributed to improve their English writing skills. A tool that comprises of a virtual wall where diverse types of files can be posted (Deni & Zainal, 2019). It was clearly observed that only a minority of participants were content with the asynchronous feedback: the majority of participants noted that they prefer synchronous feedback. When reviewing the suggestions provided by students, they include, the requests to do 2 activities per week, conducting this activity as a competition, diversification of activities such as poems and stories, addition of group work and games and impose of restrictions pertaining to time limit for the activity completion and copying from other's work.

5. CONCLUSION

Challenges are identified in the process of using a CALL tool like Padlet to develop writing skills of ESL learners. When considering the pedagogical application of Padlet specifically related to English language learning, it can be noted that student perception towards this web-based tool is quite varied. While there are many participants who prefer to use online platforms for learning, there are concerns that inhibit some learners from using it. Thus, learning through Padlet may not be the best option when considering both positive and negative responses. However,

it should be noted that this study was conducted by using only one institution with twenty-one participants by using qualitative research method.

More research can be done for the clarification pertaining to the usage of web-based tools for language learning purposes. They can also focus on diverse learning environments with the use of other research methods such as quantitative or mixed method. Understanding the use of these pedagogical approaches can be highly beneficial, so that they can be more effectively used for the benefit of the students.

Even though technology dependent modes of language teaching are proven to be effective for developing language skills like speaking, listening, and reading, certain limitation could be visible in terms of enhancing writing skills of the learners. It could be concluded that direct, synchronous feedback is effective over asynchronous feedback as teacher-student interaction is low when providing feedback in technology mediated platforms because it is not happening face to face. Synchronous and direct individual communication is vital especially for beginners in writing as the selected sample belongs to A2 level as per Common European Framework of Reference for Languages. At the same time, the use of autocorrection in typing to complete writing tasks in electronically mediated communication (EMC) could be disadvantageous as they are required to focus more on constructing grammatically accurate sentences along with accurate spellings via writing tasks. Thus, informal language or typographies that are possible

to occur in EMC could be disadvantageous to learners. However, when using EMC for teaching writing, some opportunities for developing writing skills could also be noted. Most importantly, it will be convenient for the teacher to track the progress of each student's writing in technology mediated platforms. If it is done in the onsite classroom via handwritten tasks, the students may not be always bringing the same book to the class and thus it would be difficult to keep track of the learner's progress. Moreover, Padlet enables the learners to write collaboratively via peer learning and peer reviewing to scaffold their individual writing competencies while enhancing their digital literacy and competency.

In terms of drawbacks, it is noted that when writing tasks are accessible to provide teacher feedback on asynchronous online platforms, the expectations from a teacher could be higher and demanding. As stated by Legutke, Muller-Hartman and Ditfurth (2007), "ICT-supported learning environments call for the development of a specific set of attitudes, skills, and knowledge in English language teacher education". Thus, the teacher's input material requires much time, and research due to the availability of multitude of resources online. Therefore, in relation to work-life balance, it could be challenging to a teacher when the students are expecting him/her to provide individualized feedback for submitted work on online platforms. Murray (2008) highlights that forty classes of one student each will be there in blended or online learning as opposed to one class of forty students in a stereotypical classroom setting. In contrast, in the typical

way of discussing homework, i.e., before starting the next lesson, it will not interfere with the teacher's personal life/ free time.

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Including Computer Assisted Language Learning for an Inclusive Classroom in Sri Lankan Primary Schools for Dyslexic Students

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ABSTRACT

In Sri Lankan primary schools, pupils of all abilities are mixed together in the classroom, including those who have learning and reading challenges like dyslexia. This study aims to determine whether including Computer-Assisted Language Learning (CALL) in the curriculum can result in inclusive curricula that meet the requirements of all students (those with and without learning disabilities. The study focuses on the dyslexia curriculum for students to find out which ICTs for mainstream learning support teachers and students of a (selected) primary school for class work. The three major categories of ICT that were highlighted included online curriculum materials, general ICT tools, and tools created for children with special needs. The research is a three-week project that teachers and students worked on to examine how they used these ICTs. The research design is a mixed-method study, including the criteria for creating curriculum-focused CALL materials for diverse students involved teachers and students participating in focus groups. The focus groups, observation, and qualitative surveys used as research tools. The research questions of whether teachers can create appropriate CA(L)L materials and can curriculum-focused CA(L)L materials be integrated successfully into the primary school curriculum to cater to the needs of diverse students were discussed in this study. The study demonstrated that a CALL methodology can be successfully applied to a project aimed at overcoming first language barriers, CALL materials for diverse students can be successfully incorporated into an inclusive classroom, and that teachers can successfully create their own CALL materials. This research demonstrated that tailored curriculum materials can address resource gaps for

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dyslexic students. Further, in the domain of teacher perspectives, 66% of mainstream educators and 58% of learning support instructors expressed a desire to create supplementary materials to augment the existing online exercise, and a notable 92% of learning support students and 73% of mainstream students reported heightened motivation to engage with ICT tools.

Keywords - **CALL, curriculum, dyslexia, inclusive-classroom, materials**

1. INTRODUCTION

In the contemporary landscape, Information and Communication Technology (ICT) has transcended conventional boundaries, particularly within the realm of education, ushering in innovative avenues for accessing knowledge and information. This transformation has given rise to novel approaches to pedagogy, including e-learning, game-based learning, and virtual reality-enhanced instruction, among others. One significant dimension of this evolution is the integration of ICT into special education, a pedagogical arena wherein tailored approaches are paramount to addressing diverse learning needs.

While many nations across the globe have made significant strides in leveraging ICT for special education, the progress of this integration remains relatively modest within the educational context of Sri Lanka. While specialized software materials developed by other countries hold potential, the language barrier poses a formidable obstacle for Sri Lankan students. Consequently, the integration of these tools into the educational framework remains largely unexplored. In this context, the

primary objective of the present research is to meticulously examine the viability of incorporating Computer-Assisted Language Learning (CALL) into the curriculum, with a specific focus on its potential to foster inclusive pedagogical practices that cater to the diverse requirements of all students, irrespective of their learning capabilities.

The central focus of this investigation is the domain of dyslexia, a learning disability that necessitates nuanced instructional strategies to facilitate optimal learning outcomes. The research endeavors to discern the extent to which ICT, specifically CALL, can serve as a potent ally in this endeavor. By critically evaluating the effectiveness of CALL in augmenting the dyslexia curriculum, the study aspires to not only ascertain the practical utility of this approach but also to contribute to the broader discourse on inclusive education for students with learning disabilities.

A salient facet of this research is its focus on the elementary education landscape, particularly within the confines of selected primary schools. The study transcends mere conjecture by undertaking an empirical exploration, seeking to elucidate the specific ICT tools that can efficaciously support both educators and students within this context. In doing so, the research seeks to offer insights into the optimal integration of CALL for enhancing classroom interactions, facilitating learning engagement, and tailoring instructional content to align with diverse learning needs.

This study is not merely a theoretical exercise but represents a concrete attempt to bridge the prevailing gaps in Sri Lankan

education. By investigating the feasibility of integrating CALL into the dyslexia curriculum, this research stands to contribute to the enrichment of pedagogical practices, thereby fostering a more inclusive and equitable educational landscape for all students. Through the lens of scholarly rigor and empirical investigation, this study endeavors to chart a course toward a more accessible, comprehensive, and effective educational experience for dyslexic students in Sri Lankan primary schools.

In conclusion, the exploration of integrating Computer-Assisted Language Learning within the context of Sri Lankan primary schools to address the needs of dyslexic students is a pivotal step toward fostering inclusivity in education. Through a meticulously crafted research endeavor, this study seeks to illuminate the potential of ICT in shaping pedagogy that transcends the barriers of learning disabilities, thereby contributing not only to the academic development of dyslexic students but also to the evolution of a more inclusive educational landscape.

1.1. Computer Assisted Language Learning

Computer-Assisted Language Learning (CALL) software constitutes a distinctive category of language-learning tools, encompassing a diverse range of formats such as web-based applications, DVDs, and interactive platforms. Notably, these software solutions are meticulously designed and developed with a precise focus on addressing the unique requirements of specific target groups. While CALL predominantly centers on facilitating second language acquisition, its multifaceted applications extend to diverse educational contexts.

Levy's seminal work in 2001 underscores the significance of the teacher-learner classroom interaction, highlighting its unparalleled pedagogical efficacy (Levy, 2001). The inherent complexities of language acquisition and the nuances of effective instruction, often challenging to replicate within digital interfaces, substantiate the irreplaceable role of classroom-based teaching.

In alignment with this premise, the optimal utilization of CALL necessitates its harmonious integration with the conventional classroom-based curriculum. A blended learning paradigm emerges as the ideal framework, where CALL synergistically complements face-to-face instruction (Grgurović et al., 2018). This symbiotic fusion strives to harness the distinct advantages of both traditional pedagogy and technology-mediated learning, fostering an enriched and interactive educational environment.

In parallel, the concept of Computer-Assisted Learning (CAL) elucidates an integrative approach wherein technology acts as a supplemental learning resource rather than a wholesale replacement for classroom content (Aparicio et al., 2017). Often manifested through self-directed study outside of formal curriculum hours, CAL empowers learners with autonomy in exploring subject matter in-depth.

Moreover, CAL's applicability transcends disciplinary boundaries, accommodating diverse subjects and topics. This expansiveness underscores the versatility of

CAL as a pedagogical strategy that empowers learners to engage with course material in a manner that resonates with their unique learning preferences.

Critically, the encapsulation of 'Language' within parentheses within these frameworks is emblematic of a paradigm shift. This shift redirects the traditional focus of second language acquisition towards the imperative of aiding students with learning and literacy challenges within their primary language context. This transformation underscores the inclusive ethos inherent in CALL and CAL methodologies, striving to ensure equitable educational opportunities for learners with diverse needs (García-Peñalvo et al., 2020).

In conclusion, Computer-Assisted Language Learning (CALL) and Computer Assisted Learning (CAL) represent dynamic pedagogical paradigms that intertwine technology with education. While acknowledging the distinct pedagogical advantages of classroom interaction, these methodologies offer avenues for blended learning and supplementary resources. In a rapidly evolving educational landscape, these approaches have the potential to pave the way for comprehensive and inclusive learning experiences, transcending language and subject barriers.

1.2. Dyslexia and Sri Lankan Primary School System

Dyslexia is a neurodevelopmental disorder characterized by difficulties in accurate and/or fluent word recognition and by poor spelling and decoding abilities. Individuals with dyslexia often exhibit unexpected difficulties in reading despite having average to above-average intelligence and adequate educational opportunities. Common characteristics of dyslexia include difficulties in phonological processing, working memory deficits, and slow automatic word recognition (Shaywitz et al., 2008).

In Sri Lanka, despite limited research on the prevalence of dyslexia, there is a growing recognition of the challenges faced by students with reading difficulties. According to the Ministry of Education in Sri Lanka (2019), an estimated 10% of the student population in primary schools may experience difficulties related to dyslexia. The lack of widespread awareness and screening mechanisms often leads to underdiagnosis and inadequate support for affected students.

Sri Lankan primary schools encounter several challenges in addressing dyslexia. The language barrier, as Sri Lanka has a diverse linguistic landscape, presents a significant challenge in developing effective interventions. Furthermore, limited resources, large class sizes, and a lack of trained educators equipped to handle specific learning disabilities compound the issue. However, Sri Lanka has taken some steps towards addressing these challenges. The "Inclusive Education Policy" introduced by the Ministry of Education emphasizes creating an inclusive environment for students with diverse learning needs, including dyslexia. Additionally, teacher training programs have been initiated to enhance educators' awareness and skills in identifying and

supporting students with dyslexia (Ministry of Education, Sri Lanka, 2020).

In conclusion, dyslexia remain a significant challenge in Sri Lankan primary schools, affecting a notable portion of the student population. The prevalence of dyslexia, combined with unique linguistic and resource-related challenges, underscores the need for comprehensive interventions that address the specific needs of students with dyslexia. Initiatives such as inclusive education policies and teacher training programs are steps in the right direction, but continued efforts are required to create a truly inclusive educational environment that supports the diverse learning needs of all students.

1.3. Research Questions

3.   Can teachers create appropriate CA(L)L materials?

4.   Can curriculum-focused CA(L)L materials be integrated successfully into the primary school curriculum to cater to the needs of diverse students?

1.4. Objective of the Research

A blended learning environment means that both traditional classroom teaching and ICT materials are used in tandem.

The materials should be able to be used both in the classroom and at home by the students. Importantly, they are meant to enhance the learning experience rather than detract from it. The Sri Lankan education system adopts an inclusive class approach where students of diverse abilities are taught in the same classroom. While some students have extra learning support outside of the mainstream classroom, these students spend the majority of the school week with their peers. So that, the main objectives of the research are as followed.

- ICT materials have to cater to the needs of three student groups that are present in the inclusive mainstream environment: mainstream students of all levels, students with dyslexia and students in learning support and resource classes.

- Develop learning materials incorporating feedback from these groups that can be used by the whole classroom together in an inclusive manner.

2. METHODOLOGY AND EXPERIMENTAL DESIGN

This study is focused on understanding how Information Communication Technology (ICT) is being utilized by teachers and students in Sri Lankan primary schools to support the curriculum. The study involved participants from two different schools, School A and School B, with a total sample size of 50 non-dyslexic female students from School A, 50 dyslexic female students from School B, and 10 teachers from both schools.

Research Design: The research methodology utilized an experimental approach to explore the impact of two distinct interventions: phonetic classroom activities and specialized online ICT activities. The experimental design allowed for a comparative analysis of outcomes between the two focus groups (dyslexic and non-dyslexic students).

Sampling: The sample size consisted of a total of 110 participants, comprising 50 non-dyslexic female students from School A, 50 dyslexic female students from School B, and 10 teachers (5 from each school). The inclusion of both dyslexic and non-dyslexic students ensured a diverse participant pool to draw meaningful conclusions.

Data Collection: Data were collected from the following research tools.

Observation: The research involved direct observation of classroom activities. Trained observers documented student engagement, participation levels, and overall interactions during both phonetic and ICT activities. This allowed for real-time insights into the impact of the interventions.

Surveys: Both dyslexic and non-dyslexic students were administered surveys before and after the interventions. The pre-intervention survey aimed to assess their baseline knowledge, skills, and attitudes. The post-intervention survey gauged their perceptions of the effectiveness of the interventions and their overall learning experience.

Technological Classroom Activities: Participants engaged in specialized online ICT activities tailored to dyslexic students. These activities were designed to accommodate their learning needs and preferences, leveraging technology to enhance their educational experience.

Phonetic Classroom Activities: Both dyslexic and non-dyslexic students participated in phonetic classroom activities. These activities aimed to improve phonological awareness and reading skills for all participants, with a focus on addressing potential challenges faced by dyslexic students.

Data Analysis: The collected data was subjected to both quantitative and qualitative analysis. Quantitative data from surveys were analyzed using descriptive statistics and inferential tests (e.g., t-tests) to compare changes in perceptions and attitudes before and after interventions.

Qualitative data from observations and open-ended survey questions were analyzed thematically, identifying patterns, trends, and student/teacher feedback on the effectiveness of the interventions.

The research methodology employed an experimental design to investigate the impact of phonetic classroom activities and specialized online ICT activities on dyslexic and non-dyslexic students. By using observation, surveys, and technological interventions, the study aimed to provide valuable insights into effective teaching methods for these diverse groups of learners. The combination of quantitative and qualitative analysis ensured a comprehensive understanding of the outcomes, contributing to the advancement of educational practices that cater to students with varying learning needs.

3. RESULTS AND DISCUSSION

The results that have obtained from the research tools are mentioned and discussed appropriately under each research question.

Research Question 01: Can teachers create appropriate CALL materials?

The study's findings indicated that both phonetic classroom activities (Match the

sound to the letter: Provide a list of sounds and a set of letters. The student needs to match the sound with the correct letter or combination of letters, Rhyming Words and Word Recognition) and specialized online ICT activities, as demonstrated by teachers, effectively enabled the creation of personalized and valuable learning materials. This outcome underscored the meaningful purpose of these materials in facilitating topic comprehension. A noteworthy distinction between phonetic classroom activities and specialized online ICT activities was that the latter, specifically the CA(L)L online ICT activities, could be utilized beyond the classroom environment, even at home.

Based on the insights gleaned from questionnaires and the feedback obtained during focus group discussions with both teachers and students, it was observed that students engaged with the CA(L)L online ICT activities approximately once a week. To illustrate, in an English class, students watched a brief video introducing various media forms, such as newspapers and advertising, followed by a multiple-choice exercise. This exercise drew from questions and vocabulary found in past exam papers (which were referred from the school library), facilitating familiarity with relevant terms, particularly beneficial for students facing literacy challenges. This finding underscores the adaptability of the materials to accommodate diverse learners within an inclusive environment. A concrete example from an English class demonstrated the effectiveness of the CA(L)L online ICT activities in reinforcing subject knowledge. The students reported that the exercises' level of difficulty was

well-suited for their learning needs (90% for both mainstream and learning support), given that the content was developed by their own teachers. The exercises were conveniently organized in individual student folders on the school's local server. This setup allowed teachers to tailor exercise availability based on student groups, using a persona-based approach. Teachers had the flexibility to customize the exercises by incorporating additional curriculum materials and even including notes on desired learning outcomes.

Both mainstream and learning support teachers attested to a meaningful correspondence between the CA(L)L tasks and the learning activities conducted in their classrooms. Learning support students particularly appreciated the design (70%) and content (90%) of the online ICT activities, which were thoughtfully attuned to their needs. A substantial proportion of teachers, comprising 70% of mainstream teachers and 90% of learning support teachers, found the effort invested in adapting the online ICT activities in line with design guidelines to be well worthwhile. In the context of focus group discussions, both students and teachers conveyed positive experiences with the softwares, highlighting its effectiveness. However, some challenges emerged. A notable percentage of students (60%) encountered limited access to computer labs, while internet connectivity issues were reported by 42% of participants. These challenges notwithstanding, the overall reception of the CA(L)L online ICT activities remained affirmative, underscoring their potential to facilitate

meaningful learning experiences despite occasional hurdles.

The collaborative involvement of teachers and students in the preliminary ICT integration study, which encompassed participation in focus groups to formulate design guidelines for curriculum-focused CA(L)L materials, ensured a concentrated emphasis on the learner. This learner-centric approach informed the subsequent design and development of CA(L)L Materials. Results revealed that 85% of mainstream and 95% of learning support teachers willingly engaged in creating new online activities and applied the design guidelines to them and phonetic activities. Feedback from students highlighted their favorable reception of the materials crafted by their teachers, particularly the online ICT activities, owing to their appropriate design (70%) and content (90%) tailored to their needs. This aligns with integrative CALL principles, emphasizing the incorporation of diverse modalities and a high degree of interactive engagement.

Teachers indicated that the investment of time in adapting the online ICT activities with the design guidelines was well-justified (84%). Likewise, learning support students reported a positive experience (87%) with the materials generated by their teachers (figure 1). These materials, having been developed by teachers, resonated well with students in terms of their suitable level of difficulty (91% for both mainstream and learning support), thereby underscoring the alignment with learner needs. Teachers further attested to the educational value of these materials, as students could effectively employ them to grasp the

subject matter. This substantiates the meaningful purpose of the tools, as they
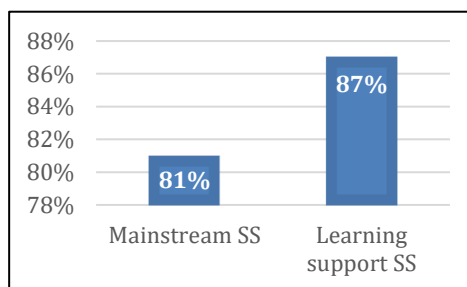
Figure 1. Students' (SS) Experience with the materials generated by teachers

actively contributed to the learning process rather than serving as mere distractions.

Overall, the research outcomes, as validated by multiple index citations, substantiate that online ICT activities and phonetic activities, designed through collaborative efforts and guided by student-centered principles, effectively catered to learner needs, fostering meaningful learning experiences.

Research Question 02: Can curriculum-focused CA(L)L materials be integrated successfully into the primary school curriculum to cater to the needs of diverse students?

The assessment of online ICT activities (creative apps: Rosetta Stone, Babbel and HelloTalk) yielded noteworthy outcomes, indicating that both mainstream and learning support students, as well as teachers, had a positive encounter with the softwares. A substantial 82% of students from both categories and 84% of teachers conveyed a favorable experience. Specifically, mainstream and learning support students expressed satisfaction with the HelloTalk and Rosetta Stone,

emphasizing that the design and content were tailored to their individual needs, underscoring the materials' learner-centric orientation. Teachers acknowledged the value of the effort invested in aligning these online activities with the stipulated design guidelines, with 84% deeming the endeavor as worthwhile. Remarkably, feedback from both students and teachers reinforced the positive nature of their interaction with the software, attesting to a positive experience at an aggregate rate of 87%. An intriguing discovery emerged from the evaluation of phonetic activities and comprehension activities available with visual content online, wherein 97% of learning support students found them beneficial due to the provision of detailed feedback on select exercise types. Moreover, these exercises facilitated the inclusion of paragraph-style answers, enabling teachers to review responses later, signifying a valuable pedagogical dimension.

An active involvement of students in the exercise design process was discernible. A notable 92% of learning support students and 73% of mainstream students reported heightened motivation to engage with ICT tools post-interaction with the CA(L)L tools, a phenomenon echoed in Dörnyei's motivational theories (1998). Evidently, these tools contributed to an enhanced motivational disposition among students.

In the domain of teacher perspectives, 66% of mainstream educators and 58% of learning support instructors expressed a desire to create supplementary materials to augment the existing online exercises. This aspiration underscores an underlying engagement with the material creation process, underscoring their commitment to optimizing the instructional environment.

An intriguing research inquiry aimed at examining whether the CA(L)L materials, tailored to cater to a diverse spectrum of student personas, might inadvertently diminish the learning experience of mainstream students. Findings from focus groups unveiled that mainstream students traversed the material swiftly. This phenomenon implies that the materials were imbued with a meaningful purpose, as evidenced by their alignment with curriculum content. Both mainstream teachers and students acknowledged that this subgroup necessitated a greater number of exercises per class session to accommodate varied paces of completion. This emerged due to the initial limited set of exercises developed by the researcher and constraints on teachers' time for material creation. A pivotal finding emerged, affirming the positive impact of the CA(L)L materials within an inclusive classroom environment. The private nature of CA(L)L usage engendered an environment devoid of stigmatization, as students were unaware of others' exercise engagement. Notably, mainstream teachers indicated that all students accessed the same CA(L)L system, thus mitigating potential disparities in resource perception. The critical distinction lay in the personalized delivery of materials, designed by each teacher to cater to specific student requirements, thus fostering a discreet, inclusive, and equitable learning atmosphere.

4. CONCLUSION

This research project shed light on the disparity in special needs support for dyslexic students, indicating a lack of sufficient resources and ICT tools available for primary learning support students. The research questions of whether teachers can create appropriate CA(L)L materials and can curriculum-focused CA(L)L materials be integrated successfully into the primary school curriculum to cater to the needs of diverse students were discussed in this study. Many learning support teachers resorted to using primary school programs, underscoring the scarcity of suitable materials. To address this gap, curriculum materials tailored to the needs of dyslexic students were developed, aiming to alleviate resource constraints. The collaborative approach employed in this study involved teachers and students in the design process through focus groups, which laid the foundation for the design guidelines used in creating the materials. Central to the success of this endeavor was the essential training provided to both teachers and students, ensuring their comfort and familiarity with the materials. This training empowered teachers to craft their own materials in accordance with the established guidelines, demonstrating their enthusiasm to incorporate ICT resources when provided with the necessary support. The resulting approach cultivated a blended learning environment, wherein teachers could seamlessly integrate the CA(L)L tools within their lesson plans or opt for traditional teaching methods. The materials served as tools to enhance the teaching and learning experience, rather than assuming the role of standalone tutors. This approach fostered the normalization of ICT in the classroom, positioning the computer as an additional instructional tool alongside projectors and boards. Observations attested to the successful integration of the developed materials into an inclusive classroom setting. Students collaborated within a unified classroom while engaging in diverse exercise types and a notable 92% of learning support students and 73% of mainstream students reported heightened motivation to engage with ICT tools. The effectiveness of the CALL methodology employed in this study underscores its viability for a CA(L)L deployment targeting dyslexic students in Sri Lankan second-level education due to its learner-centered nature. Importantly, the exercises resulting from this research were shared with teachers and continue to be utilized by one of the participating schools, underscoring their utility and enduring integration. So that, this research demonstrates that tailored curriculum materials can address resource gaps for dyslexic students. The collaborative approach, coupled with teacher and student training, underscores the potential of ICT integration. Further, in the domain of teacher perspectives, 66% of mainstream educators and 58% of learning support instructors expressed a desire to create supplementary materials to augment the existing online exercises. This learner-centered strategy, culminating in shared materials, serves as a testament to the successful application of the CALL methodology, ultimately benefiting dyslexic students in Sri Lankan primary education.

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Using Artificial Intelligence Tools in Language Learning in Tertiary Education in Sri Lanka: A Challenge to Academic Integrity?

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Abstract

With the integration of technology into modern day teaching and learning, every educator is exposed to various modes of technology wittingly or unwittingly. Consequently, in recent years the invention of the latest Artificial Intelligence tools is blurring the boundaries of what an original work is and what is not. In tertiary level, undergraduates, by and large are supposed to conduct research, which contribute to the academia. Hence, it is crucial that they maintain academic integrity and authenticity in their research work. However, with the introduction of applications such as ChatGPT, QuillBot, and Google Bard, the integrity and authenticity of the academia has been gravely challenged. These applications pose a bigger threat to the academia since conventional computer applications like Google Translator were simply used to translate one's ideas from one language to another, while Grammarly provides better suggestions to add formality for writing. The latest AI tools such as ChatGPT automatically writes the answer for the student under human commands, making it almost impossible to trace the original source of reference. This in turn challenges academic integrity as students resort to AI tools in completing their academic work as it is 'efficient' and 'quick', instead of going through the arduous process of writing to produce something on their own and browsing online sources only for the purpose of referencing. This research is both a qualitative and a quantitative study, in which answers submitted for a common creative essay writing activity by eighty first year students from the NSBM Green University, questionnaires and semi-structured interviews with lecturers and students were analyzed to trace the use of AI tools in completing their assessments. This paper aims to discuss ways in which undergraduates completely rely on AI tools like ChatGPT in tertiary education in Sri

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Lanka. The present circumstances raise doubts about the necessity of a teacher's presence and traditional language learning methods, given the availability of applications like ChatGPT.

Keywords - **Academic Integrity, Tertiary Education, Plagiarism, AI tools**

1. INTRODUCTION

Artificial intelligence (AI) has permeated the daily lives of individuals in the twenty-first century and is increasingly hailed as a versatile tool capable of improving and progressing various aspects of human existence. The adoption of AI has generated significant enthusiasm in higher education, a field heavily impacted by the evolution of information, communication technologies and research. It has already been applied across diverse academic disciplines, including language education. Despite its approximately three-decade presence, educators are still grappling with the question of how to harness the pedagogical potential of AI tools on a larger scale and how it can genuinely and significantly influence the landscape of teaching and learning in higher education.

Technology has enabled various ways of violating academic honesty such as plagiarism, collusion, fabrication of data and contract cheating. Incorporating expansive language models such as ChatGPT, which was most recently introduced into language education within higher learning, offers a promising avenue for pushing the field forward. Its capacity to provide tailored instruction and generate authentic language content underscores its potential to enhance the efficacy and productivity of language education.

Nonetheless, the utilization of ChatGPT also introduces ethical and societal concerns that require attention.

Universities are combatting this issue by providing accessible academic integrity modules, policies, and guidelines to students. Despite these efforts, academic misconduct continues to persist. With the continuous evolution of technology, higher education institutions have a unique opportunity to instill ethical values through innovative means in order to make sure that students do not misuse the resources they are provided with.

The primary goal of this study is to investigate the extent to which students utilize or misuse AI tools that are commonly favored among them. Additionally, the present study aims to uncover the underlying reasons as to why students turn to these methods. Furthermore, it seeks to underscore the importance of establishing practical guidelines in education institutes for tertiary education in Sri Lanka in order to prevent the inappropriate utilization of AI tools.

2. LITERATURE REVIEW

ChatGPT is a predictive and smart AI-powered bot, currently an evident signal for the paradigm shift that has occurred not only in the higher education sector, but also in the whole educational landscape. Today it has become a promising tool for tertiary education, creating educational resources and content tailored to a student's unique interests, skills, and learning goals. ChatGPT has already become a powerful tool for enhancing students' and teachers' experience. Javaid (2023) states that using

ChatGPT, educators design lessons and instructional materials specific to each student's requirements and skills based on current trends. Students usually work at their speed and concentrate on the areas where they need the most support, resulting in a more effective and efficient learning environment.

There have been many studies conducted on the significance of AI in tertiary education and significant applications of ChatGPT in tertiary education such as providing personalized learning opportunities. Most research predominantly presents the efficient capabilities and personalized teaching and learning mechanisms promised by AI technology. However, the potential concerns of chatbots such as challenge to academic integrity have not been investigated as much.

McCarthy et al. (1955) organized a scholarly event and coined the term "artificial intelligence" (AI) in 1955 to refer to machines and processes that imitate human cognition and make decisions like humans. ChatGPT (Generative Pre-trained Transformer) was introduced by OpenAI in November 2022, as a conversational artificial intelligence interface that uses natural language processing (NLP). It is a natural language model that generates information and responses based on the data fed on it, while interacting in a realistic way and catering to individual needs and learning styles, promoting autonomy and self-paced learning. It provides learning platforms with answers to follow-up questions, admits its mistakes, challenges incorrect premises, and rejects inappropriate requests (OpenAI, 2023).

While primary function of AI tools such as ChatGPT was to mimic human conversation, its capabilities extend far beyond that; it can literally create new things, such as a poem, story, or novel, or act like anything within its capability within its conversational AI interface. Therefore, ChatGPT today is used to create literary texts such as essays, stories, poems, and articles (Tili et al.,2023). Tili (2023) further claims that responses from a majority of the participants suggest that ChatGPT is efficacious in increasing the chances of educational success by affording users (teachers and students) baseline knowledge of various topics. Additionally, ChatGPT was recognized by the participants as efficient in providing a comprehensive understanding of varied (complex) topics in an easy-to-understand language.

Significantly, in tertiary education, ChatGPT is helpful in explaining complex topics in a simpler manner. Therefore, there is a tendency for undergraduates to use ChatGPT to generate model answers and complete assessments conveniently. Moreover, according to Cotton et al. (2023), ChatGPT facilitates collaborative learning by creating groups that enable students to work together on projects, research and assignments. According to Dwivedi et al. (2023), integrating chatbots into an online platform used in a university course can help facilitate student- teacher interaction and improve the overall learning experience. Kuhail et al. (2022) also asserted that chatbots support students by providing instant feedback and personalized learning experiences.

Learning a language involves multiple cognitive and linguistic abilities involving both low-level haptic skills like handwriting and high-level composition skills like thinking, planning and understanding, creating etc. According to Beck. J et al. (2005) higher education programs traditionally required human educational practitioners to oversee processes and maintain quality assurance, which now can be assured using AI tools. While realizing how ChatGPT has promisingly contributed to tertiary education, carefully considering its potential implications and risks is important.

This study aims to cover a crucial debate on how AI tools have challenged academic integrity. Academic integrity means acting in a way that is honest, fair, respectful and responsible in one's academic work. Maintaining academic integrity involves taking responsibility for conducting thorough research, critically evaluating sources, and properly attributing information to the appropriate sources. However, concerns about its use in assessments and the potential for academic dishonesty, integrity, and malpractices have been raised for quite some time now. Currently there is a tendency for students to misuse these tools as these leads students to plagiarize and to rely solely on automated corrections excessively or AI suggestions without properly comprehending the concepts or actively engaging with the learning process.

Therefore, it is of utmost need that these challenges should be addressed by the educators by fostering a culture of academic integrity and promoting

responsible use of AI tools. Students should be made aware of clear guidelines and ethical frameworks regarding the use of AI tools for knowledge enhancement and to leverage AI tools as aids for learning. Additionally, educators need to emphasize the importance of critical thinking, originality, and proper citation practices. As stated by Holmes et al. (2021), the growth of AI in education and its morality is being questioned due to the rapid rate at which AI can predict or offer new models surrounding higher education programming, teaching, and learning, education, which could automatically lead students to use poor logic or data and AI's trial and error.

Janssen et al. (2021) described reasons for chatbots' failure in practice, including not having enough resources, wrong use case and concerns on ChatGPT, were not well investigated in the education field. Therefore, it is not clear if ChatGPT will overcome the concerns found in previous chatbots or will even deepen them. Nevertheless, incorporating AI tools in language learning could be viewed as an opportunity to support personalized learning while upholding academic honesty and integrity. By nurturing ethical use of chatbots for academic purposes, and providing appropriate support and guidance, tertiary education in Sri Lanka can effectively harness the potential of AI tools. Hence there is great potential for leveraging AI tools to enhance the language proficiency of undergraduates.

3. METHODOLOGY

This research employs a mixed-method approach encompassing both qualitative

and quantitative techniques to comprehensively examine students' engagement with AI tools in creative writing. The study involved 70 first-year students from the Faculty of Business of NSBM Green University. To select the sample of the study, a stratified sampling method was employed to ensure representation from all seven departments within the faculty. According to Thomas (2020) the use of stratified sampling helps with the generalizability and validity of the study, as well as avoiding research biases like under coverage bias. Therefore, specifically, 10 students were randomly selected from each department, with a total of 70 participants. All 70 students were tasked with a creative writing question, which they completed during a designated in-class session for 2 hours. Their responses were then collected through an online submission process.

Next, to gauge student perceptions about the utilization of AI tools in creative writing and to collect essential data for analysis, all 70 students were administered a questionnaire via Google Forms. This questionnaire consisted of 10 questions, with 8 being closed-ended and 2 open-ended. The combination of closed and open-ended questions facilitated both quantitative and qualitative insights into the subject.

To gain insights into lecturers' perceptions and attitudes toward students' use of AI tools, structured interviews were conducted. Stratified sampling was again employed to ensure representation from all seven departments within the Faculty of Business. Consequently, interviews were conducted with one lecturer from each department, totalling 7 participants.

In the process of data analysis, the responses from the creative writing task were subjected to plagiarism and AI tool analysis using Turnitin to identify instances of AI tool usage. Quantitative data from the questionnaires was analysed using bar charts to visualize trends and patterns. Qualitative data from the open-ended questions and the lecturer interviews were transcribed manually and analysed thematically to derive meaningful insights. This qualitative analysis aimed to uncover nuanced insights and themes related to students' engagement with AI tools in academic answers, as well as lecturer perspectives and attitudes.

DATA ANALYSIS

For the data analysis the results obtained from the questionnaire which was given to 70 students including all seven departments of faculty of business were considered. These data were collected through a google form application and analysed using Excel sheets. According to the questionnaire there were 10 questions including 8 close-ended and two open ended questions. The responses of the 8 close ended questions are graphically represented below.

Figure 01: According to you, what makes it difficult for you to complete your assignments successfully on your own?

Figure 02: What are the AI tools that you use for academic purposes?

is Bing chat. Moreover, students use other AI applications for their academic work. These applications were specified in their responses. Those applications are Open AI, You Chat, Chat PDF, Scite AI, Neeva AI and Quora Poe.

Figure 03: What are the instances you use the above tools?

Figure 01 describes why students use AI tools to assist them in their academic endeavors According to Figure 01, students find it difficult to complete their assignments by themselves due to several reasons such as language barriers, not having enough knowledge, tight deadlines, not understanding the question properly, unavailability of information and having busy schedules. Out of all these reasons most of the students (68) have agreed that inability to complete their assignments by themselves is because of their busy schedules. Moreover, having tight deadlines and due to language barriers have also caused students to face difficulties in completing their assignments without seeking any help.

Figure 02 shows the common AI tools that students use for academic purposes. Chat GPT, Quillbot, Google Bard, Bing chat are very common among the students in the faculty of business. Ut of all these AI tools according to the collected data most prominent AI tool which is used by the 62 students is Chat GPT. 52 students use Quill bot and 21 students used Google Bard for academic purposes. The least used AI tool

Figure 03 shows the instances when and where the students utilize AI tool is their academics. According to the collected data, the majority of the students (63) use AI tools when writing an email or any other document. Consequently 62 students see assistance from AI tools when completing assignments at home while 60 students use AI tools when writing essay type answers. Further 43 students use AI tools for final exam preparations and 42 use AI tools when completing assignments in the classroom. Apart from these instances 11 students use AI tools for other academic purposes such as to solve mathematical equations.

The provided figure 04 shows data which outlines various reasons why individuals use AI tools in the academic context. Majority, 62 students have agreed that they can complete the academic work easily and quickly with the use of AI tools. Meanwhile 52 students think that AI tools help them to prepare quality responses as AI tools can offer suggestions, corrections, and improvements to written content, ensuring better-prepared answers. 41 students admit

Figure 04: Why do you resort to AI tools?

to using AI tools due to a lack of motivation or willingness to engage in writing or reading tasks particularly in English. Moreover 83 students lack the vocabulary necessary to articulate their thoughts or understanding effectively while minority, 18 students utilize AI tools as learning aids as these tools can provide explanations, breakdowns, and visualizations that enhance their understanding of complex topics or languages.

Figure 05: How often do you use AI tools?
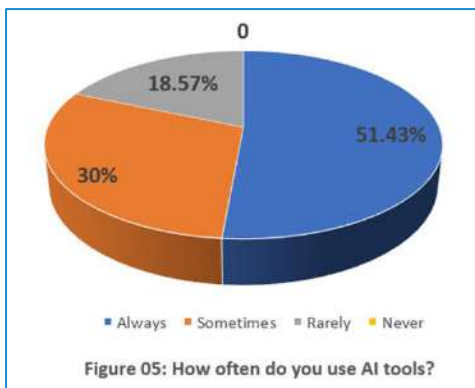
Figure 05 shows the frequency with which respondents use AI tools. Approximately 51.43% of respondents, the majority mentioned that they use AI tools regularly, indicating that they rely on AI tools consistently in their tasks or activities. 30% of the students use AI tools occasionally. They do not rely on these tools constantly but use them when the need arises. 18.57% of students use AI tools rarely suggesting that they seldom incorporate AI tools into their routines or tasks. There are no students who do not use AI tools according to figure 05 and that might indicate the increasing integration of AI tools into various aspects of daily life and work.

Figure 06: Do you directly copy from AI or do you use other strategies when writing answers?
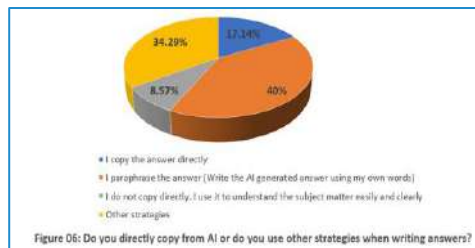
This figure (Figure 06) provides insights into how individuals utilize AI-generated answers. A significant portion, around 40% of respondents first paraphrase the AI generated answers rephrasing it in their own words before using it. Approximately 34.29% of respondents reported using strategies not specifically listed. These "other" strategies encompass a range of approaches, including summarization, integration with their own content, or using humanizing applications. On the other hand, 7.14% of respondents mentioned that they copy the AI-generated answers directly without making any changes to them. The minority, about 8.57% of respondents stated that they do not directly copy the AI-generated answer, instead, they use it to aid their understanding of the subject matter comprehensively.

Figure 07: Have you ever been penalized for using AI tools in your answers?
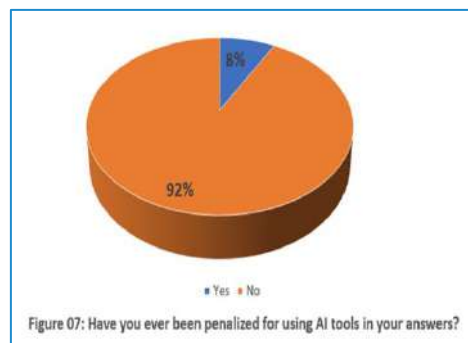
Figure 07 shows that while 8% individuals have faced penalties for their use of AI tools, the majority of 92% have not encountered such issues. It is worth noting

that the use of AI tools should align with ethical and academic guidelines to avoid potential penalties in educational or professional contexts.

Upon examining the data presented above and other research findings, it becomes evident that students predominantly utilize AI for their academic tasks. However, the term "use" may create ambiguity, as students both refer AI for supplementary information and directly copy and paste text generated by AI tools as well. Anonymous student feedback has revealed that some employ tactics to copy content from the internet without detection by AI tools, such as employing text humanization techniques. Within our scholarly discourse, we regard this as a potential vulnerability. Given the practical limitations of continuous monitoring of student activities and the impracticality of prohibiting students' access to AI platforms, it falls upon the academic community to respond thoughtfully. Academics should design assignments and questions that necessitate responses beyond what can be readily sourced from AI-generated content. Furthermore, institutions providing tertiary education can play a pivotal role in preserving academic integrity by implementing stringent policies governing the utilization of AI tools. Such policies would contribute significantly to addressing the challenge of safeguarding the integrity of scholarly work.

THEMATIC ANALYSIS

While the temptation to present AI generated content as one's original work may be alluring it carries significant risks. Overreliance on AI content can negatively affect the development of one's unique style and voice. It has the potential to deprive individuals of the opportunity to nurture their own skills and personal growth. Instead, AI generated content can serve as an initial framework for one's work or even function as a proofreading tool for completed assignments. In this capacity AI becomes a resource for efficiency and personal advancement rather than a means of plagiarism.

In the context of AI tool utilization in tertiary-level language education, there exists a spectrum of perspectives among the members of the academia, encompassing both enthusiasm and caution. Each educator in Sri Lanka perceives the integration of AI tools in language education in the tertiary level in different ways. On one hand, some view AI as a valuable resource for tackling issues like crowded classrooms and resource constraints. They acknowledge its capacity to streamline tasks like grading, thereby enabling educators to allocate more time for meaningful student engagement.

"I think people have mixed feelings about using AI tools in college-level language education. I personally think that it can help with big classes and not having enough resources. For instance, AI can do things like grading, which gives teachers more time to work with students". (Interviewee 4)

The potential benefits are evident, as AI can deliver tailored instruction, adapt to unique learning requirements, and furnish immediate feedback—an asset, especially in our diverse learning milieu characterized by varying language skills among students. Adequate training and support for educators

are imperative to harness the full potential of AI tools effectively. Furthermore, it's vital to strike a balance, ensuring that AI complements traditional teaching methods rather than supplanting them entirely, thus optimizing the educational experience.

"I think using AI tools in language education is a good thing. They can give personalized lessons, adjust to each student's needs, and give instant feedback. This is especially helpful when students have different levels of language skills. However, there are worries about making sure teachers know how to use AI tools well and that they work together with regular teaching methods instead of replacing them completely". (Interviewee 7)

While some hold a positive stance on the use of AI tools in language learning, responses as above reflect a perspective of uncertainty, making them hold a neutral ground on the subject.

However, the majority of respondents holds the view that the incorporation of artificial intelligence (AI) tools into language learning has the potential to usher in a transformative era in education, offering a host of promising benefits for both students and educators. In this evolving landscape, AI-driven solutions promise to revolutionize language instruction, providing personalized learning experiences, enhancing efficiency, and equipping learners with tools for rapid skill development. These potential advantages hold particular significance in a diverse educational context like Sri Lanka, where students bring varying language proficiencies to the classroom. This introduction explores the exciting prospects

that AI holds for language education in Sri Lanka while acknowledging the need for a balanced assessment of its impact.

One significant advantage of AI-driven language learning is the potential for personalized instruction. These AI-powered platforms can adapt to individual students' learning needs and pace, offering a tailored educational experience. This level of personalization can be especially valuable in Sri Lanka, where students often come from diverse language backgrounds and have varying levels of proficiency.

AI also offers efficiency and accessibility in language education. Educators can automate tasks like grading and assessment, freeing up more of their time for meaningful interactions with students. This efficiency becomes particularly important in resource-constrained educational environments, which are not uncommon in Sri Lanka. Providing real-time feedback could be identified as another notable benefit. AI tools can provide instant feedback on pronunciation, grammar, vocabulary, and more. This immediate feedback can significantly accelerate language skill development. Eventually, AI can contribute to equity in education. By making quality language education accessible online, even to students in remote or underserved areas of Sri Lanka, it helps bridge the digital divide. Furthermore, AI can enhance resource availability. These tools can generate authentic language content, including interactive exercises, quizzes, and multimedia resources, enriching the overall learning experience.

While the integration of artificial intelligence (AI) tools into language

learning presents a multitude of exciting possibilities, it is not without its potential drawbacks and challenges. This introduction delves into the concerns and reservations associated with the adoption of AI in language education in Sri Lanka, acknowledging that while AI offers efficiency and accessibility, it also raises questions about teacher roles, digital disparities, data privacy, pedagogical oversimplification, and ethical considerations. A balanced exploration of these concerns is essential to ensure that the benefits of AI in language learning are maximized while mitigating potential pitfalls.

One of the primary concerns surrounding the integration of AI tools in language education is the potential displacement of educators. There is apprehension that overreliance on AI might lead to job displacement for teachers, potentially reducing the essential human interaction and mentorship they provide to students.

The digital divide is another significant drawback. Not all students in Sri Lanka may have equal access to the necessary technology or the internet. This unequal access can create disparities in learning opportunities and outcomes. Data privacy and security concerns loom large. The collection and use of student data by AI systems require robust safeguards to protect sensitive information and maintain trust. AI tools also face criticism for oversimplifying language learning. Some argue that they tend to focus on memorization and standardized assessments at the expense of deeper understanding and contextual comprehension. Furthermore, there's a risk

of AI being used unethically for plagiarism or academic dishonesty. This poses a considerable challenge to academic integrity and raises concerns about the responsible use of AI tools in educational settings.

In summary, while incorporating AI tools in language learning offers several advantages, such as personalized learning and improved access, there are also challenges, including job displacement and concerns about depersonalization and data security. A balanced approach that combines the benefits of AI with the strengths of human educators is crucial for successful language education in Sri Lanka.

It is important to note that addressing academic integrity concerns in the context of AI tools is an ongoing process that may require adjustments as technology evolves. Academic institutions in Sri Lanka should stay informed about emerging trends and best practices in this area and adapt their strategies accordingly.

Given the widespread prevalence of AI tool misuse among students across tertiary education institutions, the research scope was broadened to encompass the perspectives of lecturers from different academic institutions. This expansion aimed to investigate and discern the prevailing policies related to the detection of AI misuse in student responses.

"As far as I'm aware, the institution that I work at, which is a state university, does not have a policy to address issues related to the use of AI. This semester we came across many students whom we suspected have used AI to generate their continuous assessments, but the higher authorities of

the faculty turned a blind eye to this matter when we took this issue up to them. Unfortunately, the faculty does not have a proper/paid plagiarism checker and there is a very nonchalant attitude towards the use of AI. AI also falls under the category of plagiarism as the definition of plagiarism, according to the Oxford English Dictionary, is "the practice of taking someone else's work or ideas and passing them off as one's own". In AI, then, the writing style and the content is not your own. Therefore, such cases can be penalised using the by-laws that exist regarding plagiarism. However, it does not happen. Some academics view the use of AI as similar to using Google and data/statistical analysis softwares. Some academics also justify the use of AI by stating how AI is used by senior academics in both local and foreign contexts, and also in foreign universities. As a fellow academic (albeit junior), I find this attitude, behaviour, and responses extremely shocking as AI is a serious threat to academic integrity as plagiarism of any form is illegal and unethical". (Interviewee 12)

The interviewee, working at a state university in Sri Lanka, highlights concerns about the absence of institutional policies addressing the use of AI in education. They express dismay over instances where students appear to have used AI for assessments, but the faculty authorities have not acted. The lack of a paid plagiarism checker and a nonchalant attitude towards AI further compound the issue.

"[...] While AI generated answers or responses pose a general threat to testing and evaluation process, as a lecturer I myself like to embrace the technology and allow my students to use it to the fullest possible way. For example, I like my students to use AI as a key to gather data and other necessary evidence which they can later synthesis using their own critical thinking skills. My department and the university has zero tolerance and strict policy on AI generated answers and responses. We are instructed to use Turnitin consistently and issue warnings to students if and when necessary (30% - 40% similarity index score based on Turnitin is the acceptable limit). Apart from that students have go to writing clinics in which they are consistenly instructed to avoid using AI generated responses and plagiarism. One of the plus points of working at a department of handful students is my familiarity with the individual students' writing style. [...]". (Interviewee 15)

Given the responses of fellow academics from several other universities in Sri Lanka it is safe to assume that the Sri Lankan tertiary education system is yet to develop guidelines with regard to use of AI tools in student assessments. Although plagiarism checkers exist, it is high time for the authorities to establish AI detection tools as well.

Improving the integration of AI tools in language learning within the framework of academic integrity in tertiary education is a complex challenge that necessitates a comprehensive strategy. To begin with, academic institutions should establish well-

defined policies that specifically address the utilization of AI tools in language learning. These policies should articulate what constitutes acceptable and unacceptable AI use, as well as the corresponding consequences for any breaches. Furthermore, these policies should be in alignment with existing regulations governing academic integrity within the institution. In order to ensure the ethical and effective integration of AI, educators must be equipped with the necessary knowledge and skills. Institutions should offer comprehensive training programs and workshops to familiarize educators with AI tools and train them in their responsible use. These programs should emphasize the pedagogical potential of AI while highlighting the importance of maintaining academic integrity. In addition, academic institutions should invest in plagiarism detection software capable of identifying AI-generated content.

Before penalizing students, institutions should be responsible to conduct awareness campaigns targeting students. These campaigns should educate students about the ethical and responsible use of AI tools in their academic work. Additionally, institutions should clearly communicate their policies regarding AI usage and the consequences of any misconduct. Students should be encouraged to utilize AI as a tool for gathering data and information, but they should also understand the significance of independent analysis and synthesis.

In conclusion, the successful integration of AI tools in language learning in Sri Lankan tertiary education while upholding academic integrity is a multifaceted

endeavor. It demands the formulation of clear policies, educator training, student awareness, ongoing assessment, collaboration, research, and ethical dialogue. By embracing AI responsibly and promoting its ethical use, Sri Lanka can harness the benefits of technology while preserving the integrity of its educational system. Pessimistic perspective on the adoption of AI tools. They are of the view that this trend could reduce the importance of teachers. Overreliance on AI might mean fewer jobs for educators, and that is a problem because education already faces many difficulties. Additionally, the dilemma whether AI tools can teach languages effectively, especially in a diverse place like Sri Lanka where the subtleties of language and communication matter a lot exists.

"I see this trend as potentially undermining the role of educators. Heavy reliance on AI may lead to job displacement in the education sector, which is already grappling with numerous challenges. Also, we can question the effectiveness of AI tools in teaching languages, especially in a diverse cultural context like Sri Lanka, where nuances of language and communication are significant". (Interviewee 4)

"AI tools oversimplify the complexity of language learning, reducing it to just memorization and standardized assessments. As I think, language education is human-centered and AI obviously lacks the capacity for empathetic and contextual understanding, which is crucial for effective language instruction' (Interviewee 2)

While AI tools offer certain advantages in language education, they may fall short in addressing the intricate and human-centric aspects of language learning. The oversimplification of language learning through AI can overlook the importance of empathetic teaching and contextual understanding, which are vital elements for successful language instruction. Therefore, a balanced approach that combines the benefits of AI with the unique qualities of human educators is essential to provide a comprehensive and effective language education experience.

CONCLUSION

The scope of ChatGPT's influence on language education within higher learning is extensive, rendering it a valuable area for research and investigation. It is imperative to comprehensively assess both its potential advantages and obstacles to effectively harness its benefits. Empirical research can play a pivotal role in establishing the effectiveness of ChatGPT and other AI tools in language learning, offering valuable insights into its impact on language proficiency. This scrutiny should encompass its effects on educators, learners, and society as a whole.

In the realm of tertiary education in Sri Lanka, the integration of artificial intelligence tools into language learning has introduced a complex interplay of opportunities and challenges. As explored, one of the foremost challenges lies in the potential misuse of AI tools by students. This misuse not only raises questions about academic integrity but also highlights a critical deficiency in the institutional response to this evolving issue. Despite the striking parallels between AI tool misuse and plagiarism, there appears to be a discernible void in the development and enforcement of comprehensive AI-related policies within academic institutions.

The narratives shared by educators operating within the confines of both state and private universities reflect a concerning laxity regarding AI use and a notable lack of essential tools for monitoring and curbing potential academic misconduct. This situation, if left unaddressed, could erode the credibility of academic assessments and cast a shadow over the principles of academic integrity. It is evident that institutions must embark on a proactive journey toward establishing rigid guidelines and detection mechanisms.

However, it is equally pivotal to recognize that the mindful and ethical use of AI in language learning offers a myriad of potential benefits. AI tools have the capacity to provide highly personalized instruction, offer constructive feedback, and adapt effortlessly to the unique learning requirements of each student. These attributes assume importance in an academic landscape as diverse and resource-constrained as Sri Lanka's, where catering to the varying language proficiency levels of students is a challenge.

Therefore, the integration of AI tools into language education should not be perceived solely through the lens of skepticism. Rather, it should be regarded as an opportunity to augment the quality of education and empower students with cutting-edge resources. To strike the right balance, academic institutions must embark on a multifaceted approach. This approach

entails the formulation and implementation of comprehensive AI policies, the promotion of awareness among educators and students about the ethical use of AI, and the allocation of resources for advanced AI detection mechanisms.

In conclusion, the use of artificial intelligence tools in language learning at the tertiary level in Sri Lanka is a journey fraught with both promise and peril. The challenges to academic integrity, particularly in the context of AI tool misuse, are undeniable and require immediate attention. Nevertheless, the potential advantages of AI, when harnessed responsibly and ethically, should not be underestimated. In this ever-evolving landscape, striking the right balance between leveraging the advantages of AI and preserving the principles of academic integrity is not merely a choice but a pressing necessity. Through concerted efforts, Sri Lanka's tertiary education sector can chart a course toward a future where technology elevates, rather than compromises, the educational experience.

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Exploring Language Aptitude as an Individual Difference in Acquiring Oral Proficiency: Critical Analysis of Second Language Learners

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ABSTRACT

Recent years have witnessed an increasing number of empirical second language acquisition (SLA) research into exploring the pivotal role of cognitive and affective abilities as individual differences (IDs) and their contributory nature in various aspects of L2 learning. Theoretical and empirical literature resonated in this area highlighted that due to these individual differences, learning and performance on tasks differ in their information processing demands which prompted new theoretical frameworks for conceptualizing individual differences in L2. Thus, the current study probes into the role of Language Aptitude (LA) as individual differences (IDs) in acquiring oral performance. Gardner's Multiple Intelligent theory modelled the study as a theoretical framework to conceptualize how second language learners perceive, retain, store and use language input into meaningful speech production as output. This quasi-experimental mixed-method study consists of twenty (n=20) third-year undergraduates of the faculty of Social Sciences, University of Kelaniya. Data can be collected through tests and semi-structured interviews adhering to ethical standards, and data can be analyzed quantitatively and qualitatively. The findings of this study reveal the correlation between the language aptitude and speech production of individuals has, through quantitative data results. Qualitative data shows the learning processes/strategies and whether affective variables have any sort of relationship with the speech production process. Further, this study recommends further research into other cognitive and affective variables with a bigger population.

Keywords **- Language aptitude, Individual differences, Cognitive variables, Affective variables, Speech production.**

1. INTRODUCTION

Dornyei (2005, p.31) defined, "language aptitude as human abilities, covering a variety of cognitive-based individual learner differences". The general term, human mental ability is used to refer to a variety of human traits that are involved in thinking, reasoning, processing information, and acquiring new knowledge. When it is applied to second language learning contexts, aptitude is used to suggest the individuals' potential for acquiring new knowledge or skills. The contribution made by American psychologist John Carroll who is also the pioneer of this field defined language aptitude as the "individual's initial state of readiness and capacity for learning a foreign language" (Carroll, 1981, p. 86). Gardner and Lambert (1972, p. 2) defined this term as 'a knack' for learning a foreign language. Gardner and McIntyre (1992), however, named it a 'cognitive sponge' meaning that new knowledge and skills are associated with those already acquired. Language aptitude can also be described as a specific talent for learning languages (Dornyei & Skehan, 2003). However, for Carroll (1973), language aptitude is not whether an individual can learn a foreign language or not, but rather the rate of progress that an individual can make in the language learning phenomenon. Further, Carroll (1981) pointed out, that language aptitude comprises four constituent abilities such as phonetic coding ability, grammatical sensitivity, rote learning ability, and inductive language learning ability. A detailed explanation of these four factors is given in the literature review section.

The purpose of this study is to probe into the role of individual differences among ESL learners in language aptitude, and its impact on different speaking situational tasks planned and spontaneous concerning fluency, accuracy, and complexity in task performance. The first part of the study focuses on identifying the innate endowment of individuals which is known as fixed while the latter involves propensities, investigating the strategies used by second language learners to enhance speech performance. Therefore, the current research aims to explicate how these individual differences influence the rate of progress of speech acquisition and it attempts to enlighten the language practitioners that language learners are not innately endowed with or lacking language learning skills, but they are equipped with different kinds of abilities and predispositions that those individual differences influence language learning in complex ways.

To examine the complex interplay of individual differences in acquiring oral proficiency, the current study sets out to answer the following research questions:

1. To what extent does language aptitude as an individual difference diverge among second language learners?

2. What roles does language aptitude play in l2 learning and speech production?

3. What language learning strategies are employed by second language learners to enhance speech performance?

2. LITERATURE REVIEW

Aptitude refers to the specific ability a learner has for learning a second language (Ellis, 1986). Richards (1985) explains that aptitude is the natural ability to learn a language. He added language aptitude is a combination of various abilities (identifying a sound pattern in a new language, recognizing the difference in grammatical functions of words in sentences). Learners need aptitude, meaning, some specific abilities that are responsible for learning a language. Linguistic aptitude is considered a talent or an inherent capacity to excel in languages, but it is not an achievement itself but the potential for achievement. Carroll, the pioneer in the field of foreign language (FL) aptitude defined it 'as the individual's initial state of readiness and capacity for learning a foreign language' (Carroll, 1981, p. 86). Gardner and Lambert defined this term as 'a knack' for learning a foreign language (Gardner and Lambert (1972, p. 2). Gardner and McIntyre (1992), however, named it a 'cognitive sponge' meaning that new knowledge and skills are associated with those already acquired. Language aptitude can also be described as a specific talent for learning languages according to a few other scholars (e.g., Dornyei & Skehan, 2003). A clear definition of language learning aptitude is not established yet because of its multiplicity. Research on language aptitude has mainly centred on the Modern Language Aptitude Test (MLAT) (Carroll & Sapon, 1959). Many other scholars have developed a few other language aptitude test batteries, but all the test batteries were made based on MALT.

2.1 The First Phase of Language Aptitude Research

Research on language aptitude had its golden period in the 1950s and 1960s mainly due to the contribution of Carroll (1959), who provided the following three theses referring to language aptitude:

a.) There is a distinction between language aptitude and other cognitive abilities, including intelligence.

b.) Aptitude is relatively fixed and hard to modify.

c.) It is componential (as cited in Skehan, 2014).

His fundamental contribution can be summarized into two categories as shown in table 2.1.

2.2 Post-Carroll Research

After the publication of the MLAT, a couple of further test batteries were developed as aptitude measurement tools such as PLAB- the Pimsleur Language Aptitude Battery (Pimsleur, 1966); the York Language Aptitude Test (Green, 1975); the Defense Language Aptitude Battery (Petersen & Al-Haik, 1976); the German Aptitude Test (Miller & Phillips, 1982); VORD (Parry & Child, 1990) and CANAL-FT (Grigorenko et al., 2000). There is a consensus among the researchers that the new batteries did not exceed the MLAT in superiority.

It is worth mentioning that even though language aptitude was criticized in the 1970s and 1980s, still it holds a pivotal role in the second language acquisition (SLA) research agenda. Wen and Skehan (2011, p.

18) emphasized that "the research on the components of language aptitude construct is scarce, especially with the memory component". As Dornyei (2005) observes, the role of working memory in second language acquisition (SLA), as well as language aptitude, is an area of future research that now is revealing a growing interest.

Table 2.1 Carroll's (1981) research on LA.

No	Four Component view of language aptitude (Carroll, 1981)	Measures of Modern Language Aptitude T... (the MLAT) (Carroll & Sapon, 1959)
1	Phonetic coding ability: makes distinctions between sounds, associates sounds and symbols representing them, and keeps them in mind.	The test was devised to measure several separ... components that form an individual's aptitude... learn a foreign language.
2	Grammatical sensitivity: ability needed for recognizing the grammatical functions of words in sentences.	MLAT measured the rate at which a person co... learn a foreign language, but which is wo... emphasizing, it did not predict whether individual could learn a language at all or not.
3	Rote learning ability: distinguishes sounds and meanings at a fast rate and retains them.	The battery consists of five sub-tests: Num... learning, phonetic script, spelling clues, words... sentences, and paired associates.
4	Inductive language learning ability: induces both explicit and implicit rules from the chaos of language material.	

2.3 Empirical Studies on Language Aptitude

Researching the ways language aptitude affects learners in classrooms, Harley's and Hart's (1997) study provided a perfect foundation for the latter studies. Their study aims to recognize how L2 proficiency and linguistic aptitude are correlated and interconnected by investigating the work of students' aptitude. The results especially

showed that the characteristics of aptitude vary as people age, with the older more likely to possess explanatory power and language analytical ability, and the younger prone to memory factors. This research further sheds light to deepen the understanding of the way humans' natural linguistic ability operates rather than merely working on its relations to L2 outcomes.

2.4 Theoretical Underpinning of the Study

Gardner's (1993) Multiple Intelligent Theory which is known as (MIT) provided a theoretical spine for this study. MIT has outlined eight sub-categories, but three factors are directly responsible for language acquisition and communication.
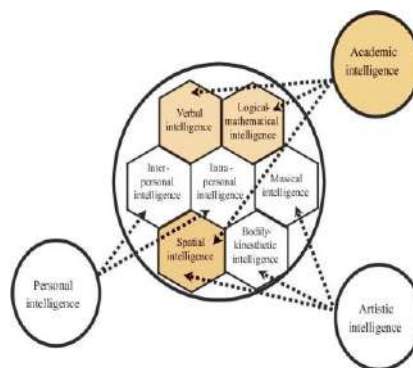
Figure 2.1 Theoretical Framework

These eight categories can be put into three broad spectrums. Academic intelligence is expanded into verbal or linguistic intelligence, logical & mathematical intelligence, and spatial intelligence. These three elements are directly involved in language acquisition. This study investigates how these three components inbuilt in the form of cognitive individual

elements contribute towards acquiring oral language proficiency.

3. METHODOLOGY

The present study incorporates a mixed-method research paradigm that aims to transcend the traditional dichotomy between quantitative (positivist) and qualitative (interpretivist) research approaches as highlighted (Johnson et al. (2007). Creswell (2008) mentioned quantitative research provides a measurement orientation in which data can be collected from multiple individuals from larger geographical locations. On the other hand, qualitative research captures in-depth information from the voices of participants and contextualized in the settings in which they provide experiences and the meanings of their experiences. The current study attempts to bring these two methods together anticipating, that the strengths of both approaches would yield a better understanding of the research problem that is being investigated. i.e., why there is so much variability in terms of process and progress in which second language learners learn and achieve success. This study incorporates a deductive and a more scientific approach, standardized tests, and a closed-ended questionnaire (Strategy Inventory for Language Learning) as quantitative research instruments to measure language aptitude. Similarly, following a more interpretive methodology,

the participants' perspectives are recorded through a semi-structured interview as a qualitative methodology. The participants' scores in the tests (language aptitude) are checked against the score they obtained for the speech production tasks (planned & spontaneous) for correlation. Qualitative data are used to reaffirm what the quantitative data have postulated as answers to the formed research questions based on a major underpinning of pragmatist epistemology; that is, a person's knowledge is unique, and the knowledge is always based on individuals' experiences.

3.1 Adapted Version of the Modern Language Aptitude Test (MLAT)

The Modern Language Aptitude Test (Carroll, 1981) is a paper-pencil-based test battery that contains five sub-categories. The administration process of the original version of MLAT takes 60 minutes and the standardization of the administration is ensured using recorded materials that include the instructions and the phonetic materials for certain parts. Here, in the adapted version of MLAT, the current researchers will be giving 60 minutes to the test takers to complete the test and will utilize the teacher's voice to give instructions and the phonetic materials. The five constituent sections in the test are as follows.

Table 3.1 Constituent sections of MLAT

Sub-category	Explanation
Number learning	Auditory and memory abilities associated with sound-meaning relationships are tested here. The participants hear five numbers spoken aloud, and then they must memorize and write down the numbers. They hear another set of five numbers, and the participants are asked to attend to the same process until they hear all thirty numbers.
Phonetic scripts	The ability to learn English phonetic scripts is tested. The participants see a set of four separate syllables and each syllable is spelled phonetically. The speaker models the sounds by pronouncing each of the four syllables in a set and continues to model the sounds in the next set till the last set. Now, the subjects are asked to look at the first set. The speaker goes through the word sets again, but this time the speaker reads only one of the four syllables in a set. The participants' task is to select (cross) the syllable that has the phonetic spelling that matches the syllable they hear.
Spelling cues	The ability to associate sounds with symbols is tested here. The participants are exposed to sets of words. Each word at the top of the group is spelled approximately as it is pronounced incorporating symbols from the International Phonetic Alphabet (IPA). The task is to recognize the disguised word from the spelling. To recognize the disguised word, the participants can look for one of the six words beneath, which corresponds most closely in meaning to the disguised word. When the participants find the word, they must write down the letters in the given blank that corresponds to their choice.

3.2

Narrative Task

The second phase of data collection consisted of a picture-cued narrative task adapted from Robbinson (1995). One of the most popular ways to elicit oral language performance is a picture- cued stimulus that requires a description from the learner. Here, the test is carried out based on two different speaking situations: planned and spontaneous. All the participants must participate in both tasks.

Under planned condition.

- Participants are given a series or set of pictures to observe.

- They have 1 minute to look at the set of pictures.

- And then put the pictures away.

- The participants are given 2 minutes to prepare for the task.

- The participants must narrate a story based on the picture clues.

Under spontaneous condition.

- Participants are given a series or set of pictures to observe. (The same picture is not given to two participants)

- They have 1 minute to look at the set of pictures.

- And then put the pictures away.

- The participants must narrate a story based on the picture clues.

Here, the choice of giving 1 minute to observe the set of pictures (see appendix E) aims at minimizing the planning as much as possible in the spontaneous condition. Each participant must participate individually and the participant who has completed the task is not allowed to meet the other participants until the test is over under normal circumstances.

The speech samples will be analyzed in terms of fluency, accuracy, and complexity as suggested by Marek & Wu (2011).

3.3 Semi-Structured Interview

An interview protocol was developed to investigate how ESL learners use their individual differences in the process of second language learning and subsequently in their performance. The in-person interviews are conducted utilizing all the participants (n=20). The semi-structured

interview questions are designed to record participants' experiences on using the cognitive individual differences while they learn a second language.

4. AVENUES FOR FUTURE RESEARCH

Based on the key findings of the current study several propositions can be suggested for further research in relevant fields. Bearing in mind all the limitations and delimitations of this study, one possible direction for future research is to conduct an extensive longitudinal study on the cognitive individual differences as language abilities among second language learners on speech production and other skills related to the English language. Since this research is focused on identifying and analyzing only one cognitive individual difference, future research can focus more on other cognitive-based individual differences which affect second language acquisition incorporating the key findings of the current study as a baseline model.

The second direction would be to study the effects of these cognitive factors on different subject majors from different universities in Sri Lanka since the current study incorporated a small sample of participants only from the faculty of social sciences at the University of Kelaniya.

Thirdly, the current study underscores the effects of cognitive individual differences on L2 learners' speech production while skimming through the influence of affective factors which play a significant role in the speech production process. Therefore, more studies are required to investigate the effects of affective variables on speech production tasks.

5. CONCLUSION

This research study intends to measure the influence of Language Aptitude as a cognitive individual difference in speech production tasks which accounts for differences in the rate of acquisition and presents considerable variability in the attainment of success or failure in the process of learning a second language. This concept paper has presented the rationale and theoretical framework for a study examining the role of LA in oral performance acquisition, and anticipated findings are expected to contribute valuable insights into the way LA influences the process of language acquisition and speech production. Furthermore, the qualitative data analysis will provide a deeper understanding of the learning strategies and potential affective variables that may be linked to speech production. These findings can have practical implications for language teaching practitioners, educators, and learners alike, helping them to tailor teaching approaches to individual differences and enhance language learning outcomes. Ultimately, by advancing the understanding of how Individual Differences impact language learning, it can be developed more effective pedagogical strategies and interventions to support language learners on their journey to proficiency.

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ACKNOWLEDGMENT

A Critical Examination of The Societal Structural Transformations in Sri Lanka Facilitated by Private Television Channels During the Turn of The Millennium: A Concept Paper

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ABSTRACT

The invention of television diverted society onto a different path, as it entertained people with a consistent array of various content. This industry fills the gap that other sectors, such as photography and films, couldn't. However, in the context of Sri Lanka, television was introduced in 1979 with the Independent Television Network and in 1982 with the Sri Lanka Rupavahini Corporation. In the first decade of television in Sri Lanka, it aimed to accomplish the media literacy of Sri Lankans. However, after granting permission to private television channels to broadcast their content in Sri Lankan territory, the intention of television broadcasting changed. Due to the profit-oriented journey among Sri Lankan television channels, their intention shifted towards grabbing the audience's attention by telecasting entertaining, educational, and other important content. This trend mainly improved with the beginning of the year 2000, a remarkable year that people all over the world had awaited, believing it would change traditional aspects of the world. This ideology influenced television channels in Sri Lanka, and private television channels always tried to capture the attention of Sri Lankan audiences with entertainment-oriented programs. This effort was a success, and the Sri Lankan community frequented those entertainment programs. As a result, a significant impact occurred in the society of Sri Lanka because of these programs. This trend mainly caused the establishment of pop

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culture in Sri Lanka When considering history, we can clearly identify how the behavior of private television channels in Sri Lanka directly influenced societal, political, and cultural changes in the country.

Keywords **- independent television network, Sri Lanka Rupavahini Corporation, pop culture, television, entertainment, education**

1. INTRODUCTION

After the invention of the radio, the next scientific step was the invention of television technology, which can be considered a remarkable breakthrough in media technology. (Vivian, 2012) Initially referred to as 'Radio with Pictures,' it reflected people's eagerness to transmit both audio and video together. After the Second World War, another competitor emerged to rival the cinema, and that competitor was the television. (Mahindapala, 2006) The word "television" is derived from the combination of the Greek and Latin words "Tele" and "Visio". (Solangaarachchi, 2016) Britain contributed significantly to the popularity of the television medium among people, just as they did for cinema. (Mahindapala, 2006) The popularity of television also affected Hollywood, and as a result, some movie producers turned to produce 30-minute dramas for the television medium. Producers could sell television dramas to television channels and gain instant profits, unlike cinema. (Mahindapala, 2006) However, when it comes to the Indian Sub-continent, India tested television transmission in 1959. In Sri Lanka, the situation is different as many times various parties tried to introduce television technology, but it failed due to a few reasons. (Rupasinghe) However, on the 14th of April 1979, Sri Lanka's first television station started. The television station was named the Independent Television Network, and its establishment was pioneered by Mr. Anil Wijewardane and Mr. Shanthilal Wickramasinghe. (Katugampola, 2012) On February 15, 1982, the Sri Lanka Rupavahini Corporation officially commenced its broadcasting service. (Katugampola, 2012) The primary concern regarding the introduction of television in Sri Lanka pertained to its cultural and societal impact within the Sri Lankan context. However, this argument was substantiated when examining the behavior of the Sri Lankan television industry. In 1977, a conference was held regarding the introduction of television to Sri Lanka. During this conference, Professor Sunil Ariyaratne asserted that both cinema and television serve as platforms for cultivating human ethics and morals, which constitute fundamental elements of education. (Muthumini, S. Sajeewani Hellen; Indrajith Sri Perera, Sujeewa Arawwala, Rasika Sampatha, 2004) The primary concern regarding television in Sri Lanka pertains to the quality and substance of its programs. This issue is primarily a result of the competition among television channels. TV stations are primarily focused on generating profits to sustain their broadcasting services, rather than prioritizing the creation of high-quality and informative programs, which was the initial purpose of the television industry. According to the ideas put forth by Mr. H.M. Gunasekara,

mass media should not rely solely on profits; rather, it should aim to contribute to the betterment of society and the country. (Muthumini, S. Sajeewani Hellen; Indrajith Sri Perera, Sujeewa Arawwala, Rasika Sampatha, 2004) Furthermore, he asserted that the media has neglected its responsibility to produce programs that target various segments of society, emphasizing the importance of creating content beyond what is commonly labelled as "entertainment," which often caters primarily to the youth demographic. The decline in the quality of Sri Lankan television and the emergence of profit-oriented media businesses began with the introduction of private television channels in Sri Lanka. (Jayasekare, 2019) The first private television channel in Sri Lanka was MTV (8th May 1992), and subsequently, Sirasa TV (10th June 1998) was introduced to the realm of mass media in Sri Lanka. (Muthumini, S. Sajeewani Hellen; Indrajith Sri Perera, Sujeewa Arawwala, Rasika Sampatha, 2004) Numerous private TV stations were introduced following these two, and they introduced a variety of programs with the primary objective of maximizing profits within Sri Lankan society. In this study, our intention is to identify the significant impact that private television channels have had on Sri Lankan society. Therefore, we observed many television programs that were broadcast on private television channels in Sri Lanka. Our primary focus has been on tele-drama series and reality shows, which have fundamentally altered Sri Lankan ideology and entertainment in various ways. Apart from that, we gathered data from semi-structured interviews.

2. LITERATURE REVIEW

Among all mass communication mediums, television stands out as the most significant mass media platform, capable of capturing the attention of a wide audience. (Muthumini, S. Sajeewani Hellen; Indrajith Sri Perera, Sujeewa Arawwala, Rasika Sampatha, 2004) During the early days of television, the BBC made concerted efforts to position television as a medium for domestic, family-oriented entertainment. Consequently, the programs broadcast by the BBC were designed to cater to a broad audience, ensuring that they could be enjoyed by all family members. (Mahindapala, 2006) Furthermore, as Mahindapala noted in his book "Film and the Public," television audiences were often characterized as a more relaxed demographic. Consequently, this audience generally preferred programs that were devoid of excessive tension and intricate meaning, as they were inclined toward content that required minimal effort to comprehend. However, it is evident that the introduction of television had a profound impact on Sri Lankan culture, serving as a pivotal factor in driving cultural changes within Sri Lankan society. (Dewasiri, 2021) In the early days of Sri Lankan television, it served as a reflection of the cultural and social transformations triggered by political decisions in the country. Nirmal Dewasiri provided an illustrative example through the analysis of the tele-drama "Paligu Menike," which aired on Sri Lanka Rupavahini Corporation in 1985. Dewasiri contended that the economic reforms implemented in 1977, known as the Open Economy policy in Sri Lanka, had a direct impact on the cultural dynamics of rural

areas, which were predominantly rooted in pre-1977 traditions. The infusion of a more money-oriented culture from urban settings into these rural areas, which were unprepared for such changes, had a direct and profound influence on their social and cultural fabric. (Dewasiri, 2021) According to Patrick Ratnayake, the television's formidable artistic impact is most notably exemplified through tele-dramas. (Ratnayake, 2022) Ratnayake further asserted that in contemporary times, the teledrama industry has surpassed the giant cinema industry in terms of production output, thereby overshadowing the artistic dimensions of the visual medium. (Ratnayake, 2022) Senesh Dissanayake noted that Sri Lanka was the pioneer in introducing the concept of television drama (Drama for Television) in the South Asian region. (Bandara, 2019) Uditha Gayashan Gunasekare also contended that contemporary citizens' media behaviour predominantly revolves around the polarity centred on the television medium. (Gunasekare, 2019) He further expounded that, in line with Philip Salzman's analysis, this trend has emerged due to three pivotal attributes inherent to the television medium: Easy Accessibility, Broad Scope, and Benign Presence. Salzman elucidated these attributes by drawing attention to their significance within Indian culture. Furthermore, Gunasekara asserted that teledramas have the power to enable individuals to transcend their current social strata and gain access to social levels or societies to which they do not belong in the real world. (Gunasekare, 2019) Wimalarathna Adhikari expounded on the notion that the technological evolution

within the communication industry can be regarded as a manifestation of societal progress. Furthermore, technological advancements are a direct outcome of the collective knowledge and innovations of the populace. Consequently, teledramas, stage dramas, films, and other communication mediums continually endeavour to mirror the contemporary social and economic conditions prevailing within society. Furthermore, Wimalarathna Adhikari elucidated that the production process of television programs entails a complex interplay between creativity, technical considerations, and business imperatives, which do not always align seamlessly. Ultimately, the creator of a teledrama must navigate the constraints imposed by the aforementioned factors while bringing their creative vision to fruition. (Adhikari, 2018) While in Sri Lanka, we commonly refer to television dramas as "Teledramas," the internationally recognized term for such productions is "Soap Operas." According to Dorathy Hobsen's analysis, a Soap Opera is a radio or television drama series that centers around specific characters and a defined setting. Its narrative often follows a repetitive pattern and tends to reinforce societal myths that are uncritically accepted, drawing people into a perceived fantasy world. (Dhanawardane, 2019) Dhanawardane further elucidated that the term "Soap Opera" was initially introduced by American newspapers. These Soap Operas were primarily targeted at housewives who were typically at home during the daytime. The sponsorship for these productions often came from soap manufacturing companies, which is why the name "Soap" was incorporated, while the

term "Opera" was retained to signify their hyper-dramatic characteristics. Dhanawardane introduced several noteworthy characteristics of Soap Operas, drawing upon the analysis by Mary Ellen Brown. These characteristics include the following:

1.   Presentation in serial format.
2.   The predominant setting (Background) is a household.
3.   The presence of an independent female character exerting pressure on others.
4.   Emphasis on dialogue over visuals.
5.   Male characters are portrayed as more sensitive and vulnerable.
6.   Incorporation of timely and diverse characters and themes within the narrative structure.

Dhanawardane underscored that the concept of Soap Operas was introduced to Sri Lanka from India in the 1990s. During that decade, the Sri Lankan government granted approval for the establishment of private television channels in the country. These private television channels began airing foreign-language Soap Operas, which were dubbed into Sinhala for the local audience. Uditha Gayashan Gunasekara elucidated that the introduction of the Indian model Soap Operas, dubbed into the Sinhala language, had a transformative impact on viewership patterns in Sri Lanka. This phenomenon established a prevailing trend and piqued the interest of local teledrama directors in crafting similarly structured teledramas. Gunasekara asserted that locally produced tele-dramas such as "Gauthami," "Kavya," "Nilanjana," "Pini Kunatu," and "Wasuda" have had a

discernible influence on Sri Lankan society. Nevertheless, the full extent of societal changes brought about by the broadcast of these tele-dramas remains uncharted territory. (Gunasekare, 2019) Sugath Watagedara underscores the significant appeal of teledramas among the Sri Lankan audience when broadcast on television channels. He referenced data published in the Television Asia International magazine for the years 2001/2002, revealing that among the top ten most popular television programs, seven were teledramas. He provided an explanation that these data illustrate the shifting viewership patterns that occurred following the establishment of private television channels in Sri Lanka. Watagedara further noted that while the Sri Lanka Rupavahini Corporation had previously dubbed certain imported teledramas from foreign countries, they maintained the program's quality and adapted the dubbing to align with the cultural framework of Sri Lanka. However, these parameters underwent significant alterations with the advent of private television channels in Sri Lanka. As a result, the Sri Lankan audience developed a penchant for watching these dubbed teledramas, and their expectation for similar content began to extend to locally produced television productions as well. Producing dubbed programs is a more cost-effective option compared to creating entirely new content for television. Consequently, entrepreneurs and investors in television production often exhibit reluctance to invest their resources, driven by concerns over the potential lack of popularity for locally produced, artistically valuable teledramas. (Watagedara, 2018) An interview with Mr.

Nilendra Deshapriya, who held an executive position at Sirasa TV from 1997 to 2012, is featured in the book "25 Years of Television in Sri Lanka." In this interview, Mr. Deshapriya highlighted the significant success of the Sujatha teledrama series, which was an Indian program dubbed into Sinhala, during that period. He attributed this success to two key factors: revenue generation and the star concept. Additionally, Mr. Deshapriya revealed that in the context of today's commercialized entertainment industry, celebrities periodically rise to prominence, and commercial brands often collaborate with these stars to promote their products. (Muthumini, S. Sajeewani Hellen; Indrajith Sri Perera, Sujeewa Arawwala, Rasika Sampatha, 2004) Fathima Shanaz contended that while the first longest teledrama series in Sri Lanka was "Doo Daruwo," directed by Nalan Mendis, it followed a schedule of airing just one episode per week, specifically on Sundays. However, a significant shift occurred with the introduction of the "Shanthi" Indian teledrama series, dubbed into Sinhala, which adopted a more frequent broadcast pattern, airing five days a week at 8:00 PM. The content of these Indian-structured teledramas directly catered to the fantasies of the Sri Lankan audience by prominently featuring beautiful Indian actresses, narratives centered on feminism, extravagant costumes, opulent residences, and luxurious vehicles. Consequently, television channels began importing Indian-structured teledramas for the Sri Lankan audience, including titles such as "Pragathi," "Chiththi," "Praveena," "Mahagedara Abhiman," and others.

(Shanaz, 2018) In analyzing the societal impact of these teledramas, Nimmi Hathiyaldeniya delved into the program structure of "Ran Depaya," Indian-made Sinhala-dubbed teledramas that aired continuously for two hours on a private television channel in Sri Lanka. Hathiyaldeniya observed that production techniques such as camera work, music, and editing employed in these teledramas were strategically used to capture the audience's attention and prolong the storyline. Frequently, the narrative was significantly extended through the depiction of violence. This, in turn, led to a reshaping of individuals' cognitive frameworks, influencing their decision-making when faced with similar real-life situations. Such an impact on society should be regarded as a matter of considerable significance. (Hathiyaldeniya, 2019) Bertram Nihal further elucidated the societal consequences associated with viewing serial teledramas, particularly Mega teledramas. It is often observed that when audiences engage with Mega teledramas, they tend to adopt a passive and unthinking stance. These dramas predominantly revolve around the perspectives of women and depict conflicts within middle-class families in society. Consequently, viewers often find themselves immersed in a melancholic state when consuming such content. (Nihal, 2019) In the present context, the primary objective associated with the production of teledramas primarily revolves around the act of storytelling itself, rather than seeking to impart profound wisdom or cater to the entertainment pleasures of the audience. (Nayana Suraweera, Kalani Irosha Dharmasiri, 2019) Furthermore, Suraweera

expounded that foreign teledrama genres are predominantly influenced by the spiritual disposition of the audience. Bertram Nihal, in his work titled "Sri Lankan Television," expounded on the principal function of television, which involves elucidating societal principles and social rituals, thereby imbuing our social existence with multifaceted meanings. He went on to elaborate that television channels in Sri Lanka have been unable to fulfil the aforementioned task, thereby failing to contribute to the developmental potentialities of both society and individuals.

In addition to teledramas, television channels have introduced an alternative programming structure aimed at captivating a diverse audience, transcending age and gender boundaries. These programs are commonly categorized as entertainment programs, encompassing both indoor and outdoor formats. Television channels in Sri Lanka have introduced reality programs as a means to present the aforementioned entertainment-oriented programming genre in a diverse and creatively distinctive manner. (Dharmasiri, 2018) Dharmasiri elucidated the concept of reality shows as the presentation of an event to the television audience through the utilization of television technology, an event that the audience did not personally witness at the time of its occurrence. He went on to provide additional clarification that the world's inaugural reality show came into existence in 1998 with the debut of the "Candid Camera" program, which was hosted by Alan Funt. According to Dharmasiri, Sri Lanka adopted this television program format after the year 2000. The trailblazer in introducing this genre of programming to the Sri Lankan audience was Sirasa TV, with their inaugural reality show titled "Sirasa Super Star." Professor Praneeth Abeysundara expounded that reality programs have engendered a competitive environment among television channels in Sri Lanka. These programs have imposed numerous constraints on the cognitive capacities of the Sri Lankan audience. (Abeysundara, 2012) Professor Abeysundara further elucidated that despite certain advantages of reality programs for society, such as providing a platform for individuals without the means to showcase their talents and emerge as artists, these programs exhibit discrepancies in their structure and significant attributes. Elements such as their language usage and clothing patterns do not align with the cultural context of Sri Lanka. Dharmasiri expounded that, reality shows exert a predominantly adverse influence on the creative appreciation capacity of the Sri Lankan audience. (Dharmasiri, 2018) Bertram Nihal went on to provide further clarification that a significant portion of Sri Lanka's electronic media has organized its programs with a primary emphasis on the entertainment aspect. (Nihal, 2019) He elaborated that Sri Lankan television underscores two pivotal considerations: the substantial political influence on state media and the profit-oriented objectives of private television channels. These two factors exert an enduring influence on television channels in Sri Lanka, as the media proprietors maintain affiliations with influential business networks and are entwined with political agendas in the country.

3. METHODOLOGY

This paper primarily undertakes an examination of the societal structural transformation within Sri Lanka as a result of the introduction of private television channels. Given the intricacies of the Sri Lankan television program landscape, our focus is specifically directed towards the genres of teledrama and reality shows, which have exerted a profound impact on Sri Lankan society. In conducting this assessment, we adopt the cultivation theory, a conceptual framework originally introduced by George Gerbner and Larry Gross in 1976. (Koller) This theory is a sociocultural framework primarily concerned with examining the influence of television on aspects including viewer perceptions, beliefs, attitudes, and values, all of which can undergo transformation as a result of television exposure. (Shrum, 2017) According to Shrum, three interconnected components can be discerned within this theory: media institutions, message production, and the impact of messages on viewers. These components are intricately linked to one another. Furthermore, he elucidated that the third component serves as the primary focal point for the majority of researchers. This theory encompasses a multitude of concepts, including but not limited to the symbolic environment, storytelling, the symbolic function of television, television traits, the cultural model, the cultivation of a value system, the multidirectional process, and cultural indicators. (Mosharafa, 2015) Mosharafa further expounded that television serves as a significant conduit for the dissemination of information, presenting information in various narrative forms such as realism, fantasy, tragedy, or comedy through program genres like fiction, drama, and news. This medium offers an effective means of conveying values and morals in an acceptable manner. Gerbner posits that individuals' perception of reality is primarily moulded or influenced by television. (Nevzat, 2018) Nevzat further explicated through his study that cultivation analysis underscores how the messages disseminated through television construct an ideology that subsequently shapes what is commonly referred to as reality, potentially influencing and distorting people's judgments. George Gerbner measured this distortion and operationalized the worldview through the Cultural Indicators and Violation Index projects. The initial hypothesis posited by the cultivation theory suggests that individuals who consume a greater amount of television content will tend to assimilate and internalize the underlying messages propagated by television. (Shrum, 2017) Nonetheless, content analyses of television programs have suggested that the world portrayed by television significantly diverges from the actual reality. Shrum provided an illustrative instance pertaining to violence, asserting that televised violence exceeds real-world levels. Furthermore, he contended that television disproportionately portrays violence directed at specific demographic groups, notably children, the elderly, and minority populations, compared to actual societal trends. Additionally, certain professions such as lawyers, doctors, and police officers are prominently featured on television, creating a perception of their prevalence, while

occupations like blue-collar workers receive minimal representation, suggesting a scarcity of individuals engaged in such roles within the television world.

4. DATA ANALYSIS

The primary objective of this conceptual paper is to conduct an examination and analysis of the societal transformations that transpired in Sri Lanka following the advent of private television channels. These private television channels introduced a novel array of organized programming to the Sri Lankan populace. It is noteworthy that a significant portion of both the general populace and the academic community within this domain have levelled accusations against this newly introduced programming structure, contending that it has had detrimental effects on societal values and the cultivation of artistic appreciation. Henceforth, this conceptual paper endeavours to conduct a rigorous critical assessment of the aforementioned allegations surrounding the impact of private television channels on society. It seeks to ascertain whether private television channels have indeed caused any adverse effects on the societal fabric. The research will employ a qualitative research approach to gather pertinent information for this investigation. Initial scrutiny will involve a comprehensive analysis of the programming content broadcasted by four prominent television channels in Sri Lanka, namely Sirasa TV, Swarnavahini, TV Derana, and Hiru TV, during the period spanning from 2000 to 2023. All programs under consideration have been broadcast exclusively in the Sinhala language. The focus of this analysis will center on

teledramas, and reality shows that were aired within the stipulated timeframe. The specific programs selected for content analysis are delineated as follows:

Foreign teledramas dubbed into Sinhala – Praweena (Kasautii Zindagii Kay), Sirasa TV / Me Adarayai (Sirasa TV) / Mage Sanda Obai (Saath Nibani Sathiya), Swarnavahini / Boys over Flowers (TV Derana).

Local Soap Operas – Sidu (TV Derana) / Deweni Inima (TV Derana) / Neela Pabalu (Sirasa TV) / Diwithura (Hiru TV).

Local teledramas (Limited Episodes) – Bohimiyanuwa (Swanravahini) / Pithru (Swarnavahini)

Reality Shows – Derana Dream Star (TV Derana) / The Voice Sri Lanka (Sirasa TV) / Hiru Mega Star (Hiru TV)

Through the application of content analysis, this study endeavors to examine the societal transformation resulting from the introduction of a novel program structure. This examination will be conducted by means of semi-structured interviews. The research methodology aims to engage approximately four pivotal stakeholders operating at diverse hierarchical levels within the industry. These interviews are designed to extract comprehensive insights pertaining to the allegations against, and the emergent societal facets attributed to, this innovative program structure. Consequently, the selected respondents will encompass representatives from both the academic sphere and the television industry in Sri Lanka, affording a comprehensive perspective on the subject matter.

5. CONCLUSION

This conceptual paper endeavors to undertake a comprehensive and rigorous investigation into the profound societal changes engendered by the novel program structure introduced by private television channels around the turn of the millennium. Accusations abound within society, suggesting that the advent of private television channels in Sri Lanka has been a catalyst for substantial societal transformation. However, it is imperative to ascertain whether television serves as a substantial influence in shaping societal ideologies or remains primarily an instrument of entertainment. In pursuit of this inquiry, this study will employ the Cultivation Theory, originally postulated by George Gerbner and Larry Gross in 1976. Grounded in this theoretical framework, an analysis of the substantive content disseminated by Sri Lankan private television channels will be conducted. Additionally, to gain a deeper understanding of the dynamics of societal transformation, a series of interviews will be conducted to elicit in-depth insights from relevant stakeholders.

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Analyzing the Effectiveness of Newsjacking Public Relation Characteristics and Their Impact on Social Media Engagement

(A Comparative Study of Sri Lankan Brand Campaigns)

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ABSTRACT

With the rising popularity of social media, a vast number of brands entered to advertise their products and services on these platforms. However, the monotonous nature of brands' marketing strategies has led to a decline in social media engagement between consumers and them. As a solution, the practice called newsjacking was identified as to gain attention of consumers and media exposure. Even though newsjacking is not a new practice on social media, there is little literature discussed about it. For this reason, the researcher's purpose was to analyze the effectiveness of Newsjacking Public Relation characteristics and their Impact on Social Media Engagement. The study utilized several newsjacking campaigns to collect the data for the research. behaviour. All this data was demonstrated in a theoretical framework established for consumers' social media engagement using valid analysis techniques. According to the findings, the study found that newsjacking is formed of six elements: rapidness, relevant to the audience, humour, ability to decode the message, virality and creativity. Furthermore, the study observed that these characteristics could influence specific social media engagement activities of consumers. Therefore, these findings supported the theoretical gap that the fact of newsjacking public relations practice influences consumers' social media engagement.

Keywords - **Engagement, Social media, Public Relations, Newsjacking**

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1. INTRODUCTION

David Meerman Scott coined the term 'Newsjacking' in his book published in 2011, 'Newsjacking: How to Inject your Ideas into a Breaking News Story and generate tons of Media Coverage' (Scott, 2011), introducing a strategy for leveraging current events to garner significant media attention. The phenomenon stands for "The practice of taking advantage of current events or news stories in such a way as to promote or advertise one's product or brand" (Lexico,2018). At the point when an organization is using newsjacking in their strategy, they are responding to what is going on the news on an instant premise and are ensuring they are the first ones to react (Scott, 2010)

In today's real-time social media environment, brands face a unique challenge. In the past, offline and TV commercial campaigns had the luxury of taking months to prepare, but with the advent of social media, campaigns must be created and executed within minutes to remain relevant (Kerns, 2014). Contemporary consumers are increasingly engaged in digital discussions (Jiang, Luo, & Kulemeka, 2016). These discussions, occurring both among themselves and with brands, require brands to provide compelling reasons for people to care about their messages and share them (Meire, Hewett, & Ballings, 2019). Successfully meeting this challenge can yield significant rewards, including increased followers and higher social media engagement—a crucial aspect for twenty-first-century brands (Kerns, 2014).

Newsjacking has become a pivotal element in many brands' social media strategies, allowing them to leverage current events and trends to draw attention to their products and services (Håkansson & Bengtsson, 2015). As Scott (2012) aptly puts it, "Sometimes, even a simple message can generate widespread coverage at the right time" (p. 27). Brands are eager to tap into the vast audience on social media and capture a share of that attention (Kerns, 2014).

A prime example of successful newsjacking occurred during the 2014 FIFA World Cup when Snickers capitalized on a famous incident involving soccer player Luis Suárez biting an Italian player. Snickers cleverly aligned their brand with the incident by using humor. They introduced the tagline, "You're not you when you're hungry" (Beck, 2014). This witty move resulted in immense engagement, with the post receiving 44,000 retweets and 20,000 favorites on Twitter and garnering more than 4,000 likes, 156 comments, and over 1,300 shares on Facebook (ibid)

A famous example of newsjacking practice is Oreo's successful tweet during the 2013 Super Bowl (Football game) in New Orleans. At the point when the stadium endured a 35-minute power interruption in the game, people turned to their social media (mainly Twitter) to talk about it (Scott, 2011). Oreo (a chocolate cookie brand) planned to take advantage of this. and within a short time, they had made an image of an Oreo cookie on a table in a dark room with the tagline "Power out? Don't worry about it; you can still dunk in the dark" (Håkansson & Bengtsson,

2015, p. 19-20). Since the audience had diverted their concentration to their smartphones, and since the power interruption was a trending news, Oreo's tweet became highalf famous on Twitter. Within a few hours, this newsjacking campaign captured the attention of different news platforms, such as CNN, NBC.

2. RESEARCH METHODOLOGY

This research utilized a qualitative approach to perform a comparative analysis of newsjacking strategies within Sri Lankan brand campaigns. The data employed for this study was secondary in nature, emphasizing an anti-foundationalist ontological perspective. The chosen research strategy for this investigation was a case study approach, allowing for an in-depth exploration of newsjacking strategies deployed by Sri Lankan brands.

In analyzing web comments, the research looked at the respective newsjacking campaigns' comments that users have commented as texts. The objective of examining comments was to determine how users perceive newsjacking campaigns regarding their characteristics. Therefore, the purposive sampling method used for both techniques to select campaigns that are rich in information and emblematic aspects, thus giving way to more reliable intuition.

When considering the limitations of the methodology, the selected time for this study is 6 months. Based on that time period the scope was selected. Hence the data can be varied apart from the 6 months of the time period. Sample size would be 6 Newsjacking Public Relations Campaigns

3. FINDINGS & DISCUSSION

3.1 Newsjacking Public Relations practice in Sri Lankan context

In the Sri Lankan context, few companies ran newsjacking campaigns in the last few years. Seylan Bank launched one of the most successful newsjacking campaigns for their credit cards. Their principal objective was to gain brand awareness for hotel offers on their credit cards during the holiday season. They produced a brief video using Dino Correra and Gehan Blok, two well-known actors, about an ordinary circumstance that appeals to the target audience (Blok & Corera, 2018). The plot is based on newsjacking and timely relevant content. It was about traveling around the island using Seylan's credit card. The creative was about a typical office circumstance where Dino plays the role of a boss. Dino is out of ideas to please his wife and starts looking for assistance from his closest companion Gehan who takes on numerous roles to persuade Dino's wife on destinations (Blok & Corera, 2018). The entire story rotates around various destinations in Sri Lanka and news incidents related to that particular destination to showcase the way that Seylan Credit Cards provide an offer to travel anywhere on the island (Blok & Corera, 2018). Newsjacking incidents used to relate to sports and politics (Blok & Corera, 2018).

Following statements made by Blok and Corera (2018) are directly related to newsjacking, At one particular time, Dino's wife mentioned, "No flights coming to Hambantota airport." Another point that Dino said, "There is no more Wilpattu

forest because there are no trees." Finally, Gehan brought up the quote "Off Season" by famous South African cricketer, AB de Villiers, because AB de Villiers made fun of Sri Lankan cricket players for losing matches consecutively. What he meant by "Off Season" was that playing cricket with Sri Lanka is less competitive and therefore, easy to win. A short time after AB de Villiers made that comment, the South African cricket team visited Sri Lanka for a test match series, and they lost the series against them. Many Sri Lankans made fun of AB de Villiers on social media for what he said, and the "Off Season" quote became a boomerang for him (Sri Lanka vs. South Africa: Sri Lankan fans troll AB de Villiers for his comments about the tour, 2018). Then Gehan and Blok used this quote because it became viral on social media.

The purpose of using the above example is to look at the impact on social media engagement by newsjacking. With regards to the above example, according to Blok & Corera (2018), On Facebook, their video has gone beyond viral because of the inventiveness of the idea (however, they have used a boost of USD 100 as well). They have reached over 650,000 views organically (genuine reach without paying money). The video reached overwhelmingly Western provinces, aged 25-34 audience (Blok & Corera, 2018). The official Website of Block and Dino has published the social media engagement analytics of the newsjacking campaign they have done.

Overall, there are 27,322 responses (likes and other reactions), 7,119 shares, and also 3,104 comments for the original video.

Contrasting to ordinary posts, the quality of the comments was also positive. When it comes to YouTube, (where they did not boost their video), all reach, impressions, and views are recorded organically (genuine responses without paying money) (Blok & Corera, 2018). There were 128,600 views for the video and over 1 million impressions. Another scenario is, that a reputed Facebook page named "Api Sri" shared this video on their page, and it gained over 1 million views and over 20,000 shares. Apart from social media engagement analytics, Seylan Bank confirmed their platinum card acquisition grew by 218%, and their YOY sales growth increased by 122%. (Blok & Corera, 2018). Eventually, this video became viral content on social media in sequence to achieve higher social media engagement. Therefore, the Seylan Bank credit cards campaign indicates how brands can leverage newsjacking practice to receive higher social media engagement from people.

Digital Public Relations provided an invaluable opportunity for brands by letting them have conversations with consumers. Newsjacking strengthened this conversation by providing relevant content to brands in an innovative way. Brand engagement consists of cognitive, emotional, and behavioral factors. Followed by Social media engagement, which evolved from brand engagement in digital media. Previous literature indicated that behavioral factors of brand engagement have a higher similarity in social media engagement activities. In a practical scenario, newsjacking appears to be a useful tool in generating social media engagement. The above literature review discussed social

media marketing to newsjacking and brand engagement to outcomes of newsjacking. Even though newsjacking is not a new practice in social media marketing; there was not much literature on this topic. Existing literature provided only the theoretical aspect of newsjacking. Since literature does not appear to have explored this relationship thoroughly, it is an interesting area to research.

3.2 Identifying Newsjacking and Other Social Media Characteristics

As explained by Maon et al. (2018), the study identified four characteristics of newsjacking. Rapidness or executing the campaign within the right-time frame helps the brand to get the attention of the people. Relevance in newsjacking practice emphasizes the importance of participating in consumers' conversations without using conventional marketing messages. Humour plays the role of producing light-hearted content to gain favourable attitudes toward the brand. Finally, how consumers comprehended the newsjacking campaign depends on the ability to decode the story. Each of these characteristics imply they are vital in making the newsjacking campaign more engaging.

Moreover, the study identified two characteristics, which were not specifically discussed under the theoretical sphere of newsjacking but in social media campaigns. Namely, virality and creativity. Virality can be defined as the possibility of rapid circulation of a piece of content on social media. To be viral, it should represent a status, prompt users' mind, combine with an emotion, associate with consumer norms, produce a value, and include a story

(Berger, 2016). Creativity denoted as a dynamic human skill to produce something novel in the context. Novelty is caused from unexpectedness, surprise, unusualness, uniqueness, and unpredictability (San et al., 2020) Content materials, which consist of creativity, can rise among other conventional materials. In the following section, the study has analyzed five Sri Lankan newsjacking campaigns executed on social media to identify newsjacking characteristics.

3.3 Case Studies

3.3.1 Maliban Biscuits' Oxygen Campaign

News item

A proposal to develop a playground in the Kadolkele mangrove of the Negombo lagoon has been reversed after the solid stand taken by the Gampaha District Forest Officer. A video containing the footage of the conversation where a few residents of the area are verbally arguing with the forest official asking her permission for the development of the playground has turned into a viral topic on social media ("Forest officer sticks to guns, refuses to break the law," 2020). In the video footage, one resident got hostile with the forest officer and said, "There is no need of Oxygen" (Dailymirror, 2020).

Maliban Campaign

*A*fter releasing video footage to the internet, the above incident gradually became a viral video on social media. Maliban capitalized this incident and published a static post by saying, "When you are out of Maliban biscuits for teatime, it is like having no oxygen to breathe."

Rapidness - The incident happened on the 10th of February 2020 (Dailymirror, 2020). News reporters reported it on the 12th of February. The media team of the Maliban Biscuits Company observed this scenario, realized it was becoming a trending topic, kept pace with the journalists and published the campaign on the same day (12th of February). Thus, the response was rapid.

Relevant to the audience - In relation to the mangrove incident, it was the time that the audience gained to know and have a conversation about it. In other words, this incident is becoming a trending topic in social media. Maliban Biscuits did not push the news that the audience already knew, but they added a meaningful message which was, "When you are out of Maliban biscuits for tea time, it is like having no oxygen to breathe." Maliban Biscuits implied their biscuits are equally important as oxygen in the teatime. They have not repeated what the news said but added an innovative message to earn users' attention.

Humour - It should be noted that the image used by the Maliban company did not generate any sense of humor. However, the person who made the reckless comment by devaluing the importance of oxygen was highly mocked on social media. Therefore, the Maliban company did not need to add humour in the campaign because the incident itself was treated sarcastically by the audience.

Ability to decode news story - When decoding the news story, Oxygen was the cue that the audience kept in their mind. It is because the individual said, "There is no need of Oxygen". Therefore, Maliban Biscuits also included a similar phrase which is "It is like having no oxygen". This phrase provided the opportunity for the audience to understand the underlying incident and engage with the campaign.

Virality - "When you are out of Maliban biscuits for teatime, it is like having no oxygen to breathe." This sentence in the campaign emphasizes not having Maliban Biscuits at teatime is similar to the lack of oxygen to breathe. Given the importance of oxygen, here it shows the 'trigger' component of virality because Maliban Biscuits used this word to show the current relation of their biscuit at the teatime.

Creativity - It should be noted that creativity does not appear within the Maliban Biscuits' Oxygen campaign. It derived from showing the advertisement at an unexpected time to the audience. Thus, the unexpectedness produced creativity.

3.3.2 Clogard Fresh Blast Gel with Cinnamon and Propolis

News item & the campaign

In October 2019, Clogard Fresh Blast Gel introduced their new tooth gel to the market. It was named as Clogard Fresh Blast Gel with Cinnamon and Propolis. The main ingredients in this tooth gel are Cinnamon and Propolis. The time that Clogard Fresh Blast Gel launched the product into the market, the presidential election in Sri Lanka was a highly popular topic among the local audience. Clogard Fresh Blast Gel identified this hype and launched a newsjacking campaign using two hypothetical presidential candidates with the names of the main ingredients. "Propolisia Danthanarayana" represents the Propolis ingredient and Propolis is referred

to as "Beeswax" in English. "Hasitha Kurunduwatte" represents the Cinnamon ingredient and Kurundu is referred to as "Cinnamon" in English. Similar to the other presidential candidates, Propolisia Danthanarayana and Hasitha Kurunduwatte started their campaigns through their respective social media pages. They used political advertising methods such as manifestos, voice cuts, press releases and published them on their respective social media pages. Throughout the campaign, Propolisia and Hasitha adopted significant political incidents which happened in the presidential election. A day before the election date, Propolisia and Hasitha held a live stream talk-show on social media. They revealed their connection with Clogard Fresh Blast Gel Cinnamon and Propolis tooth gel and informed the users that they were not the candidates for the presidential election but the ingredients of the tooth gel.

Rapidness – As stated above, Clogard Fresh Blast Gel with Cinnamon and Propolis launched a newsjacking campaign during the presidential elections with Propolisia Danthanarayana and Hasitha Kurunduwatte (Appendix 3.2.1). They adopted significant political incidents that happened in presidential elections into their campaigns. For instance, in a meeting, one presidential candidate said, "I promise that I will go to the homes at night to check on peoples' wellbeing." (Gunasekara, 2019). He said this on the 31st of October. Since it was an unusual election promise, this quote became immensely popular within the audience on social media. Hasitha Kurunduwatte saw this opportunity and came up with a newsjacking campaign on the 4th of November which highlighted,

"Morning and Night, Hasitha is close to you.". When the post was published, the audience knew it was related to the quote made by a presidential candidate. Publishing this post while the incident is trending on social media has increased the audience's attentiveness to the post.

Relevance to the audience - Clogard Fresh Blast Gel with Cinnamon and Propolis campaign was initiated fifteen days before the presidential election. Since it is the time that the entire country is interested in politics, if the product was introduced to the market with a conventional advertisement campaign on television or as an outdoor promotion, the audience would not retain the advertisement in their mind because their interest is on another event. People expect mudslinging, criticism of speeches, crossovers between parties, false promises in political campaigns. For instance, Propolisia Danthanarayana published a voice record clip on her social media page which was about how Hasitha Kurunduwatte paid his people to insult her status. The popularity of the post suggests it has gained the attraction of the audience because people expect such events during election season. The Clogard Fresh Blast Gel with Cinnamon and Propolis campaign has gained higher popularity on social media as the posts are based on events that occurred in the presidential election.

Humour - With reference to the Clogard Fresh Blast Gel campaign, it has utilized humour in most content materials. In a video published by Hasitha Kurunduwatte, he accidentally pressed the voice search without having any knowledge about it and said, "If Propolisia wins, I will have to

leave for Australia by boat." and the voice replied to him, "You cannot come to Australia by boat. They will send you back." . The sarcastic response from the voice-search assistant and the awkward moment that Hasitha is facing there, highlights the sense of humour in the video.

Ability to decode the news story - On one occasion, Propolisia Danthanarayana has published a post (Appendix 3.2.4) on her social media page saying, "My political campaign is eco-friendly. So, I want your donations to carry out my campaign.". In the presidential election, the word donation was a highly discussed subject among the people. That was due to an incident where one presidential candidate withdrew his nomination after receiving public donations for his election campaign (Himal Southasian, 2019). The people accused the candidate of collecting donations for his election campaign and then hiding without handing over nominations. Then, Propolisia Danthanarayana has used the word donation in this post, which has given the opportunity to the audience to understand the story behind it.

Virality - The entire Clogard Fresh Blast Gel with Cinnamon and Propolis campaign was based on the Sri Lankan presidential election. Using Propolisia Danthanarayana and Hasitha Kurunduwatte, the campaign exhibited a variety of stories revolving around the election. Moreover, most of the posts published in the campaign provided enjoyment to users. Thus, the campaign became viral on social media.

Creativity - Throughout the Clogard Fresh Blast Gel with Cinnamon and Propolis campaign, both candidates published static

posts, videos, live discussions, virtual polls to promote themselves. For instance, as the final promotional promotion, both candidates had to attend a live debate premiered on Facebook. Before the live debate, both candidates boasted they would defeat the other candidate. However, at the end of the debate, both candidates came to an agreement, settled with each other, and revealed their true identities. Hence, such activities demonstrate how the campaign attempted to create something novel in the context.

3.3.3 LAUGFS Types of Sri Lankans at the Supermarkets

News item

In October/November 2018, the removal of the Prime Minister by the Sri Lankan president and a new prime minister's appointment was a highly controversial incident that happened in Sri Lankan Parliament. When the government party members brought a no-confidence motion against the new Prime Minister to remove him from the position, opposition members surrounded the Speaker's seat and obstructed the Speaker from conducting the voting. Initially, there were verbal attacks between the ruling party and opposition, but later, opposition members attacked the ruling party with chili powder and furniture (Safi, 2018). This incident has gained the attention of both local and international media as the chili powder chaos in Sri Lankan Parliament.

Campaign

LAUGFS Supermarkets did a campaign to enhance the brand awareness of newlook LAUGFS Supermarkets amongst modern

trade shoppers (Appendix 3.3). It was a video featured by Blok and Dino (two YouTube artists) and premiered in December 2018 on social media. The video was titled "Types of Sri Lankan at the supermarket." The main purpose behind the video was to show different behaviour patterns of consumers at supermarkets. To bring excitement, the video has utilized several incidents that became highly popular in society. One of them is the chili powder chaos that happened in the Sri Lankan Parliament. The video represents the incident as follows and it defines this scene as 'drive-through' customers. A person who can be said to be working in a security unit is walking towards a jeep. As he approaches the car, another person in a white suit inside the jeep asks if he has bought all the items. Then he shows the goods he brought to the person inside the jeep. Suddenly the person inside the jeep becomes angry and asks, "Where is the chili powder?"At the same time, the security person hands over the chili powder packet to the person inside the jeep. Then he shouts, "Rana, mix this chili powder in water, and let's go to Parliament... Cheers!"

Rapidness - The incident occurred in Parliament on November 16, 2018. Due to the incident's intensity, it was published on the online news websites on the same day (Safi, 2018). However, the LAUGFS campaign was released in December 2018. That is, several weeks after it happened. Thus, it does not have the rapidness element.

Relevance to the audience - Although the LAUGFS newsjacking campaign was released several weeks after the incident in Parliament, Blok and Dino used the event because it was becoming popular among the community. Moreover, using the drive through customer segment, they have expressed the behavior of an audience that visits the supermarket. Hence, rather than communicating a mere marketing message utilizing the chili powder incident, employing it for something relevant to the audience could increase the engagement in the campaign.

Humour - As mentioned earlier, this incident became highly discussed news in local and international media. This is because such incidents are rare in a supreme institution like Parliament. In the video, Blok and Dino had sarcastically addressed the Parliamentarians involved in the incident through the LAUGFS campaign. By the phrase, they used, "Mix this chili powder into water, and let's go to Parliament..." It shows that the Parliamentarians are going to the Parliament to clash with fellow Parliamentarians. Similarly, the dialogues and the performances of both artists added more humour to the video.

Ability to decode the story - The first few seconds of the video clip does not show any cues related to the event. However, when it shows the person dressed in white, viewers can guess him as a public representative. Later, this clip relates to the Parliamentary situation when the person who looks like a public representative says, "Rana, mix this chili powder into water, and let's go to Parliament... Cheers!" In this dialogue, by the terms' chili powder' and 'Parliament,' the viewer can assume that he is implying the incident. Moreover, 'Cheers!' confirms

that the person dressed in white is a Parliamentarian.

Virality - In the campaign, LAUGFS exhibited various behaviour patterns of consumers at the supermarkets. This scene of security personnel and the Parliamentarian referenced drive-through customers who purchase products without leaving their vehicles. The discussion between the security personnel and the Parliamentarian shows that they are going to create a disturbance in Parliament using the chili powder. It also indicated how LAUGFS used an unusual story to demonstrate a particular customer behaviour using the chili powder incident at the Parliament. Furthermore, using drive-through customers type, LAUGFS referenced it to upper social class consumers in the newsjacking scene. Hence, it shows the story and social currency elements in virality.

Creativity - The campaign was launched a few weeks after the initial incident. However, at that time, the audience was already aware of it. Hence, creativity was not visible through the campaign.

3.3.4 Seylan Bank's Wet Hair Wet Pitch Campaign

News item

A cricket match between India and Sri Lanka was called off due to the rain. The game could have been recommended because the rain stopped after a while. However, ground staff have failed to dry the pitch on time and due to that, the game was called off. They tried various techniques such as rollers, vacuum cleaners to dry the dampened pitch. As those efforts were unsuccessful and next, they began using hairdryers and steam irons to dry the pitch. Since it was showing the desperate efforts of ground staff, the incident went viral in social media, and cricket supporters in both countries have started to make fun of the Indian Cricket Board and ground staff of the stadium for their failure (Rudra, 2020).

Campaign

Following the publicity of the incident on social media, Seylan Bank has partnered with Abans Company to publish a newsjacking campaign about the incident. They released a static post saying, "Wet Hair? Wet Pitch? Get all in one multi-purpose electronics with up to 20% savings at Abans only with your Seylan Card!" The campaign's purpose was to disseminate awareness on the offer of Seylan Bank's credit when purchasing Abans electrical appliances.

Rapidness - The incident happened on the 5th of January 2020 (Rudra, 2020). Seylan Bank launched its campaign on the very next day, which was on the 6th of January. They saw it was becoming a trending topic on social media and quickly captured the opportunity.

Relevance to the audience – As stated above, Indian ground staff went to the extent to use electric devices such as hairdryers and steam irons to drain the pitch. What Seylan Bank did is, they came up with a creative execution for credit cards about an offer for electric items using this incident. Since the original incident has a connection with electric devices, Seylan Bank has created a relevant connection between the incident and their offer.

Therefore, the study observed a twofold connection in the newsjacking campaign. That is, a creative execution related to electronic devices and a discount offer for credit cardholders combining the respective incident.

Humour - It should be noted that the campaign itself does not generate a sense of humour. However, Rudra (2020) asserted, some users posted images on social media about how the ground staff drying the pitch using hair dryers and seeing this, many people sarcastically condemned these actions of the Indian Cricket Board. That was the main reason why this incident was humorous to the audience.

Ability to decode the story – In their creative execution, Seylan Bank used the image of a cricket stadium, a leather bowl, and a hairdryer. Moreover, the tagline, "Wet Hair? Wet Pitch?" stimulates the audience to decipher the underlying event.

Virality - Seylan Bank's Wet Hair Wet Pitch campaign launched to advertise their credit card discount for electronics. In terms of virality, it indicates a practical value for consumers who possess credit cards because they can purchase electronics at a discount. Apart from that, using the wording "Wet Hair", the advertisement indicated that it is the ideal time to purchase electronics for consumers. Next instance the study identified that, using the word "Wet Pitch", Seylan Bank sarcastically suggested India purchase hair dryers to dry their pitch as well. In the first instance, Seylan Bank had utilized triggers to relate their discount to consumers and in the following instance, they had provided enjoyment to users from the incident.

Creativity - The study observed that Seylan Bank already had published a credit card promotion for electronic items (Appendix 3.4.2). However, Seylan Bank's Wet Hair Wet Pitch campaign launched precisely within 24 hours after the initial incident happened. It shows that the Seylan Bank used this unpredicted incident to promote their credit promotion again. As a result, the unpredictable nature of the incident caused the campaign's creativity.

3.3.5 The Economic Patient Campaign by Block and Dino

News item

A series of bombs ripped through churches and hotels in Sri Lanka on Easter Sunday, killing at least 290 people and injuring hundreds. After that the tax concession given by the Podujana Peramuna government, when they came to power in 2019, the taxes such as VAT, Personal Income and Corporate Taxes were amended which led the tax revenue to be reduced by 3.46% of the GDP. According to the Varite Research records, Tax Policy changes implemented in January 2022 reduced the government revenue by over 25% and contracted the tax base by over 33%. As the solution to this debt crisis Money Printing, a concept based on the modern monetary theory was introduced by the government. That can be identified as the main reason as to why Sri Lanka's economy is suffering at the present. Aftermath of this solution is the debt crisis of the country only got worse and then in 2020 Covid-19 virus came into play. With this pandemic situation, the crisis has gotten more serious. The Economic Specialists in the country were suggesting different kinds of strategies to

get this worst situation under control but the government did not allow them to implement those strategies. After that as per the Verite Research records, Sri Lanka seems to be banking too much on inflows from tourism. In 2019, foreign exchange spent per tourist per day was estimated as USD 181.23. But regional peers expect much less: India USD 130.33, Indonesia USD 129.20, and Vietnam USD 132.60. The Credit Rating of the country is like the heart rate and if the rating goes down, we must face crucial problems. The main reason behind this is investors who deal with Sri Lanka will not come to the country if the Credit Rating goes down because nobody is likely to do business with Countries which are at the brink of death.

According to the Verite Research records, Sri Lanka's Fitch Credit Rating has been downgraded 4 times from the beginning of 2022 until mid-April 2022. As of now, the current rating is at C. The other countries who are suffering from the same matter have taken the Debt restructuring as the solution by moving into the International Monetary Fund. Without a proper plan on the economy, the government spent dollars to accomplish their personal desires and finally the reserves depleted. Since the country does not have dollars to run the economy, to save reserves, they even restricted the imports of essential items. According to the Varite Research records Sri Lanka's foreign reserves reduced from over 4 months to less than one month of imports from 2019 to 2021. But all other South Asian countries increased their reserves. Furthermore, Swaps and credit lines taken by the government from other countries, but doing it long-term is not

feasible. As per the Verite Research records, Sri Lanka's usable foreign reserves fell to USD 369 Million in March 2022 from USD 7,622 million in March 2019. As per no lends without condition, countries such as India, China asked for strategic assets of our country. Taking tough economic measures to save the country from going bankrupt due to debt, the government took few strategies. On 7th April 2022, Dr.P.Nandalal Weerasinghe, a career central banker with extensive experience in Monetary and Exchange Rate Policy, assumed duties as the 17th Governor of the Central Bank of Sri Lanka. Same day, Dr.Indrajit Coomaraswamy, Prof.Shanta Devarajan, and Dr.Sharmini Coorey, who are eminent economists and fiscal experts, were appointed to advise the government on multilateral engagement and debt sustainability. On 8th April 2022, the Monetary Board of the Central Bank of Sri Lanka decided to increase the Standing Deposit Facility Rate (SDFR) and the Standing Lending Facility Rate (SLFR) of the Central Bank by 700 basis points to 13.50 per cent and 14.50 per cent respectively. On 12th April 2022, Sri Lanka announced a temporary suspension of debt payments in preparation for a comprehensive debt restructuring program with the International Monetary Fund (IMF).

Campaign

The hidden agendas behind why China & India are investing billions of dollars and issuing lends for the support of Sri Lanka to overcome this debt crisis incident gradually became a viral story on social media. Block and Dino (two YouTube artists) capitalized

this incident and has partnered with Varite Research, Strategic Analysis for Asia and Public finance.lk by Varite Research did a campaign to enhance the public awareness of the Debt Crisis in Sri Lanka. It was a video featured by Blok and Dino (two YouTube artists) and premiered in December 2022 on social media. The video was titled "The Patient". The main purpose behind the video was to show in-depth of the debt crisis, how Sri Lanka's economy has collapsed due to irrational decisions by responsible parties and the things we should do to get rid of this crucial juncture. To bring excitement, the video has utilized several incidents that became highly popular in society.

Rapidness - The sequence of events leading to the debt crisis in Sri Lanka commenced in mid-2019, with a culmination in social media discussions commencing in early April 2022. Subsequently, the "Economic Patient" campaign was launched on April 18, 2022. Despite a time lag of several weeks, the campaign coincided with ongoing discussions related to the debt crisis on social media, signifying an element of rapid response.

Relevance to the audience - The economic landscape in Sri Lanka had reached a critical juncture marked by high inflation, abrupt price surges for essential commodities, and fuel shortages. Given the nation's heightened interest in the debt crisis and concerns about political corruption, strategic content aligned with the prevailing circumstances effectively captured the audience's attention and engagement. Thus, the campaign exhibited a high level of relevance to the audience.

Humor - Humor was strategically employed throughout the campaign to maintain audience engagement and convey nuanced messages related to the subject matter. For instance, in the introductory segment of the video, a satirical exchange between "Appachchi" (former President Mahinda Rajapaksha) and the "mother of the economic patient" (the public) revolved around discussions of loans and debt payments. The dialogue humorously alluded to the accumulation of debt, symbolized as "credit cards" denoting swaps and credit lines obtained from foreign countries, thereby emphasizing the worsening debt crisis. Additionally, the video featured a comical portrayal of "Appachchi" and the "Dr. Kabba" government organizing a "Thovil" (a traditional Sri Lankan ritual) to heal the economic patient. This scene underscored the depletion of national reserves due to government expenditure on non-essential endeavors. As Sri Lanka faced a shortage of foreign currency reserves, the government resorted to restricting imports of vital goods. The "Thovil" scene humorously represented the current economic scenario, depicting it as a fruitless attempt to cure the economic patient. Lastly, the video concluded with two individuals, symbolizing India and China, entering the hospital to inquire about acquiring the economic patient's organs in exchange for settling hospital bills. These "organs" symbolized strategic assets of the country, such as lands, airports, and ports, humorously highlighting the consequences of an inability to meet debt obligations and the subsequent impact on the nation.

Ability to decode the news story - The campaign successfully employed various instances, such as the portrayal of India and China seeking country assets if hospital bills could not be paid (an analogy for these nations seeking repayment of debt), the depiction of the "Thovil" scene (representative of government actions diverting focus from the economic crisis), and the "credit cards" discussion between "Appachchi" and the "mother of the economic patient" (symbolizing debt obtained from foreign countries). These elements served as effective tools for the audience to comprehend the underlying narrative.

Virality - The campaign capitalized on the virality of the debt crisis, which had become a prominent and contentious topic in both social media and society at large. The campaign's title, "The Economic Patient," humorously encapsulated the current state of the Sri Lankan economy, fostering viral appeal. Phrases like "Which credit card? How many credit cards did you get now?" underscored the concept of swaps and credit lines acquired from foreign governments, accentuating the worsening debt crisis. Such elements acted as "triggers" for virality, strategically aligning the campaign with the ongoing discourse. Furthermore, terms such as "Appachchi" and "Thovil" imbued different meanings, further enhancing their viral potential across social media platforms.

Creativity - Despite the campaign's launch occurring shortly after the peak of the incident, the creative elements in the campaign were evident through the clever use of language and imaginative scenes.

These creative elements effectively conveyed the campaign's message, incorporating a sense of humor and engaging factors.

In conclusion, the "Economic Patient" campaign ingeniously combined rapid responsiveness, relevance to the audience, humor, effective storytelling, virality, and creativity to address the pressing issue of the debt crisis in Sri Lanka. Through its strategic deployment of humor and symbolism, the campaign succeeded in engaging the audience while effectively conveying the complexities of the economic crisis and its consequences.

3.4 Web Comment Analysis

Under the first objective of the study, the analysis relating to identifying specific newsjacking characteristics in Sri Lankan newsjacking campaigns were discussed. The findings demonstrated that almost all the campaigns consisted of newsjacking characteristics and other social media characteristics. Most campaigns utilized a sense of humour and creativity in them. On one occasion, the study noted that creativity, which is the other social media characteristic, is absent when the rapidness, the newsjacking characteristic, was not seen in the campaign. In web comments analysis, the findings revealed that the majority of the social media users also identified the humour and creativity characteristics in newsjacking campaigns. It was found that even though the campaign does not demonstrate humour, users still perceive it as humour because the utilized incident was humorous. Even though users did not add remarks related to virality characteristics, they mentioned their peers

in the comment section to make the campaign virality. In addition to that, most users appreciated the brand's creativity. The findings relating to how these characteristics influence consumers' social media engagement levels is presented in the following chapter in accordance with the second objective of the study.

4. CONCLUSION

This research aimed to provide a comprehensive understanding of the Newsjacking Characteristics in Sri Lankan Newsjacking PR Campaigns through content analysis of case studies. The primary objective was to identify key characteristics inherent in these campaigns, shedding light on their strategies and impact.

Rapidness, one of the fundamental aspects of successful newsjacking, as emphasized by Dumitriu and Bahna (as cited in Offermans, 2018), is the swift response to an event. Our findings align with this principle, revealing that brands in Sri Lanka timed their newsjacking campaigns to coincide with the events becoming trending topics on social media. This rapid response was not only observed but also appreciated by users who recognized the timely nature of these campaigns. This underscores the importance of immediacy in newsjacking, where brands need to seize the moment when an event captures public attention.

Relevant to the audience, in accordance with Kerns' (2014) assertion that content should resonate with the audience, our content analysis revealed that Sri Lankan brands placed a strong emphasis on crafting messages that were meaningful to their target audience. Instead of merely capitalizing on the incident itself, these brands sought to add value to user conversations surrounding the event. Users, in turn, expressed appreciation for brands that contributed positively to the discourse. This aligns with the findings of Micu and Thorson (2008), who highlighted the significance of diversifying conversations and its positive impact on brand attitudes.

Humor emerged as a prevalent characteristic in Sri Lankan newsjacking campaigns, often intertwined with political incidents. This finding is in line with Baum's research (as cited in Heiss and Matthes, 2019), which suggests that political humor can significantly enhance user engagement on social media. It's worth noting that while some campaigns directly infused humor into their messaging, others relied on users' recognition of humor embedded within the original political incident. This approach, in accordance with McGhee and Goldstein's insights (2012), encouraged users to extract humor from the news item itself. This humor not only entertained but also contributed to the overall success of the campaigns.

In nutshell, the analysis of Newsjacking Characteristics in Sri Lankan Newsjacking Campaigns has highlighted the significance of rapid response, audience relevance, and humor as key elements in the effectiveness of these campaigns. Brands that harnessed these characteristics successfully not only engaged their audiences but also left a lasting impression in a dynamic media landscape in the public relation perspective. As newsjacking PR practice continues to evolve as a powerful marketing strategy,

understanding and applying these characteristics will be essential for brands aiming to capture the attention of an ever-demanding and discerning audience.

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Determine What the Student Understands- Assessment in An Un-scaffolded Environment

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ABSTRACT

The current landscape of computer-assisted language learning (CALL) necessitates effective assessment tools that are capable of evaluating students' comprehension and skills in an un-scaffolded environment. Traditional assessment systems often provide predefined scaffolding, potentially influencing assessment outcomes. In response to this, this document presents a novel grading tool designed to autonomously evaluate free-form responses without furnishing pre-determined structures or suggestions. This innovative tool aims to empower students by fostering independent thinking while mitigating the challenges of individual variability that arise within the context of un-scaffolded assessments. The tool discussed in this document is centered around evaluating student knowledge and proficiency without imposing a rigid framework that could impact the assessment process. It comprises a framework-free testing environment module alongside a module for analyzing correct student responses. A scoring module is incorporated to discern between responsive answers and incorrect responses, further categorizing errors based on their nature. This research advances the conversation surrounding un-scaffolded assessment in CALL, offering a solution that promotes self-reliance and effective evaluation while maintaining accuracy in capturing student comprehension and proficiency.

***Keywords* - Computer-Assisted Language Learning (CALL), Assessment, Un-Scaffolded Environment**

1. INTRODUCTION

In the realm of Computer-Assisted Language Learning (CALL), the assessment of student understanding has long been a central concern. Traditional assessment systems often provide a standardized level of support known as scaffolding, which can inadvertently influence assessment outcomes by guiding students toward particular responses (Smith, 2018). This practice can potentially limit the authenticity of assessing a student's true comprehension and proficiency. As educators and researchers continue to explore innovative approaches in CALL, there is a growing interest in creating assessment tools that operate in an un-scaffolded environment — where students are not provided with predefined structures or suggestions —to gauge their independent grasp of the subject matter more accurately. This document introduces a pioneering grading tool designed to evaluate student responses without furnishing predefined skeletons or suggestions. The key focus of this tool is to retain the essence of un-scaffolded learning experiences while automating the assessment process. In line with the evolving principles of CALL, this tool embraces the notion that fostering independent thinking and reducing individual variability in assessment outcomes are essential for meaningful educational evaluation (Chapelle, 2004).

Unlike conventional grading tools, the tool discussed herein does not provide predefined support mechanisms yet still accomplishes the task of grading unstructured responses automatically. This innovative approach raises the possibility of enabling students to enhance their understanding autonomously, as it refrains from prescribing a particular direction and encourages learners to explore their own paths to comprehension. By addressing individual variations that often arise in diverse learning contexts, this tool strives to minimize the impact of external factors that may distort assessment outcomes (Bachman & Palmer, 2016).

This document delves into the core features of the assessment tool, highlighting its framework-free testing environment module and the correct student responses module, which collectively contribute to the evaluation of student knowledge and skills. Additionally, the tool includes a scoring module that discerns responsive answers from incorrect responses and further categorizes errors based on their nature. This categorization process is particularly insightful, as it frequently reveals that most errors are concentrated in the initial responses.

As the educational landscape continues to evolve, the quest for more accurate and equitable assessment practices remains paramount. The tool discussed in this document seeks to contribute to this journey by offering an avenue for assessing student understanding in un-scaffolded environments, ultimately shaping a more authentic and comprehensive assessment landscape in CALL.

Problem identification balanced binary trees. Self-balancing binary search trees are a type of binary search tree that automatically keeps its height small in the face of arbitrary item insertions and

deletions. This ensures that operations such as search, insert, and delete can be performed in O(log n) time, where n is the number of nodes in the tree.

There are many different types of self-balancing binary search trees, but some of the most common include AVL trees, red-black trees, and treaps. AVL trees achieve their balance by associating each node with a balance factor, which is the difference between the heights of the left and right subtrees of the node (AVL Tree Data Structure, 2023) A node is considered balanced if its balance factor is 0, left-heavy if its balance factor is -1, and right-heavy if its balance factor is 1. When a new node is inserted into an AVL tree, the affected nodes' balance factors may change. If a node's balance factor becomes -2 or 2, the tree is unbalanced and must be rebalanced. Rebalancing is performed by rotating the affected subtrees in a way that maintains the balance of the tree.

Red-black trees achieve their balance by associating each node with a color, which can be either red or black (Programiz, 2023) The following rules must be followed in a red-black tree:

  I.   The root node is black.
  II.   Every leaf node is black.
  III. If a node is red, then both of its children must be black.
  IV.   Every path from a node to a leaf node contains the same number of black nodes.
  V.   When a new node is inserted into a red-black tree, the color of the node is set to red. If the insertion causes the tree to become unbalanced, the tree is rebalanced by rotating the affected subtrees.

Treaps are a type of self-balancing binary search tree that achieves its balance by associating each node with a priority value. The priority value of a node is a non-negative integer that represents the importance of the node. When a new node is inserted into a trap, it is inserted into the tree based on its priority value. (Treap (Cartesian tree) , 2022) If the insertion causes the tree to become unbalanced, the tree is rebalanced by rotating the affected subtrees (GeeksforGeeks, 2023).

Self-balancing binary search trees are a powerful tool for data structures and algorithms. They are used in a variety of applications, such as:

1.   Databases
2.   Compilers
3.   Operating systems
4.   Cryptography

2. LITERATURE REVIEW

In education, the assessment of student learning has long been a focal point of pedagogical inquiry and development. Un-scaffolded environments, characterized by their emphasis on self-directed learning and open-ended exploration, have gained attention for their potential to foster genuine comprehension and cognitive development. However, the assessment paradigms aligned with such environments remain relatively uncharted territory. The central inquiry of this literature review is thus defined: How does assessment function within the context of an un-scaffolded learning environment, and how

effectively does it gauge the depth of students' understanding?

2.1 Web-Based Scaffolding for Enhancing Writing Skills in Students with Learning Disabilities.

The integration of technology in education has paved the way for innovative strategies to support students with learning disabilities (LD). This review focuses on a pivotal study by (Englert, Wu, & Zhao, 2005) that introduced the web-based tool, Technology-Enhanced Learning Environments on the Web (TELE-Web), to enhance the writing skills of fourth- and fifth-grade students with LD.

2.2 The Shifting Theoretical Landscape of Computer-Assisted Language Learning (CALL) and its Implications for Second Language Acquisition (SLA)

The infusion of technology into language education, particularly in computer-assisted language learning (CALL), has sparked a transformation in language teaching theories. This literature review focuses on an enlightening article that showcases the dynamic nature of CALL development and its connection to various theoretical approaches in second language acquisition (SLA), with wider implications for the field. Within these perspectives, cognitive linguistic theories, including Universal Grammar and autonomous induction theory, delve into the cognitive mechanisms of language acquisition. The psycholinguistic perspective explores cognitive processes in language comprehension and production (Chappelle, 2009).

2.3 Scaffolded and Un scaffolded reflection on Bachelor of Education Students' Learner Self-Efficacy.

Self-efficacy beliefs wield a significant influence in pre-service teacher education, shaping students' motivation, engagement, and learning. This review delves into their impact amid debates over "evidence-based teacher education," exploring how benchmarked professional standards intersect with student-teacher self-efficacy.

As foundational motivators, self-efficacy beliefs drive engagement and growth for future educators. We examine how these beliefs affect teaching efficacy and learning experiences. The review probes the alignment between established standards and the cultivation of self-efficacy, aiming to enhance evidence-based practices and pedagogical strategies. (Jones & Maxwell, 2007)

The critical comparison of self-efficacy beliefs and evidence-based approaches between pre-service teacher education and CALL reveals intriguing parallels and nuanced distinctions. While both domains harness technology and pedagogy to empower learners, the unique characteristics of CALL demand a delicate balance between language acquisition, technology integration, and learner autonomy. Striving for this equilibrium holds the key to harnessing the transformative potential of technology in language learning, akin to the influence of self-efficacy beliefs in shaping aspiring educators' growth and development.

2.4 Exploring CALL's Vertical Integration and Its Impact on Materials Evaluation

The (Chapelle C. , 2010) examines the profound impact of technology, particularly computer-assisted language learning (CALL), on language education. It critically addresses the notion that the widespread integration of CALL throughout language materials and curricula blurs the conventional distinctions between CALL and traditional language resources. Amid the growing focus on evaluating CALL's effectiveness, the review asserts that insights derived from CALL evaluation can offer valuable lessons for the broader realm of materials assessment. Through a reflective exploration of CALL evaluation, the review explores the intricate relationship between CALL and materials assessment, presenting opportunities for innovative approaches to rethinking established paradigms.

3. SYSTEM / MODEL DESCRIPTION

The pre-test, the tutor, and the post-test are divided into three sections by the system. Students must display the status of the tree once each functionality like insertion/deletion, including any intermediate stages (the trees that are created along the path to the solution), are encouraged. Based on that purpose, the test interface is showed a binary tree canvas with 31 empty nodes. Students in the teaching portion do the identical job of inserting (or removing from) a beginning tree. The granularity technique is used by the tutoring system, which demands the learner to always choose a node and then a transformation.

a) Data & Analysis

During the three semesters were included 105 students. The principles underpinning functionality like insertion were given in the lecture for one week. The pre-test for 30 minutes on the first day is given by the students, and the session was followed by the tutoring system. 10% of Unrecognised mistakes are identified in pre-tests and 4% in post-testing. As per the result of statistics, the most typical error was made when deciding which transformation to use. This has occurred when the learner selects the incorrect node as the current node or fails to recognize the preconditions for each transformation. When employing the colour flip transformation, most blunders were committed.

This is a simple transformation that flips the colours of three nodes. The bulk of errors were caused by students failing to recognize the proper preconditions and selecting the transformation. Because the grading tool is evaluated up to the first error, if pupils commit more errors, those flaws will go unnoticed. Students who don't use the colour flip transformation will not be graded on the second transformation. Despite having differing preconditions and semantics, several of the operations consist of similarities as insertion operations. The most complicated operation is the deletion in comparison with the insertion operation, which is aggravated by the similarity of many preconditions and semantics. Students who don't use the colour flip transformation will not be graded on the second transformation. Deletion operations are more complicated than insertion operations, which is aggravated by the

similarity of many preconditions and semantics.

4. CONCLUSION

Descriptive details are provided about the tool or the purpose of assessing the student skills based on the algorithms in insertion and deletion on binary search trees like red black tree including the advantages of the tools, the accuracy level of the correct answers given by the students, and the strong knowledge with heuristics are included for facilitating the error type in the specific cases in the data structures class of students in three semesters based with the Bayesian student model efficiency is constructed.

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A Study on the Importance of Introducing Railway Organizational Structural Reforms in Sri Lanka: A Passenger Transport Perspective

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Abstract

William Coase, introducing his theorem on cost efficiency in 1975, had explained that allowing free trade would result in the optimum outcome under any specific economic condition. Privatisation was the best solution that was presented over the world to cut the financial inefficiency that was created by the monopolies of state-owned entities out. Even at that, structural reforms are encouraged over outright privatisation. 'Regulatory Reforms' is an on-going process that optimizes the regulatory performance of an economy. Many potential problem areas would occur, if we were to consider the long-term trial-and-error process of introducing railway structural reforms; such as, (1) whether the structural reforms that will undertake will be appropriate for an industry as technically complex as railways, (2) whether a system of negotiated contracts will lead to lower transaction costs than a system of administered commands, (3) whether the vertical separation of infrastructure and operations will ignore the likelihood of pursuing the concepts of an integrated economy; such as investment planning and land-use planning at the strategic level, maintenance planning at the tactical level, and planning to recover from possible infrastructure failures at the operational level, (4) whether there will be practical problems, when determining the costs of regulating the infrastructure management, (5) whether there will be diseconomies of scope form jointly operating freight and passenger services, (6) whether a split into three or four operators will be more efficient than separating operations market into less than three or more than four competitors, (7) whether the franchising bid will not be competitive, (8) whether franchising contracts would be difficult to specify, award, enforce, and renew, even if there were some sort of a competition that

resulted in the winning bid not being efficient, (9) whether there will require a substantial risk premium, where franchising will not be exclusive, or (10) whether allocative efficiency gains will be more problematic, although productive efficiency gains will be likely. Nevertheless, If the final outcome was idealist, bringing a net financial surplus in the economy, those kinds of structural reforms would always be advisable.

***Keywords* - Railway Structural Reforms, Regulatory Policy Making, Financial Performance Efficiency, Developing Countries**

1. INTRODUCTION

As one of the oldest rail services in Asia, Sri Lanka Railway (SLR) will complete its 159 years of service by December 27, 2023. (Kesavan et al., 2015). In the early 20th century, SLR was established as Ceylon Government Railway (CGR), in order to operate as the major mode of freight transportation all over the country. Over time, road transportation which was the main passenger transport saturated and there was a need for an alternative mode of transport. The marginal productivity of roads and vehicles were researched and identified (Shaja M.M.M., Sobika M. & Bandara Y.M., 2023). Further, the road transportation became unattractive since the safety driving was an unsolved issue which was mainly interconnected with the socio-economic characteristics of the drivers and the utility of driving (Shaja M.M.M., & Bandara Y.M., 2020). By the late 20th century, SLR's purpose was gradually redefined to majorly act as a mode of passenger transportation. (Hyat, 2021) The

operative level of SLR is actually a network, which includes the two key components; infrastructure (i.e., facilities), and operations (i.e., functions). Rail facilities consist of tracks and stations, signaling and level crossings, and rolling stocks.

There are two types of rail tracks, which are based on the difference between the track gauge that is usually measured as the inner width between the two railings (Puffert, 2001); broad gauge rail tracks, and narrow gauge rail tracks. The inner width of a standardized broad gauge rail track is 5ft 6in (i.e., 1.670m), while that of a standardized narrow gauge rail track is 2ft 6in (i.e., 0.762m) (Hyatt, 2021).

The broad gauge rail network of SLR contains of two Upcountry lines (i.e. the Colombo-Peradeniya-Badulla line, and the Colombo-Kandy-Matale line), two Southern coastal lines (i.e. the Colombo-Matara line, and the Mutual line from Colombo Port to the harbour works quarry at Mahara, Ragama), the Northern line (i.e. the line from Polgahawela to Kankesanthurai (KKS)), two North Western lines (i.e., the Talaimannar line from Medawachchiya to Talaimannar, and the Puttalam line from Ja Ela to Aruwakkadu), and two Eastern lines (i.e. the Maho-Trincomalee line, and the Maho-Batticaloa line). (Hyatt, 2021)

The narrow-gauge railway network of SLR contained of two significant lines; the Udu Pussellawa Railway (UPR) line (i.e., from Nanu Oya to Ragala), and the Kelani Valley (KV) line [i.e., from Maradana to Avissawella, and to Yatiyantota (i.e., towards North from Avissawella), and to

Rathnapura (i.e. towards South from Avissawella)]. Unfortunately, by 1977, all the narrow gauge rail lines that belonged to SLR discontinued their operations due to their high maintenance costs. Some parts of them were even lifted to be used in other broad gauge railway maintenance. (Hyatt, 2021)

SLR possesses five types of rolling stocks; locomotives (i.e. steam engine locomotives, and Internal Combustion Engine (ICE) locomotives), multiple units, carriages, goods wagons, and oil tankers, of which only the first three items are related with passenger transportation. (Hyatt, 2021)

Rail functions consist of train services and ticket issuing. There are two main types of train services; passenger train services, and freight train services. Commuter passenger train services and tourism passenger train services are the two types of passenger train services offered by SLR.

At present, SLR operates a total of 1492 km in track length, 181 main and 162 sub stations, 59 diesel-electric locomotives, 30 diesel-hydraulic locomotives, 875 km of mechanical interlocking, 575 km of electric interlocking, 650km of Central Lighting System (CLS), 180 km of Centralized Traffic Control (CTC), 136 electric barriers, 405 bells and flashlights, 136 mechanized barriers, 7 winged-type gates, and 300 protected road signs, accounting for more than 300 passenger trains that commute over 350,000 passengers daily (MTH, 2022), which is a 5 to 6 percentage from the total passenger transportation share in the market (SLRD, 2011).

One crucial characteristic of the studies that were carried out prior to and about three decades after the independence regarding CGR, was their focus on contributing to the future development of rail transportation in Sri Lanka, where the rail mode share was as high as 40% in the market. (Kesavan et al., 2015)

1.2 Problem Statement

SLR started to become a loss-making entity only a few decades after independence. Rail mode share has immensely decreased due to the unsatisfactory level of service performance that is measured by means of; the actual arrival times against the scheduled arrival times, comfortable seating facilities, and safe journey. SLR has come to a point where customers demand more trips, online ticketing facilities, and adequate maintenance of tracks and trains. (Kesavan et al., 2015).

Rail transportation is one of the two main on-land public transportation methods in Sri Lanka, but considering the easy access to most of the geographical area in the country, other transportation modes; such as motor-taxis and public bus transportation service have come forward, giving a tough competition to the public rail transportation service. (Kesavan et al., 2015)

The reason why rail services cannot match the competition from other transportation modes is because SLR lags behind with unsophisticated technologies, due to its leapfrog type of infrastructural development, which is led by the high bureaucracy (Kesavan et al., 2015) and the unsuccessful strategies in capturing the financial performance (Danthanarayana and Kumarage, 2021), attached to it.

As a department under the State, SLR gets fully subsidized by the Government Treasury annually. SLR also gets funded by some capital grants that are influenced by time to time policy making decisions of the Government. (Danthanarayana and Kumarage, 2021)

Apart from the revenue being decreased, SLR has outgrown its self-sufficiency (Kesavan et al., 2015) with the rapidly increasing recurring expenditures that annually gets consumed by its operational and maintenance functions, even at a level of non-growing capital expenditure, where there incur no expenses in new infrastructural developments. From a numerical perspective, although, SLR has confronted a 62 percent of sudden increment in revenues during the post-war season (i.e. from 2009-2014), due to the rebirth of the Northern line, the operational loss was 118 percent, when compared to the figures from 1999 (Danthanarayana and Kumarage, 2021).

The study of Danthanarayana and Kumarage (2021) has found out that a large portion of recurrent costs has been consumed by the Personal Employee Emoluments (PEEs) in SLR, which are basically the salaries, wages, overtime and holiday payments, and other allowances; such as the fuel allowance.

Most employees are attracted to job security and pension benefits, being recruited under a Governmental Department (Danthanarayana and Kumarage, 2021). Knowing this, some differently subjective parties try to exploit their powers to acquire people's voting rights via different Trade Unions (TUs).

TUs demand more increments in remuneration, short shifts, and holidays (Kesavan et al., 2015). It is evidently clear that TUs over-power the authority of the management in SLR, as it is indicating a 13.18 wage ratio, compared to the 11.83 ratio in other Governmental Departments. (Danthanarayana and Kumarage, 2021)

On the other hand, it is way easier for TUs to manipulate workers' minds, since SLR lacks adequate inaugural, training and development programmes to make them understand its vision and long-term objectives. (Kesavan et al., 2015)

Simply, certain governmental regulations have offended the authority of the administration of SLR to overpower other coalitions. After all, the government seems to neglect introducing adequate regulatory structural reforms into SLR. (Kesavan et al., 2015; Danthanarayana and Kumarage, 2021)

SLR is being operated as a service-oriented organisation. Sri Lankan Government has been keeping SLR's monopoly up to date, in order to provide equal opportunity of transportation to passengers from all income levels. (Kesavan et al., 2015)

Throughout its history, there have been conducted research on some significant aspects related to SLR, but when compared to other industries, and the same industry over the world, the amount of studies done goes too little. Even at that, mostly research has covered the historical, technical and human resources aspects of SLR. There is little to no studies based on the administrative structure of SLR. (Kesavan et al., 2015)

Current administrative structure of SLR consists of three sub departments; the Chief Engineer Mechanical Sub Department, the Chief Engineer Way and Works Sub Department, and the Chief Engineer Signaling and Telecommunication Sub Department. All sub department heads report to the General Manager of Railway (GMR), who is bound to directly report to the Secretary to the Ministry of Transport and Highways (MTH). (SLRD, 2011; Kesavan et al., 2015)

SLR gains its revenues as operating revenues and non-operating revenues, among which the former is prominent and the latter is miscellaneous. Since the fare is significantly lower than of any other public transportation mode, SLR will have to either run more trains or lay more lines to achieve a predefined target of revenue than to now. (Danthanarayana and Kumarage, 2021)

Investing in the development of public transportation infrastructure is a contribution to an economy as it fulfils the daily transportation needs of people (Abeysekara, 2021), keeping supply chains connected (Edward et al., 2003).

The developed countries generally invest about 31 percent of its GDP annually, upon this purpose. The main concern on this subject is that this type of investments will take around 20 to 30 years (i.e. a long term) to gain profits. That is why transportation infrastructure investments are mostly undertaken by national governments. (Abeysekara, 2021)

When it comes to the projects on the development of public transportation infrastructure, developing countries; such as

Sri Lanka, usually lack the necessary financial and technical feasibility in this regard. After all, developing the commuter passenger rail service to access most of the geological area will be a huge investment project. Therefore, Sri Lanka has to go through solicited projects that seek the assistance of the external funding sources that would make a nation indebted over a long term, mostly resulting in lower than standard economic benefits (Abeysekara, 2021) due to the high bureaucracy of SLR that hinders to pass through certain steps to efficiency (Kesavan et al., 2015) which has become a critical discussion at the statutory level (Kumarage, 2022).

Transportation policies are after all, a type of public policies that are subjected to non-linear (i.e. not an effect of just one cause), complex, dynamic, co-evolving (i.e. simultaneously evolving with the evolution of other policies), cognitively-biased, and reactive in nature. (Kumarage, 2022)

Most of the current rail transportation policies are being conducted without a clear conscience by the authorities. Some rules are not written by the Law but have been implied by conduct over years (i.e. implicit), while others are written by Law but have been oblivious to authorities over decades (i.e. explicit). Either way, this gap is an immense opportunity for differently interested parties to drag the objective of SLR away from profits; such as the government decision back in 1978 to increase the import of motor vehicles, in order to increase the national tax return. (Kumarage, 2022)

Beyond everything, most of the recent explicit transportation policies, and all the

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administrative transportation policies have been identified to result in failure, because of their lack of strategic foundation. Most policies have failed due to the excess optimism without maintaining flexibility over the implementation, containing the objectives of treasury-based funding without self-financing, and viewing them only from a fully nationalized perspective from the beginning. (Kumarage, 2022)

1.3 Theory and Objectives

Sri Lanka indicated a minus 7.8 national GDP growth in 2022, which had been the biggest drop since 2019 (The World Bank Data, 2023). Sri Lanka heavily depended on the tourism income, which basically stopped flowing in after the COVID-19 outbreak. The political instability in the first half of 2022 stopped migrant workers from depositing remittance in local banks, leading to a huge fall of national liquid foreign currency reserves. The sudden escalation of the USD rate when importing fuel and fertilizer made the international Ceylon tea export market to fall apart. At a crucial time as this, keeping inefficient state-owned entities; such as SLR, would further add to the debt burden of the Central Government. Therefore, converting them into profit making entities is essential. (Kesavan et al., 2015)

This study was based on Coase's theorem, which was introduced in 1975 by William Coase and explains that under any specific economic circumstance, valuing and allowing free trade of property rights would result in an optimum outcome. (Preston, 1996)

Even under the political environment in the British colonial era, although transportation infrastructure development investments of CGR were committed by the State, rail operations were self-sufficient, hence, no subsidiary was provided for service provision to retain (Kumarage, 2022).

Going along with the Coase's theorem, railways better undergo other structural reforms than outright privatisation, since its nature is attached to time, space and safety, oscillating between profitability and non-profitability as situations given (Preston, 1996). Imahashi (2000) also described the on-going nature of railway structural reforms. Despite all doubts, if the end result would be ideal and bring a financial surplus, such railway structural reforms are advisable (Imahashi, 2000).

What interests introducing railway structural reforms in Sri Lanka are the inefficiencies of national monopolies, when competition is restricted as described by Imahashi (2000).

Followed by the lack of studies in the area of introducing regulatory reforms into SLR, this paper aimed over five objectives. They were (1) to analyse the most productive types of railway structural reforms in the world, (2) to gather the most compatible approaches to structural reforms in SLR, (3) to qualitatively evaluate the feasibility of adopting the selected structural reforms, (4) to draw an initial plan to structural reforms in SLR, and (5) to discuss possible recoveries against some potential risks of introducing railway structural reforms.

2. LITERATURE REVIEW

2.1 Introduction to Literature

General railway structural reforms are derived by the two axes; the vertical axis, and the horizontal axis, and the two movements; the regulation, and the deregulation. According to these two measures, there exist four prominent railway markets; (1) both vertically and horizontally integrated, (2) vertically integrated and horizontally separated, (3) vertically separated and horizontally integrated, and (4) both vertically and horizontally separated. (Ali and Eliasson, 2022)

The vertical axis concerns infrastructure management (i.e. track development and maintenance, capacity allocation, traffic control, and real estate management) and service provision (i.e. ticket issuing, and running trains), while the horizontal axis concerns the number of parties who are responsible over the same function. (Ali and Eliasson, 2022)

The most primitive rail markets are both vertically and horizontally integrated. Oftentimes, these types of markets are state-owned monopolies. The governing executive is solely responsible for both infrastructure management and service provision (Ali and Eliasson, 2022). SLR also belongs to this category.

The secondary rail markets are vertically integrated and horizontally separated (Ali and Eliasson, 2022). Horizontal separation can have two forms; one is the freight service being separated from the passenger service (i.e. functional distinction) and the other is, allocating rail services into certain geographical areas (i.e. geographical sub-division) (Mizutani, 2004) . While most railways in the world manifest functional distinction (Ali and Eliasson, 2022), Japanese Railway (JR) especially exhibits geographical sub-division (Imahashi, 2000).

The tertiary rail markets are vertically separated and horizontally integrated. These types of rail markets are hard to find. The only practical examples are the United States passenger rail market, and the Japanese freight rail market (Ali and Eliasson, 2022). The strategy behind is cutting excessive financial burdens down, where the market share of that function is lower (Imahashi, 2000).

The most sophisticated rail markets are both vertically and horizontally separated. Here, the horizontal separation is in the form of functional distinction. Not as it seems, there can exist various types of ownership structures in this type of rail markets. (Ali and Eliasson, 2022)

As this study is conducted from a passenger rail transportation perspective, here considers three geographies, where railway structural reforms in the passenger train services are most experienced; (1) European Railways (ER) as they were subjected to most trials of reforms (Ali and Eliasson, 2022), (2) JR because Japanese regulatory affairs regarding railways before reforms were similar to the current circumstances in SLR (Mizutani, 2004), and (3) Russian railways because it discusses some potential risks of introducing railway structural reforms (Bykadorov, Kibalov and Kin, 2017).

Japan was the first to introduce railway structural reforms in their country

(Mizutani, 2004). After Sweden, other countries in the European Union (EU) followed (Ali and Eliasson, 2022). In fact, the discussion upon ERs and JR makes it to one point where railway structural reforms could be situated without being overly capitalised or nationalized. ERs discuss how to refrain railway structural reforms from capitalization, while JR discusses how to refrain railway structural reforms from nationalization.

2.2 European Railways

Early ERs were fully privatized. Private sector owned and operated railways, while managing infrastructure. Capitalised monopolies created three major issues; (1) the conflict of capacity allocation (i.e. Capacity allocators favoured companies under their same mother company, as there was a heavy competition to share the same space and time on rail tracks. Hence, entry was impossible.) (Ali and Eliasson, 2022), (2) the high rail fare (i.e. Private sector was profit-oriented. To increase the revenues, they increased rail fares that middle to low income passengers could not afford) (Preston, 1996), and (3) the unsafe travel conditions (i.e. As the private sector was profit-oriented, to cut the costs down, they avoided maintaining safety standards, putting passengers in danger.) (Preston, 1996). As a remedy, in the early 20th century, ERs were rapidly nationalized, and European national railways indicated a decline in their regulatory, operational and financial performances afterwards. The effect was allowing the private sector to enter into the railway market again. (Ali and Eliasson, 2022)

The European Commission (EC) only demanded the separation of the accounts function from other operations in the 1st directive (i.e. 91/440/EEC). Only the 3rd and 4th directives allowed the open access to domestic passenger rail services market, during the recent 2007-2016 period. Most of the recent ERs are both vertically and horizontally separated. Vertical separation is prominent. Even under the same European legislation, EU countries indicate various types of railway structural reforms. (Ali and Eliasson, 2022)

There are two most common passenger railway market structures in modern Europe; (1) organizational separation (i.e., infrastructure management, capacity allocation and service provision are done by subsidiaries under the same parent or holding company), and (2) institutional separation (i.e. infrastructure management and capacity allocation are done by a state owned institute or a governmental agency, while service provision is done by private sector companies. Among these two types, institutional separation is considered as a complete and more efficient type of vertical separation which allows objective competition. (Ali and Eliasson, 2022)

2.3 Japanese Railways

The Japanese National Railway (JNR) confronted several major conflicts as a state-owned monopoly. (1) As it depended on large government subsidies that were easily accessible, making profits was not nearly one of its major priorities. (2) The bad political influence on JNR made TUs more powerful than the management, which impeded the growth of it. (Mizutani, 2004)

(3) The high bureaucracy made even huge financial allocations inefficient. (4) The over-expansion of the administrative function made it difficult and time-consuming to come up with centralized decisions. (5) Some divisions such as the Civil Engineering Department over-powering the decision making authority of the management, made it even worse. (Mizutani, 2004)

In order to extricate JNR from its downfall, going for a market economy was a need, since the private sector could not refrain from earning profits. (Mizutani, 2004)

Even though privatisation was a must, JNR did not pursue an outright privatisation. As a first step, it was assigned under Japanese National Railway Settlement Corporation (JNRSC), which acted as a kind of stock holding company for JNR. Infrastructure management was separated from service provision (i.e. vertical separation) at an early stage. Later, passenger rail services were separated from freight rail services (i.e. functional distinction under horizontal separation) as well.

After considering the high density of population residing near the major rail lines accumulating an immense demand over commuter services in selective urban areas which were far apart from each other, later it was decided to separate JRs geographically rather than vertically. This avoided the conflict of capacity allocation on the same rail track as well (Mizutani, 2004). However, which private sector party would manage which geographical subdivision would ultimately be a decision of the government. (Imahashi, 2000; Ali and Eliasson, 2022).

JNR was incorporated into six regional subdivisions under JNRCS. They are the three Honshu JRs (i.e. JR East, JR West and JR Central), and the three Island's JRs (i.e. JR Hokkaido, JR Shikuku and JR Kyushu). The first to incorporate was the JR East in 1993, followed by JR West in 1996, JR Central in 1997. Even by 2002, only JR East was fully privatized. While the other two Honshu JRs are yet to be fully privatized, the three Island's JRs need to indicate profits if they were to be corporate.

3. RESEARCH METHODOLOGY

Considering the technical complexity of railways, this research pursues a qualitative strategy. The research methodology follows a case study since it intensely describes a unique phenomenon within a single organisation. As mentioned in the '1.3 Theory and Objectives' section, this research indicates five objectives.

The first objective is to analyse the most productive types of railway structural reforms in the world. Upon the completion of this objective, a desk research was carried out. As this study is conducted from a passenger rail transportation perspective, here considered three geographies, where railway structural reforms in the passenger train services are most experienced; (1) European Railways (ER) as they were subjected to most trials of reforms (Ali and Eliasson, 2022), (2) JR because Japanese regulatory affairs regarding railways before reforms were similar to the current circumstances in SLR (Mizutani, 2004), and (3) Russian railways because it discusses some potential risks of introducing railway structural reforms (Bykadorov, Kibalov and Kin, 2017).

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The second objective that was to gather the most compatible approaches to structural reforms in SLR, and the third objective that was to qualitatively evaluate the feasibility of adopting the selected structural reforms, were fulfilled through a series of structured interviews that were conducted under the Delphi method, which accumulated individual opinions to form the most favourable opinion at the end. Considering the biased interests of the TUs in SLR, this method would escalate the objectivity of the study.

The sample of interviewees were a stratified simple random one, selected from the three engineering sub-divisions of SLR since they are the staff with the most adequate operational and managerial knowledge and skills about SLR. Among the sixteen railway engineers who were interviewed for the academic purpose of this study, eight were from the Chief Engineer (Mechanical) sub-department, six were from the Chief Engineer (Way and Works) sub-department, and the other two were from the Chief Engineer (Signaling and Telecommunication) sub-department. The characteristics of the sample are described in the table 3.1 below.

Table 3.1: Characteristics of the sample selected

Interviewee ID	Sub Department	Subject Area
E1	The Chief Engineer (Mechanical) Office	Engineer (Mechanical)
E2	The Chief Engineer (Mechanical) Office	Engineer (Electrical)
E3	The Chief Engineer (Mechanical) Office	Engineer (Mechanical)
E4	The Chief Engineer (Mechanical) Office	Engineer (Mechanical)
E5	The Chief Engineer (Mechanical) Office	Engineer (Mechanical)
E6	The Chief Engineer (Mechanical) Office	Engineer (Electrical)
E7	The Chief Engineer (Mechanical) Office	Engineer (Mechanical)
E8	The Chief Engineer (Mechanical) Office	Engineer (Electrical)
E9	The Chief Engineer (Way and Works) Office	Engineer (Design)
E10	The Chief Engineer (Way and Works) Office	Engineer (Design)

E11	The Chief Engineer (Way and Works) Office	Engineer (Bridge Works)
E12	The Chief Engineer (Way and Works) Office	Engineer (Upper District)
E13	The Chief Engineer (Way and Works) Office	Engineer (Lower District)
E14	The Chief Engineer (Way and Works) Office	Engineer (Nanu Oya)
E15	The Chief Engineer (Signalling and Telecommunication) Office	Engineer (Signalling)
E16	The Chief Engineer (Signalling and Telecommunication) Office	Engineer (Signalling)

As this case study solely focuses on SLR, and its outcomes account for social welfare, it is of high ecological value (Sekaran and Bougie, 2016). The study area of this research is extremely unique. Consequently, there could not be much generalizability attached to this study according to Sekaran and Bougie (2016). However, the Oxford exclaims that the generalizability of a case study could not necessarily mean the wider applicability over many industries, rather the capability to generate a model out of it. If that was the argument, since this research is suggesting a general model for a deregulated rail market structure in a developing country, there would definitely be an intensive analytical value, hence, much generalizability, in this research.

After considering these four areas that are essential for the general railway structural reform policy formations, a questionnaire was prepared, consisting of eight questions on par with the research objectives. They are; (1) what the variations of the general structural reforms (i.e., market structure, entry, ownership, and competition regulations) are most suitable for the railway market in Sri Lanka, and (2) why those forms will be more compatible for SLR and country's context, (3) whether there is a capability for railway structural reforms in Sri Lanka, provided by the current economic condition (4) what the possible advantages / disadvantages that Sri Lanka would experience would be, if the nation were to adopt railway structural reforms, (5) whether the advantages / disadvantages would weigh more than the other, (6) what the possible changes that would happen in the structure of the SLR, if it were to adopt structural reforms, and (7) considering the advantages / disadvantages, and the possible changes in the structure of

the SLR, whether the suggested reforms would be worth adopting, and (8) whether the suggested railway structural reforms would have the capability to put an end to the alteration between the privatisation and the nationalization of railway market policies.

The first question of the questionnaire was a descriptive research question, while all others were exploratory research questions. (Sekaran and Bougie, 2016)

11 out of the 16 railway engineers were interviewed using the face-to-face interviewing approach, since they were on duty within the sub-department premises. The other five railway engineers were interviewed over the phone, since they were on field-duty or at outstations.

After transcribing the information from the interviews, they were analyzed according to the themes. Firstly, the responses of the similar type of questions were gathered into one place. Secondly, the major points discussed by most of the experts were identified as 'Main Themes'. Thirdly, several variations under each main theme, and the drivers of those changings were identified as 'Sub Themes'.

Using the data collected and analyzed, the fourth objective to draw an initial plan to structural reforms in SLR and the fifth objective to discuss possible recoveries against some potential risks of introducing railway structural reforms were completed, going beyond mere qualitative research.

4. FINDINGS

After going through several studies, four types of general structural reforms and 17 types of their key variations could be identified in the desk research.

Ali and Eliasson (2022) mentioned vertical and horizontal integration and separation of railway markets in their study. Mizutani and Uranishi (2020) named this first general factor as 'Market Structure'. There are four key variations to this [i.e. (1) market being both vertically and horizontally integrated, (2) market being vertically integrated and horizontally separated, (3) market being vertically separated and horizontally integrated, and (4) both market being vertically and horizontally separated. Even though these are the major types, other forms of market structure; such as, one of the competing or complementary functions being vertically or horizontally integrated, while the other being vertically or horizontally separated, could always exist (Ali and Eliasson, 2022).

Following is the concern on who owns, develops, maintains, rail infrastructure and allocates capacity and gets profited from rail operations. Misutani and Uranishi named this second general factor as 'Ownership Regulation'. Ali and Eliasson (2022) recognized five types of market ownerships; (1) being owned by the State, (2) being owned by a governmental agency, (3) being owned by a subsidiary of a parent company, (4) being owned by a subsidiary of a holding company, or (5) being owned by a non-profit organisation.

The third general factor is 'Entry Regulation' that describes how competing operators would approach the market (Mizutani and Uranishi, 2020) with the four key variants; (1) entry being franchised to a single firm (i.e., only one actor being

available in the market) (2) entry being franchised to separate companies in separate geographical areas, (3) entry being franchised to several companies to compete in the same geographical area, and (4) free entry (i.e., any desired party from private-sector could start their rail operations at any given time) (Ali and Eliasson, 2022).

The fourth general factor is 'Competition Regulation' that describes how operators altogether exist and act in the market (Mizutani and Uranishi, 2020) with the four key variants; (1) the monopoly (i.e., There will be only one actor per each function in the railway market, and all the actors altogether will provide complementary services for each other.), (2) the duopoly (i.e., There will be two actors per each function in the railway market, and these two actors will have to compete in winning the larger share of the passenger market for the provision of the services of that function.), (3) the limited oligopoly (i.e., There will be three or four actors per each function in the railway market, and these actors will have to compete in winning the largest share of the passenger market for the provision of the services of that function.), and (4) the unlimited oligopoly (i.e., There will be 30-40 actors per each function in the railway market, and these actors will have to compete in winning the larger share of the passenger market for the provision of the services of that function.).

After analyzing the responses of the industry experts, several main themes could be identified as the topics of discussion in this research. They are; (1) the market structure, (2) the entry into the market, (3) the ownership of railway market functions,

(4) the promotion of competition among actors in the market, (5) the impacts of railway structural reforms on the passenger market, (6) the non-operational income generation methods, (7) the areas to concern before a policy is to introduce, and (8) the organizational support to adopt railway structural reforms. A summary of the findings are in Table 4.1 below.

Table 4.2: Thematic Analysis of the Data

Theme	Respondents	No of responses	Response Rate
Need of introducing regulatory reforms in SLR	E1 | E2 | E3 | E4 | E5 | E6 | E7 | E8 | E9 | E10 E11 | E12 | E13 | E14 | E15 | E16	16	100.00%
Vertical separation between infrastructure and operations	E1 | E2 | E3 | E4 | E5 | E6 | E7 | E8 | E9 | E10 E11 | E12 | E13 | E14 | E15 | E16	16	100.00%
Infrastructure management	E1 | E2 | E4 | E5 | E6 | E7 | E8 | E9 |	15	93.75%

under government	E10 E11 | E12 | E13 | E14 | E15 | E16			Changing SLR administrative structure from Department to Corporation or Authority	E2 | E3 | E4 | E9 | E10 E11 | E12 | E13 | E14 | E15 | E16	11	68.75 %
Operations privatization	E1 | E2 | E4 | E5 | E6 | E7 | E8 | E9 | E10 E11 | E12 | E13 | E14 | E15 | E16	15	93.75 %				
Operations privatization under the control of government	E1 | E2 | E4 | E5 | E6 | E7 | E8 | E9 | E10 E11 | E12 | E13 | E14 | E15 | E16	15	93.75 %	Reducing expenses	E7 | E8 | E9 | E10 | E11 | E12 | E13 | E15 | E16	9	56.25 %
Market entry franchising to several companies to compete	E2 | E3 | E4 | E5 | E6 | E7 | E8 | E9 | E10 E11 | E12 | E13 | E14 | E15 | E16	15	93.75 %	Increasing non-operating revenues	E7 | E8 | E9 | E10 | E11 | E12 | E13 | E15 | E16	9	56.25 %
Duopoly or limited oligopoly market	E2 | E3 | E4 | E5 | E6 | E7 | E8 | E9 | E10 E11 | E12 | E13 | E14 | E15 | E16	15	93.75 %				

Sub-themes under these categories explain what the most compatible approaches to structural reforms in SLR are.

Industry experts, in general, fully agree upon bringing structural reforms into SLR. They even explain a few reasons why SLR should be restructured. One is that in the prevailing circumstance, SLR lacks modern technologies to cope with the functions of SLR. Another reason is the over-employment of unskilled and union-wise powerful labour force within the organisation leading to inefficiencies in operations. A third reason is the traditional procedures of SLR being time-consuming.

A fourth reason is that the Government is not paying adequate attention to gain proper economic benefits from SLR.

According to them, vertical separation of managing infrastructure from providing services is essential. Most of them suggest that the authority to invest on maintenance of infrastructure should be kept with the Government.

Horizontal separation between freight and passenger rail services should be subjected to further discussion. Number of actors that are competing to operate a single function is also subjected to further discussion, but most had an idea that having two to four actors would be sufficient overall. A significant percent accepted the ideal form of a government franchisor could be an Authority or a Corporation.

When the welfare-oriented market gets converted into a profit-oriented market, there could arise some socio-economic issues as rail transportation services are unable to reach the lower income generating population. Therefore, once there lay an outline for a fully functioning blueprint for railway structural reforms, all these aspects should be taken into account. Reducing recurrent expenses and increasing non-operational costs were also mentioned in more than half of the answers.

5. DISCUSSION, CONCLUSION & IMPLICATIONS

After analyzing the collected data of this study, an ideal concept for railway structural reforms in Sri Lanka could be drafted. There, service provision would be separated from infrastructure management. Ali and Eliasson (2022) validate this choice

in their study, saying the most sophisticated and stabilized railway markets are vertically separated.

According to Abeysekara (2021), generally it will take around 20-30 years for infrastructure development investments to indicate profits. This characteristic influences most of the transportation infrastructure development projects to be undertaken by the national Governments, instead of the private-sector.

When coming to railway structural reforms, industry experts' opinion is to keep the burden of infrastructure management with the Government. Ali and Eliasson (2022) explain retaining infrastructure management within the control of the Government as an advantage to make space for the new private sector entrants into the operations rail market.

However, Preston (1996), Imahashi (2000), and Mizutani and Nakamura (2004) suggest that as an initial step, ownership, development and maintenance of rail tracks and stations, signaling and level crossings, and rolling stocks could be done by the government, while service provision could be assigned to the private sector, till the private sector gets established in the railway market, and then gradually partnering up with the private sector for maintenance and later developing of railway infrastructure. However, to avoid the conflict of capacity allocation at organizational separation, rail tracks would still be owned by the government, which would prepare train schedules as well (Ali and Eliasson, 2022).

As mentioned earlier, the private sector may have access to the operational market.

However, as Preston (1996) argued, there could incur several shortfalls of privatizing the operational aspect of railways. Fare price and safety requirements of passengers might get into conflicts with the profit orientation of the private sector. Therefore, rail operations should still be overhead by the government. On the other hand, if much pressure was put on the private sector upon reducing fare prices, they would not enter into the railway operations market. Anyhow, to cater passengers from less than standard income earning, attaching several carriages presenting economy classes could be advisable.

The control over the private sector actors could be maintained, if the market entry of the operations rail market were franchised to several actors to compete upon the same geographical area rather than providing open access. Preston's (1996) study discusses benefits of franchising rather than outright privatisation. An efficient franchise would result in optimally utilizing the existing rail infrastructure, providing a higher quality service for passengers and goods that could ensure increments in the rail market shares, and guaranteeing the maximum value for money of both the people that utilize the service, and the nation as a whole that invest on developing transportation infrastructure in railways.

Some might argue that separating responsibilities among separate parties would lead to increased transaction costs, but the revelation of links that connect parties, only made the transactions process more transparent (Preston, 1996).

As Imahashi (2000), and Mizutani and Nakamura (2004) mentioned, SLR would

not compliment a geographical subdivision approach, since the area of the whole country is smaller and that of one island. Only functional distinction would be advisable.

Freight services would be separated from passenger services. Consequently, both passenger and freight rail shares could be increased by using separate tracks. Two to four actors could compete for the provision of services under each functional distinction. However, when there would be competing operators on the same track, time and capacity conflicts among competitors may incur. Hence, the government should act as the railway's capacity allocator. This goes with Ali's and Eliasson's (2022) argument that there should be a centralized control over capacity allocations on railways.

When comparing this ideal situation to the prevailing circumstances of the nation, SLR still has a long way before converting into a sophisticated reformation. This time-consuming process will consist of two initial stages to the ultimate long-term approach, which is described as the ideal situation; (1) the short-term approaches, and (2) the medium-term approaches. The latter is discussed first for better understanding. The private sector would not prefer investing in loss-making industry, even if it was to be franchised. Therefore, indicating that profits could be made in future with real data is essential. Hence, a medium-term approach would be sensible.

As suggested by the studies, a cut off in the permanent workforce is essential, but this could incur major industrial disputes. Hence, SLR would have to maintain the

current workforce until their retirement. However, SLR could be converted into an acting agent of the government for the time being, and decrease its high bureaucracy by transforming into an Authority or a Cooperation, hiring workers on contract-basis, only when certain projects are implemented.

This acting agency character prior to railway structural reforms, is described in Mizutani's and Nakamura's (2004) study that explains how Japan implemented railway structural reforms. Japan indicated the humanist transition in the socio-cultural aspect related to privatizing a state-owned entity. The franchising agent acted as an intermediary, and smoothly transferred the dismissed employees into other governmental agencies, where the workforce would shortfall.

The short-term approach to railway structural reforms focuses on reducing expenditures and increasing revenues of SLR using the existing resources in SLR. It would also be a backup for the preparation to implement medium term strategies of railway structural reforms.

Under reducing expenses, reducing fuel expenditures were taken into account by railway engineers. Electrification of the railway network, at least within the suburban areas, was highly opinionated. To generate the amount of electricity needed for this step, the idea of setting solar panels up alongside major rail lines, and establishing minor power stations on the lands that belong to SLR was presented. This procedure does not require any affirmations from the Government since by regulations, SLR is already permitted to produce electricity, using their own resources. SLR is the only governmental entity that is awarded with this benefit. Reducing the amount of electricity bought from the Ceylon Electricity Board (CEB) for the consumption in offices and yards also, solar panels could be set up.

Under increasing revenues, escalating non-operational revenues is highly recommended. SLR is rumoured to own most of the land area of the country in its possession. Utilizing these lands for the agricultural and purified water industries could gain extra incomes, while making a useful contribution from the workers as well. Mizutani's and Nakamura's (2004) study explains how Japanese railways gradually became a profit-gaining entity, using non-rail revenues.

After all, the most important fact for structural reforms to last long, is the retention of long-term national policies that would pull the weight of the struggling nature of transportation policies to gain profits off from their infrastructure investments. As Bykadorov, Kibalov, and Kin (2017) have mentioned, a transportation policy would only benefit after five to six years of establishment, and Russian railways recognized a rush to change the national policies before the transportation policies to cover the investment expenditures, hindering the transportation infrastructure from making profits (Bykadorov, Kibalov, and Kin, 2017).

Therefore, having efficient long-term national transportation policies, would highly support to benefit from railway structural reforms in Sri Lanka. It does not

necessarily mean that not having strong transportation policies decades prior to railway structural reforms is a must as they can be gradually developed over the process of reformation. Nonetheless, after imposing a good harmonization of policies, it would be appreciable to wait upon a minimum of 20 years without doing major subjective changes to it other than the routine monitoring, reviewing, and controlling procedure.

Anyway, still none of the countries could establish an equilibrium between nationalization and privatisation. The separation or integration is always subjected to trial and error. The only way to find the equilibrium is not oscillating between the two dead ends as governments may change, but closely monitoring and testing the minor changes between the most probable points to variate the efficiency of a reformation in between.

Still, the overall advantage of railway structural reforms to the Sri Lankan economy seem to bring about a net surplus, outdoing all its disadvantages, making SLR structural reforms advisable.

On a final note, this study only discusses a general approach toward railway structural reforms in Sri Lanka as an introduction to the topic. Since this is completed as transportation logistics research, it might obviously lack in the technical, legal, political, human resources, and many other factors that might relate to structural reforms. Hence, future researchers could go into in depth analyses of each section in this study, find other undiscovered aspects, and contribute to strengthen the foundation for the best approach to implement railway

structural reforms in Sri Lanka. However, as Kesavan et al., (2015) mentioned, contributing to the future development of Sri Lanka, should be one crucial characteristic of each study.

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A Novel Approach to Solving the Fuzzy Assignment Problems

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ABSTRACT

The most successful and practical approach to solving an optimization problem is linear programming. A prime scenario of a problem is a situation where all the constraints are linear and either the function is inequalities or equivalent. Here, the problem of maximizing or minimizing an objective function was the key thing. Due to these factors, numerous types of optimization problems developed. Such as the problems with scheduling, transportation, and engineering. In the fields of logistics and business operations, for example, assignment problems are quite important. To optimally allocate a set of resources to a set of tasks is the main goal of the classical assignment problem in mathematical optimization. Here, resources should be distributed among each other so that costs are minimized. In solving such problems, the Hungarian

method can be pointed out as one of the most successful and widely used methods. However, problems are created with some uncertainty or ambiguity in solving them in the real world.

When the cost values related to the assignment problem cannot be expressed precisely, fuzzy theory is used for a range of values. It has created fuzzy assignment problems. The main purpose of these problems is to develop ways to minimize the total cost of resource distribution. There are many techniques for fuzzy set theory and fuzzy optimization in linear programming. Also, to solve the problem, researchers have proposed different methods to obtain an optimal or near-optimal solution. Thus, the purpose of this research paper is to address the above-mentioned point. For that, a new alternative method was proposed in this research paper, and its efficiency and correctness have been shown by solving numerical problems using MATLAB

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software.

Keywords **- fuzzy Assignment Problem, Hungarian Method, Optimal Solution**

1. INTRODUCTION

In logistics and business operations, assignment problems are extremely important, and efficient solutions for resource allocation, scheduling, and optimization are essential as well (Ghadle Kirtiwant P, 2015). There are numerous ways to explain the significance of assignment problems. They are Logistics and Supply Chain Management, Project Management, service assignment, and task allocation in a team. The main objective of the classical assignment problem in mathematical optimization is to assign a set of resources to a set of tasks in an optimal manner.

Solve the types of problems that many mathematical methods introduce in literature. Here, the popular and accurate Hungarian method can be considered one of those types of methods (Dil Afroz, 2023). However, real-life decision-makers face uncertain situations when solving optimization problems. In those special cases, some transitive values cannot be expressed clearly. Therefore, solving problems by using fuzzy values was introduced as a successful method. As a result, fuzzy assignment problems are constructed (Kumar & Gupta, 2011). Each job in the fuzzy assignment issue is linked to a group of potential resources, and each resource is linked to a group of potential tasks. Finding an assignment that generally optimizes an overall measure of compatibility or satisfaction while taking into account the degree of membership

connected to each assignment is the goal of the fuzzy assignment problems (Pal et al., 2015).

Many methods have been introduced to solve fuzzy assignment problems. It can be pointed out that they are constructed by researchers in different ways in their studies. H.W. Kuhn presented the Hungarian method to solve assignment problems related to linear programming (Kuhn, n.d.). Yuan Feng (Feng & Yang, 2006) proposed a new method considering two objectives in 2002. R. Neelambari (Neelambari et al., 2023) has recently shown in his study a new method to solve assignment problems with fuzzy numbers. In this research paper, triangular and trapezoidal problems are brought out. These papers deal with triangular fuzzy problems (Ramesh Kumar & Subramanian, 2018) and trapezoidal fuzzy problems (Arora, 2022). The main objective of this study is to propose an alternative method to obtain solutions to fuzzy assignment problems. Based on Yager's Robust's ranking method, the objective is to study the problems with triangular and trapezoidal assignment problems and carry out the optimization process through an alternative method. Also, solutions are to be obtained through MATLAB-Software, to simplify this.

2. METHODOLOGY

Assignment problems are a liner programming model. Also, fuzzy assignment models can be summarized in the following form:

Table 1. cost matrix of fuzzy assignment problem

	Job (Resource) 1	Job (Resource) 2	…	Job (Resource) m
Worker (task) 1	$\tilde{C}_{11}$ X_{11}	$\tilde{C}_{12}$ X_{12}	…	$\tilde{C}_{1n}$ X_{1n}
Worker (task) 2	$\tilde{C}_{21}$ X_{21}	$\tilde{C}_{22}$ X_{22}	…	$\tilde{C}_{2n}$ X_{2n}
Worker (task) n	$\tilde{C}_{m1}$ X_{m1}	$\tilde{C}_{m2}$ X_{m2}	…	$\tilde{C}_{mn}$ X_{mn}

2.1 fuzzy assignment problem

The fuzzy assignment problem can be represented by the following cost matrix:

In our general idea of the solution to the problem, we generalized the linear programming model (Balaji & Sundar, 2020).

c_{ij} : $[\tilde{c}_{ij}]$ is called the fuzzy cost matrix. Where i^{th} job (set of resources) to j^{th} workers (set of tasks) (E. M. U. S. B.Ekanayake, 2021)

Let's take the assignment problem with n jobs and n workers. Cost defines the assigning of workers i to job j in the following way:

$$x_{ij} = \begin{cases} 1; & if\ worker\ i\ assigned\ for\ job\ j \\ 0; & if\ worker\ i\ not\ assigned\ job\ j \end{cases}$$

Objective function: minimize the total cost

Minimize $\sum_{i=1}^{m} \sum_{j=1}^{n} X_{ij} \tilde{C}_{ij}$

Subject constraints.

One worker can be assigned one job.

$\sum_{j=1}^{n} X_{ij} = 1, i = 1,2,…,m$

One job can be assigned to one worker.

$\sum_{i=1}^{m} X_{ij} = b_j,\ j = 1,2,…,n$ and

$X_{ij} \geq 0$ for all $i = 1,2,…,m$, $j = 1,2,…,n$

In this research, we use fuzzy concept-related assignment problems.

2.2 Fuzzy set

To describe problems with mathematics with ambiguous and uncertain values, the fuzzy set idea was invented. The formula that determines how much of a given element is a member of a fuzzy set Additionally, membership functions have a value in the [0, 1] range. It deals with values that have a strict boundary and are either 1 or 0, and has crisp, precise values (Dijkman et al., 1983).

The triangular fuzzy number set can be written as follows in mathematical notation (Hunwisai & Kumam, 2017):

ã= (a_1, a_2, a_3) is triangular fuzzy number with membership function is mention follows;

$$\mu_{\tilde{A}}(x) = \begin{cases} \frac{(x-a_1)}{(a_2-a_1)} & a_1 \leq x \leq a_2 \\ \frac{(a_3-x)}{(a_3-a_2)} & a_2 \leq x \leq a_3 \\ 0 & else \end{cases}$$

The trapezoidal fuzzy number set can be written as follows in mathematical notation (Hunwisai & Kumam, 2017):

ã= (a_1, a_2, a_3, a_4) is triangular fuzzy number with membership function is mention follows;

$$\mu_{\tilde{A}}(x) \begin{cases} 0 & x \leq a_1 \\ \dfrac{(x-a_1)}{(a_2-a_1)} & a_1 \leq x \leq a_2 \\ 1 & a_2 \leq x \leq a_3 \\ \dfrac{(a_4-x)}{(a_4-a_3)} & a_3 \leq x \leq a_4 \\ 0 & else \end{cases}$$

In this research, using Robust's ranking technology, ranking fuzzy numbers is a necessary step in many mathematical models. In the study, we used fuzzy assignment problems related to triangular and trapezoidal fuzzy numbers. Following is a discussion of Yager's robust ranking mathematical formula for triangular and trapezoidal fuzzy sets.

Triangular fuzzy set

$R(\tilde{a}) = \int_0^1 0.5(a_\alpha^l, a_\alpha^u)d\alpha$

Where (a_α^l, a_α^u) is α cut level of the fuzzy number $\tilde{a}$

$a_\alpha^l = (a_2 - a_1)\alpha + a_1$

$\quad a_\alpha^u = (a_3 - a_2)\alpha + a_3$

Trapezoidal fuzzy set

$R(\tilde{a}) = \int_0^1 0.5(a_\alpha^l, a_\alpha^u)d\alpha$

Where (a_α^l, a_α^u) is α cut level of the fuzzy number $\tilde{a}$

$a_\alpha^l = (a_2 - a_1)\alpha + a_1$

$\quad a_\alpha^u = (a_4 - a_3)\alpha + a_4$

2.3 proposed method

Step 1: First, obtain the crisp values. related fuzzy cost set using Yager's robust ranking method.

Step 2: Define the cost matrix according to the assignment problem. Workers (W1,

W2, and Wn) represent each row, and jobs (J1, J2, and Jn)

represent each column in the problem.

Step 3: After that, divide those cost values by the total cost values in the column corresponding to each other to get the ratio of the cost values relative to each other. Named the column ratio matrix.

Step 4: Then, in the same way, divide those cost values by the total cost values in the row corresponding to each

other to get the ratio of the cost values relative to each other. Named the row ratio matrix.

Step 5: After that, multiply the two corresponding ratio values of the row ratio matrix and the column ratio matrix to get a new matrix.

Step 6: Select the value in the increasing order of the ratio values, mark it, and cross that value.

in the corresponding column and row, and do the process for each remaining row and column until all the rows and columns are crossed.

Step 7: Mention the selected values in the original cost matrix in relation to the places marked as such.

Step 8: At the end, give the sum of those values as the total assignment value.

3. RESULT AND DISCUSSION

By using the algorithm mentioned above, the numerical example can be shown as follows: Triangular and trapezoidal fuzzy assignment problems are illustrated in it. Also, the calculations related to the first step of the algorithm are shown, and the

calculations related to all the other steps are shown in MATLAB in figures 1 and 2.

Ex.1

fuzzy assignment problem (triangular fuzzy set)

$$[\tilde{c}_{ij}] = \begin{pmatrix} (10,20,30) & (10,20,40) & (10,30,40) & (10,20,30) \\ (10,20,40) & (10,30,40) & (10,20,30) & (20,30,40) \\ (10,20,40) & (20,30,40) & (20,30,40) & (10,20,30) \\ (20,30,50) & (10,20,30) & (20,40,60) & (20,30,50) \end{pmatrix}$$

According to the step 01, obtain the crisp values of each fuzzy cost using following Yager's robust ranking technique

$\mathbf{R(\tilde{C}_{11})} = R\,(10,20,30)$

$Ṛ(ã) = \int_0^1 0.5(a_\alpha^l, a_\alpha^u)\,d\alpha$

Where:

$a_\alpha^l = (20-10)\,\alpha+10 = 10\,\alpha + 10$

$a_\alpha^u = -(30-20)\,\alpha+30 = -10\,\alpha+30$

$Ṛ(ã) = \int_0^1 0.5(a_\alpha^l, a_\alpha^u)\,d\alpha$

$\int_0^1 0.5(40)\,d\alpha = 20$

Similar way we can obtain the following crisp values

$Ṛ(\tilde{C}_{11}) = 20$, $Ṛ(\tilde{C}_{12}) = 22.5$, $Ṛ(\tilde{C}_{13}) = 27.5$, $Ṛ(\tilde{C}_{14}) = 20$

$Ṛ(\tilde{C}_{21}) = 22.5$, $Ṛ(\tilde{C}_{22}) = 27.5$, $Ṛ(\tilde{C}_{23}) = 20$, $Ṛ(\tilde{C}_{24}) = 30$

$Ṛ(\tilde{C}_{31}) = 22.5$, $Ṛ(\tilde{C}_{32}) = 30$, $Ṛ(\tilde{C}_{33}) = 30$, $Ṛ(\tilde{C}_{34}) = 20$

$Ṛ(\tilde{C}_{41}) = 32.5$, $Ṛ(\tilde{C}_{42}) = 20$, $Ṛ(\tilde{C}_{43}) = 40$, $Ṛ(\tilde{C}_{44}) = 32.5$

Step 2,3,4,5,6,7 &8 show the following worksheet interface in "MATLAB software"
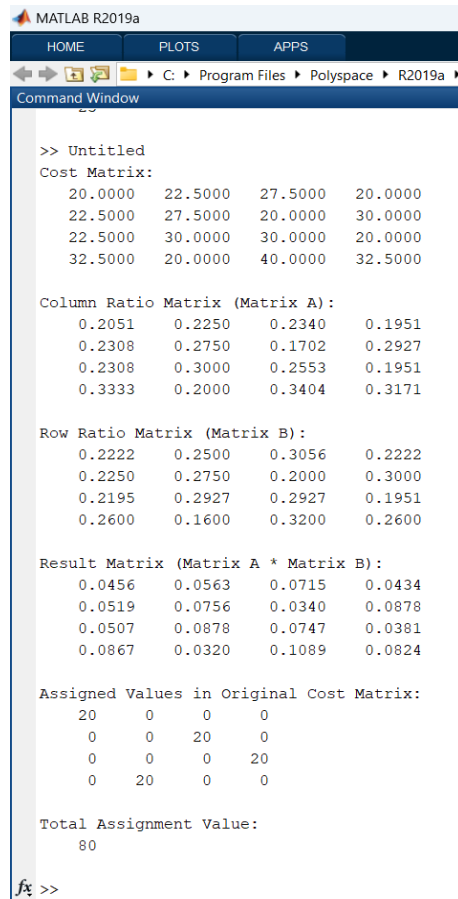
Figure 1. MATLAB worksheet for example 1

total assignment cost = 80

Ex.2

Table 01: fuzzy assignment problem (trapezoidal fuzzy set)

$$\tilde{c}_{ij}] = \begin{pmatrix} (10,20,30,40) & (10,20,40,50) & (10,30,40,50) & (10,20,30,40) \\ (10,20,40,50) & (10,30,40,50) & (10,20,30,40) & (20,30,40,50) \\ (10,20,40,50) & (20,30,40,50) & (20,30,40,50) & (10,20,30,40) \\ (20,30,50,60) & (10,20,30,40) & (20,40,60,80) & (20,30,50,60) \end{pmatrix}$$

According to the step 01, obtain the crisp values of each fuzzy cost using following Yager's robust ranking technique

$R(\tilde{C}_{11}) = R\ (10,20,30,40)$

$Ṛ(ã)=\int_0^1 0.5(a_\alpha^l , a_\alpha^u)d\alpha$

Where:

$a_\alpha^l = (20\text{-}10)\ \alpha+10 =10\ \alpha + 10$

$a_\alpha^u = \text{-}(40\text{-}30)\ \alpha+30 =\text{-}10\ \alpha+40$

$Ṛ(ã)=\int_0^1 0.5(a_\alpha^l , a_\alpha^u)d\alpha$

$\int_0^1 0.5(50)\ d\alpha = 25$

Similar way we can obtain the following crisp values

$Ṛ(\tilde{C}_{11})$ =25, $Ṛ(\tilde{C}_{12})$ =30, $Ṛ(\tilde{C}_{13})$ =32.5, $Ṛ(\tilde{C}_{14})$ =25

$Ṛ(\tilde{C}_{21})$ =30, $Ṛ(\tilde{C}_{22})$ =32.5, $Ṛ(\tilde{C}_{23})$ =25,

$Ṛ(\tilde{C}_{24})$ =25

$Ṛ(\tilde{C}_{31})$ =30, $Ṛ(\tilde{C}_{32})$ =35, $Ṛ(\tilde{C}_{33})$ =35, $Ṛ(\tilde{C}_{34})$ =25

$Ṛ(\tilde{C}_{41})$ =40, $Ṛ(\tilde{C}_{42})$ =25, $Ṛ(\tilde{C}_{43})$ =50, $Ṛ(\tilde{C}_{44})$ =40

Step 2,3,4,5,6,7 &8 show the following worksheet interface in "MATLAB software

The stepwise analysis of the problem solved by the proposed algorithm is given above. In addition, the results obtained for several numerical problems are shown in tables and figures. It shows the results of the proposed algorithm as well as the solution values obtained by the Hungarian method using Yager's method.

Figure 2. MATLAB worksheet for example 2 total assignment cost = 100
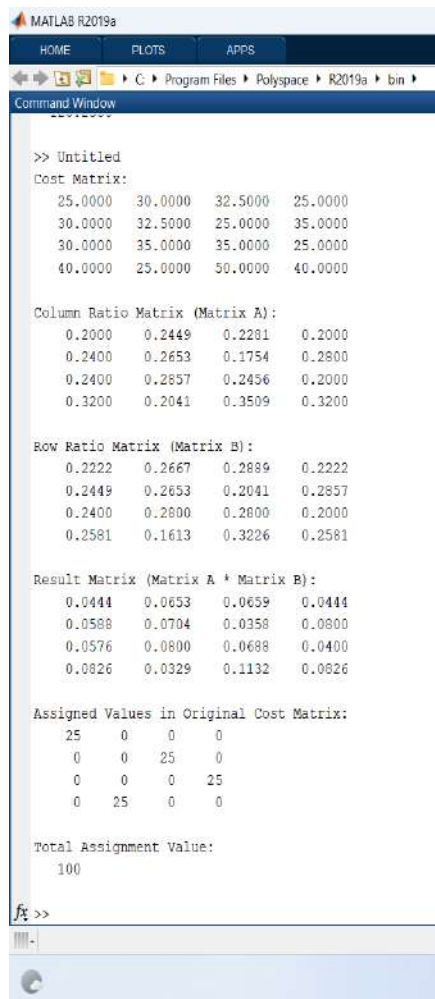
Table 2. comparison of the optimal and proposed method solutions

Ex.1 (Kadhirvel & Balamurugan, 2012)	Proposed method	80
	Optimal solution (using Hungarian method)	80
Ex.2 (Akila & Kavinelavhu, 2022)	Proposed method	100
	Optimal solution (using Hungarian method)	100
Ex.3 (Amit	Proposed	16

360

Kumar, 2009)	method		i, 2020)	Optimal solution (using Hungarian method)	25.25
	Optimal solution (using Hungarian method)	16			

Ex.4 (Jahirhussain & Jayaraman, 2013)	Proposed method	86.25
	Optimal solution (using Hungarian method)	86.25

Ex.5 (Kalaiarasi et al., 2014)	Proposed method	23
	Optimal solution (using Hungarian method)	23

Ex.6 (Muamer, 2020)	Proposed method	49.5
	Optimal solution (using Hungarian method)	49.5

Ex.7 (Muruganandam & Hema, 2019)	Proposed method	12
	Optimal solution (using Hungarian method)	12

Ex.8 (Thangapand	Proposed method	25.25

Figure 3. comparison of the optimal and proposed method solutions
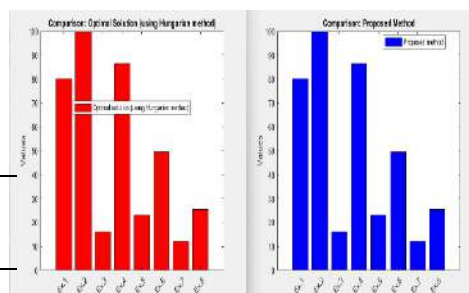
In order to accurately display the comparison based on the comparative data shown in Table No. 2 above, we applied a bar graph. Figure 3 refers to it. For each case, there are two sets of information. "Proposed Method" and "Optimal Solution (Using the Hungarian Method)" are the two alternates. Here, it is logical to display the numerical representation using a bar chart. Each example is organized into two columns: "Proposed Method" and "Optimal Solution (Using Hungarian Method)". Each column's height depends on the numerical value used in that approach.

4. CONCLUSIONS

The fuzzy assignment problem is a special type of assignment problem, which is another type of optimization problem. Here, the problems in certain uncertain situations are discussed. The primary objective of these problems is to allocate a set of resources to a set of tasks in an optimal

manner. In relation to the problem, assignments should be made at the lowest possible cost. The fuzzy nature of assignments should be taken into account when solving fuzzy assignment problems. It should decide how the overall assignment will be done. Here, it can be pointed out that various mathematical models and algorithms, including various optimization techniques, have been used to obtain an optimal or near-optimal solution by solving fuzzy assignment problems. The primary purpose of this research paper was to introduce such an algorithm.

Most of the steps related to the algorithm we used here were solved in MATLAB," and by doing so, we tried to maximize the efficiency of the algorithm. Here, the solution of the proposed method and the optimal solution through eight examples are shown in Figure 2 and Table 1 in comparison. It was confirmed that the values of the proposed algorithm and the optimal solution are the same. However, it cannot be determined from these eight problems alone that the proposed method always gives the optimal solution. For that, it is necessary to analyses a wide range of special problems related to different situations. But looking at the overall model, it can be concluded that this model gives good solutions for fuzzy assignment problems by getting the optimal solution for these problems. The primary objective of this research paper was to propose a method that can obtain an optimal or near-optimal solution for fuzzy assignment problems. Accordingly, as a final conclusion, it was possible to introduce an efficient alternative algorithm that provides efficient solutions for fuzzy assignment problems.

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APPENDIX

Table 03. example of the fuzzy assignment problem

Example	$\tilde{C}_{ij}$
Ex.1	[(10,20,30),(10,20,40),(10,30,40),(10,20,30);(10,20,40),(10,30,40),(10,20,30),(20,30,40); (10,20,40),(20,30,40),(20,30,40),(10,20,30);(20,30,50),(10,20,30),(20,40,60),(20,30,50)]
Ex.2	[(10,20,30,40),(10,20,40,50),(10,30,40,50),(10,20,30,40);(10,20,40,50),(10,30,40,50),(10 ,20,30,40),(20,30,40,50);(10,20,40,50),(20,30,40,50),(20,30,40,50),(10,20,30,40);(20,30, 50,60),(10,20,30,40),(20,40,60,80),(20,30,50,60)]
Ex.3	[(1,5,9),(8,9,10),(2,3,4);(7,8,9),(6,7,8),(6,8,10);(5,6,7),(6,10,14),(10,12,14)]
Ex.4	[(1,4,9),(16,25,36),(9,36,49);(16,25,64),(36,64,81),(4,49,64);(4,25,81),(25,36,64),(49,64, 81)]
Ex.5	[(1,5,9),(3,7,11),(7,11,15),(2,6,10);(4,8,12),(1,5,9),(4,9,13),(2,6,10);(0,4,8),(3,7,11),(6,10 ,14),(3,7,11);(6,10,14),(0,4,8),(4,8,12),(-1,3,7)]
Ex.6	[(11,12,13),(5,6,13),(7,9,11),(3,10,11),(3,8,13),(12,14,16),(7,9,11);(7,9,11),(9,10,11),(5,8, 11),(8,10,12),(5,6,7),(9,11,13),(8,10,11);(3,9,15),(7,8,13),(6,7,9),(4,5,12),(4,6,12),(8,15,1 8),(3,4,17) ;(5,6,13),(13,17,21),(5,7,13),(8,10,16),(8,15,18),(7,11,15),(3,9,13) ;(6,8,10),(6,9,12),(9,11,13),(11,13,15),(8,9,10),(6,8,12),(4,8,12);(10,14,18),(9,13,17),(4,6 ,17),(2,4,18),(3,8,17),(6,12,14),(7,8,13);4,7,10),(7,8,13),(5,6,7),(1,8,13),(8,9,14),(5,12,19),(7,8,17)]
Ex.7	[(1,2,3),(3,4,5),(5,6,7),((7,8,9);(2,3,4),(4,5,6),(7,8,9),(1,2,3);(4,5,6),(6,7,8),(2,3,4),(1,2,3) ;(3,4,5),(4,5,6),(5,6,7),(6,7,8)]

Ex.8	[(3,5,6,7),(5,8,11,12),(9,10,11,15),(5,8,10,11);(7,8,10,11),(3,5,6,7),(6,8,10,12),(5,8,9,10); (2,4,5,6),(5,7,10,11),(8,11,13,15),(4,6,7,10); (6,8,10,12),(2,5,6,7),(5,7,10,11),(2,4,5,7)]

The Impact of The International Conventions on Arrest of Ships on The Maritime Claimant

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ABSTRACT

This dissertation is based on an analytical study of "The impact of the International Convention on Arrest of ships" on the Maritime Claimant. The research will consist on international perspective of Ship Arrest by considering rights and interest of claimants, ship-owners and ship operators. Addition to that, research will examine on the rights consists on mortgagees and holders of maritime liens as well.

The key importance of this research is to compare two Arrest Conventions, namely International Convention on the Arrest of Sea-Going Ships of 1952 (referred to as Brussels Convention & 1952 Convention) and International Convention on the Arrest of Ships 1999 (referred to as 1999 Geneva Convention), taking into account of the theoretical background by discussing on implementation and interpretation of rules and procedures on arrest, re-arrests, release of arrested ship and on counter security.

However, researcher mainly emphasize the effect of implementing 1999 Convention, which has explained many provisions specified in the 1952 Convention, by elaborating the list of maritime claims. Therefore, 1999 Convention seems to be more favorable for developing countries, while the Brussels Convention discuss more traditional approach and it is of the view that convention is still make provisions for conversation and liberty for state regulation to fill the gaps. Most importantly, none of the conventions address the issue arising out of cargo and caveat in dealing with arrest and release.

When it ratified 1952 Convention, it was implemented in order to limit the number of ship arrests, by permitting arrest only with regard to maritime claims. Thus, the main purpose of ratifying 1999 Convention is to introduce the list of comprehensive maritime claims into national legislations, such as the Merchant Shipping Code.

1. INTRODUCTION

1.1 Background

Presently, the notion of shipping can be considered as a dynamic as well as coherent system which was improved relatively due to considerable time spent in process for the ships. The decrease of the time spent in the operation of ship compatible with increasing coherency with the technical and economic benefits. Nevertheless, the legal concept of ship arrest is one of the milestone components that need to be discussed under shipping, where the ship can be arrested and prevented from moving from its original position.

However, in cases of ordinary *action in personam*, any property in question will be considered to be seized to recover the claim only upon the consideration of the judgement is pronounced and after the merits of case be considered. But, in *action in rem*, the consistency differs on the basis that the vessels are emphasized as highly moveable from port to port, irrespective of its jurisdiction and any consequence occur at the time of the voyage may devalue the ship and the fact that ownership of the ship may change without prior announcement. Further to that, flag of convenience is another component where the ship can change the identity of the ports without any difficulty. Therefore, it emphasizes that unlike *action in personam*, in an *action in rem* it is impossible to enforce the claim against the ship without having the ship taken into custody.

Hence, enforcing such claim has always been questionable and significant consequence for maritime claimants, ship-owners and operators. In fact, over the decades many jurisdictions have developed various methods of enforcement by considering the value of maritime industry. Nevertheless, in an action *in rem*, apart from the ship which is subjected to be arrested, any other property which meet the requirements as maritime property, such as cargo can also be taken into custody of the court, until the merits of the case are being properly heard.

Out of which, the arrest of ship is the most common and workable legal framework available for enforcing the maritime claim. Therefore, arrest of ship can be considered as a legal method and can serve as a security for an action in rem. Thus, it is also considered as a pre-trial remedy significantly introduced for maritime claimants and has formed as an exceptional remedy seek in law relating to maritime. In fact, pre-judgement security is the defense available for maritime creditors, who are generally in risk of being unable to recover his due debts from the deceitful debtor. However, whether the litigant is successful in the action in rem is often considered on the basis of the main asset (mostly the ship) on which maritime creditors depends on, where the court has the sole discretion to sell the asset of the debtor to pay the maritime claimant. Therefore, it is often seen that collecting due payments from

the debtor has being recognized as a creditor's nightmare.[1]

In most of the circumstance, after considering the merits of the case, it is depicted that the res (the said vessel) against which the judgement is pronounced could not be placed or have sailed to other jurisdictions. Therefore, arrest of ship can be considered as an interim relief, which is a preventive method to obtain some sort of security at the time of legal proceedings or prior to such proceedings. However, in such instances respective ship is recognized as a security for the action in rem under the discretion of the court and such security cannot be vanquished due to a bankruptcy of the owner of the arrested vessel.[2] Thus, there are various systems and rules governing the manner in which a ship needs to be arrested.

In fact, the importance of introducing a unified body of law which depicted that international ship arrest concept is intimidating, which has been the main objective of maritime law during the past decades.[3] As a reason of which, the legal framework of ship arrest is mostly based on the implementation of the international convention law. The first convention is International Convention on the Unification of Certain Rules Relating to Arrest of Sea-Going Ships of 1952, which was introduced upon the patronage of the Government of Belgium and considered by the Comity Maritime International (CMI),[4] at the same time this convention is also known as 1952 Brussel Convention. In addition to that, the United Nations Conference on Trade and Development (UNCTAD) with the guidance of CMI and International Maritime Organization (IMO) instigated the second convention, which is named as the International Convention on the Arrest of Ships 1999.[5] However, these international bodies have made a tremendous effort by instigating a procedural method for arrest of ships.

Both the Conventions aim to strike a balance between maritime claimants and

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[1] Hare, J., Shipping Law and Admiralty Jurisdiction in South Africa, juta & Co., Cape Town 1999 at 7

[2] Messon, N., Admiralty Jurisdiction and Practice, LLP, London 1993 at 118

[3] Lynn, R." A Comment on the New International Convention on Arrest of Ships, 1999" 55 U. Miami Law Review 453 (2000-2001) at 456: See also Tetly, note 3 at 1899. 12

[4] Article 1 of the CMI Constitution states: "The Comité Maritime International is a non-governmental international law organization, the object of which is to contribute by all appropriate means and activities to the unification of maritime law in all its aspects"; see also Report of the United Nations/International Maritime Organization Diplomatic Conference held at the Palais des Nations, Geneva, from 1 to 12 March 1999. A/CONF.188/5.

[5] International Convention on the Arrest of Ships, 1999.

ship owners, in line with other methods adopted by various legal systems. Therefore, the question remains as: To what extent the provisions of both 1952 and 1999 Arrest Convention has created an impediment to maritime claimants, in obtaining security for action in rem from the shipowners and to settle their claim against shipowners. It includes examination of International law perspective of ship arrest, emphasizing on the fact that whether both the conventions impacts destructively on the claimants when enforcing their action against shipowners and does the claimants has in enforcing his claim and whether the provisions of law makes restrictions for the claimant to proceed with the current action in rem.

1.2 The term "Arrest" came into an action

When considering right to arrest ship, various jurisdictions developed in different countries are governed by different system of rules and regulations, an arrest will generally have the effect of the ship being impeded from freely leaving the port or berth until the merits of the case have been heard, a judicial sale has taken place or the debtor has put up sufficient security for the claim.[6]

According to the Anglo-Norman, term "arrest" is comparable to the French word arrêt, which depicted as "stop". Whereas,

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[6] See Visnes, Siril Steinsholt "Arrest of ships in Norway and South Africa – a comparison", Research dissertation for the Master of Shipping Law at the University of Cape Town, 2005

a laconic definition of 'arrest' was depicted by Baughen as "Judicial detention of a vessel pending provision of security for a maritime claim."[7] In the case of *The Anna H*,[8] Hobhouse L.J, depicted that arrest *in rem* under English law states that any property in question for arrest of a ship or other maritime property in an action in rem shall involves the detention of ship through the directions of Admiralty Court by the Admiralty Marshal in judicial proceedings to protect the maritime claim.[9]

1.3 Consequences of Ship Arrest

There are various aftermaths that could have occurred due to the fact that ship is arrested as per an action *in rem*. Therefore, as a result of the arrest, the vessel is recognized under the control of the Admiralty Court, also be restrained from moving and restricted from sailing.

In addition to that, due to such arrest of vessel or any other property, which is recognized as security under the custody of the Admiralty Court and this guarantee cannot be challenged consequent of owner of the arrested property being insolvent.[10] This was depicted in the case of *The Cella*,[11] where Fry L.J. is of the

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[7] Baughen, Simon, Shipping Law – 2nd ed. London: Cavendish Publishing Limited. 2001, at p. lxvii

[8] The Anna H (1995) 1 Lloyd's Rep.11

[9] Ibid

[10] Messon, note 5 at 118.

[11] The Cella (1888) 13 P.D. 82

view that "arrest enables the court to keep the property as security to answer the judgement, and unaffected by chance events which may happen between the arrest and the judgement.[12] At the same time, Lopes L.J. depicted that "…from the moment of the arrest, the ship is held by the court to abide the result in the action, and the rights of the parties must be determined by the state of things at the time of the institution of the action *in rem,* and cannot be altered by anything which takes place subsequently".[13] According to this case, it clearly shows that arrested property cannot be transformed by any other property or due to a liquidation of the shipowner afterwards".[14]

Thus, another significance of ship arrest is where the arrest of ship generates on the jurisdiction on the merits as specified in the case of *the Anna H*.[15] In general practice, the maritime claimant need to be satisfied at the jurisdiction where he obtained the security. Therefore, the security may be considered ineffective on the basis that the security obtained would be transferable between the court which has the jurisdiction on the merits and the court of the other jurisdiction.[16]

In fact, when the ship is taken into the control of the court, it is of the view that ship is considered as the financial security for the maritime claimant under the action *in rem*. Unless and until the shipowner shows other means of finance except for the ship (in order to have the ship released from arrest) which is in question, claimant comprise of the ability to sold the ship and claim the due amount as a result of the proceeds of sale. Finally, the last significance of arrest of ship is that it breaks the time bar for the maritime liens. [17]

1.4 'Arrest' under the International Convention of 1952

This convention is considered as the first International Convention implemented in order to provide equilibrium, by establishing undeviating rules and regulations on arrest of ships, while prevailed among common law and civil law countries.

The Article 1(2) of the International Convention on the Arrest of Sea-Going Ships of 1952[18] emphasize the term 'arrest' means the detention of a ship by judicial process to secure a maritime claim, but does not include the seizure of

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[12] The Cella (1888) 13 P.D. 88

[13] Ibid page 88

[14] Ibid page 89

[15] See The Anna H (1995) 1 Lloyd's Rep 11 (C.A.)

[16] Southampton on Shipping Law, Institute of Maritime Law, Informa, London, 2008 at p.357.

[17] See Convention on Liens and Mortgages, 1993. Art. 9 (1).

[18] International Convention on the Arrest of Sea-Going Ships of 1952

a ship in execution or satisfaction of a judgment.[19]

The main purpose of arrest of ship is to preserve the vessel or to provide security in lieu of the vessel until the judgement on the merits is attained. Whereas, the seizure can also be considered as a way of enforcing the judgement and to satisfy the maritime claimant to proceed with sale of such vessel.[20] Nevertheless, in contrary the arrest of ship ordered by the criminal court due to a cause of crime (such as smuggling) is omitted from the scope of 1952 convention.[21]

Further to that Article 1(1) of the Convention,[22] lists the maritime actions for which the right of arrest may be granted is computed. Which emphasize that term 'maritime claim' means a claim arising within the sub-paragraph (a) – (q) and the list presented as closed list of maritime claims.

The Article 2 states that "a ship flying the flag of one of the contracting states may be arrested in the jurisdiction of any contracting state in respect of any

maritime claim, but in respect of no other claim."[23] As a result of the implementation of the convention, the arrest of ship for non-maritime claim was not recognized, unlike in previously, it was possible to arrest ship for any claim, whether it is maritime or not. Nevertheless, this provision aims to limit for the ships which are flying the flag of state parties.[24] These provisions were extended according to Article 8, paragraph 2 which creates limitations for maritime claims arising to those ships flying the flag of non-contracting state, which does not extend to the ships which are benefited through the Article 2.

Under Civil jurisdiction, arrest is recognized as 'conserving measure' which can be accomplished against the property of debtor as security for any claim, where the ships flying the flag of a non-contracting state may be arrested for any claim against the ship owner subjected to the conditions set out in *lex fori.*[25]

1.5 'Arrest' under International Convention of 1999

According to the preamble, convention was implemented as a 'necessity for a

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[19] Article 1(2) of the International Convention on the Arrest of Sea-Going Ships of 1952

[20] Berlingieri, note 9 at 88

[21] Ibid., at 89

[22] International Convention on the Arrest of Sea-Going Ships of 1952

[23] Article 2 of the International Convention on the Arrest of Sea-Going Ships of 1952

[24] Berlingieri, note 9 at 105

[25] Berlingieri, " The Scope of Application of the 1952 Brussels Convention on the Arrest of Ships", JMLC, Vol. 22, No. 3 (1991) 405 at pp. 407-408.

legal instrument establishing international uniformity in the field of arrest of ships which takes account of recent developments in related fields'.[26] However, the Article 2 states that "Arrest" means any detention or restriction on removal of a ship by order of a Court to secure a maritime claim, but does not include the seizure of a ship in execution or satisfaction of a judgment or other enforceable instrument.[27]

In addition to that, the Article 2 (4) of the 1999 convention also provides that the process in which arrest of ship and its subsequent release shall be administered by the respective national law of the state, in which arrest took place.[28]

1.6 Aims and Objective of the Research Paper

The important purpose of this piece of work is to emphasize on the impact of International Convention on arrest and whether was created for the convenience and benefit for the maritime claimant.

The researcher mainly concentrates at accomplishing the following objectives:

I. To analyze the provisions on International Convention on Ship Arrest of 1999 with International Convention Relating to the Arrest of Sea-going Ships of 1952.

II. To assess the conflicting interests and benefits between shipowners and maritime claimants.

III. To determine the absence of law relating to ship arrest, in collaboration with the other international legal framework.

IV. To ascertain the issues faced by the maritime claimants specifically and shipowners, as a result of lack of provisions in the International Convention.

V. To evaluate as to what extent the law pertaining to International Convention need to be amended and whether such law provides sufficient benefits and interests for the maritime claimants.

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[26] Preamble, International Convention on the Arrest of Ships 1999

[27] Article 2 of the International Convention on the Arrest of Ships 1999

[28] Article 2 (4) of the International Convention on the Arrest of Ships 1999

2. METHODOLOGY

2.1 Introduction

This chapter provides a thorough exploration of the research methods and methodology employed in this dissertation to address its goals and objectives. It emphasizes the effectiveness of these methods in depicting consequential outcomes. The focus is on sourcing and analyzing data, particularly through a common law approach. The chapter delves into a detailed discussion on the rationale behind choosing specific methodological types over others and highlights the benefits of these choices for the dissertation. The researcher utilizes primary and secondary data methods, along with case law and comparative analysis, to achieve the research goals and objectives outlined in this study.

2.2 Methodology Approach

The researcher mostly directed her research on exploring the provisions of 1952 and 1999 Convention on ship arrest to provide protection for maritime claimants and also to create fair position to those who are affected by such provisions.

Thus, this piece of work will consist of both applied and doctrinal research, as a result of which this study comprises of theoretical as well as practical circumstances. While, this study will focus via conducting an epistemological consideration through legislatives, conventions, case law, journal articles and other several publications. In fact, the researcher aims to provide interpretivism, through the nature of qualitative research method, which are derived primarily from secondary sources. Whereas, the author aims to discuss on the incidental issues which maritime claimants face during their day today business.

2.3 Primary and Secondary Source of data

In a research, data collection emphasizes a very crucial role in order to standardize the dissertation properly. Whereas the researcher carried out a desk research methodology in order to collect the practical data for the purpose of constructing an analysis. Therefore, the author distinguished primary and secondary sources of data in order to depict the forms under which the researcher has gathered different information.

The most important piece of enactments are conventions, considered as primary source of data which derives the rules and procedures applicable under international laws such as International Convention of 1952 and International Convention of 1999.

2.4 Case Law Method

This method is regarded as another important source of law considering international legal aspects, emphasizing on the opinion of judicial precedent. As the research topic is based on obstruction and the applicability in the process of international shipping law, the statutory provision depicts the procedural

atmosphere, while the judgements pronounced in different courts clearly emphasize on the practical circumstances of applying such law. Which aided to understand the enforcement procedure of such conventions and manner in which the judicial precedent works in real circumstances.

2.5 Comparative Analysis method

This method was used by the researcher in order to provide similarities, differences as well as loopholes described in one another convention. Such comparison was mainly considered among the rules and regulations provided under the 1952 Convention and whether and to what extent 1999 Convention has created provisions to overcome the loopholes addressed in the 1952 Convention.

Further to that, comparative analysis also discusses on pros and cons of the applicability of International Convention and thereby identify the strengthens and weaknesses derived under the legal system towards the protection of rights and benefits of the maritime claimants. This will distinguish and identify on the amendments that need to be implemented by considering the points in which such legal system could be improve.

2.6 Assessment of the research

The dynamism of the research is relied upon the primary and secondary sources of data, comparative analysis data and case law exploited by the researcher to consider the precision of the research area. In fact, such accurateness is also considered upon reliability and validity of the research. Therefore, it is important to consider the correct methods of data gathered for the dissertation. This will be controlled by using recognized articles in order to avoid discrepancies, which could have had occurred as result of considering unreliable source of information.

In order to have a sound dissertation, researcher must be free of bias and distortion. Whereas, reliability and validity are two segments which are vital for defining and measuring bias and misrepresentation of the research findings.

2.7 Reliability

The term reliability emphasizes to the extent on which the research is consistent, on the basis that the findings are gathered through unswerving sources of law. Thus, in this research, the author has used the provisions denotes in International Conventions for ship arrest as an authoritative instance, while considering the protection of rights of the maritime claimants as a measurement to create international standard, emphasizing on the internal consistency of the findings.

2.8 Validity

The term validity refers to the accuracy of the dissertation, considering the fact that whether or not it measures what it is supposed to measure. Whereas, even though the findings constitute to be reliable, it might not always provide valid sources, in fact the validity inferred from

the findings are important, it is even more crucial than reliability of sources. As the research is mainly focused on the provision which protect the rights and benefits of the claimants and the development of the provisions relating to International Conventions, the sources of law gathered are reserved from reliable sources, whereas all the conventional provisions and other legal instruments discussed were obtained from the official websites of International Conventions and other official websites handled by the government in order to preserve the consistency of the findings. In addition to that, secondary sources such as textbooks and journal articles and other comprehensive papers were used through original texts are utilized to emphasize high standard in the research paper.

However, in this research paper, the author aims to emphasize a comparative analysis of the legal requirements of the implementation of International Conventions in 1952 and 1999, by use of reliable qualitative data.

2.9 Problems and Limitations

There are various challenges encountered during the conduct of this dissertation. Subsequently, the research is constrained to discuss the law pertaining to international ship arrest and the legal system developed in different jurisdictions, and the researcher will also analyze the effectiveness and the applicability of such procedure considering the betterment towards the maritime claimants.

One of the consequences faced at the time of gathering data was due to the dearth of expertise knowledge in Sri Lanka to highlight proper determinations on International perspective of ship arrest, due to lack of secondary sources found in Sri Lanka on the law pertaining to International Shipping.

Thus, inaccessibility of many written records of International aspect was a main challenge faced by the researcher in concluding the analysis. Nevertheless, researcher makes the best effort to create a better argumentative approach for the dissertation irrespective of deficiency of secondary sources available.

Moreover, the dearth of Sri Lankan judgement on International shipping was another challenging point for the researcher to develop the analysis. However, different secondary sources were able to mitigate such circumstances to certain degree, with reference to case studies depicted in different jurisdictions.

3. ANALYSIS AND DISCUSSION OF FINDINGS

3.1 The Concept of Ship Arrest

The term 'arrest of ships' is very distinct component in English Admiralty law.[29] In common law jurisdictions, arrest is limited to maritime claims and it requires the previous institution of an action *in rem,* and shall be imposed only on the respective ship, cargo or freight.[30] In practical circumstances, vessel shall be arrest upon serving a 'warrant of arrest', once after the plaintiff has attained a writ *in rem* action, which is the civil admiralty method of arrest, comparatively similar to criminal practice of *albeit.*

Nonetheless, the fact that judgement should be awarded ultimately and claimant should show an arguable claim is not the cause to secure the arrest of a vessel. Whereas, the vital factor is that there is an enforceable action *in rem* and only the property in question is arrestable.

3.2 Purpose of Ship Arrest

The vital purpose of arrest of ship is to incur a security for the respective claim before the judgment for the claim and the merits of the case be decided. In such circumstances, ship which is under arrest, will be prohibited from moving, which emphasize that the ship owner will not be able to continue with current trading, hence the ship owner and the operate will not be able to gain profits. But in practice, generally owner request for a bail application, by arranging the security by way of promise or undertaking through the finance institutions (such as Banks) or by way of Protection and Indemnity (P & I) clubs.[31]

The second most important factor in ship arrest is to consider whether the security against which the judgement may be imposed is by way of arrest of the property. Whereas, the property in question shall be at the custody of the Admiralty Court, except where similar security was provided.32

3.2.1 Analysis on 1952 Arrest Convention

3.2.1.1 Applicability of the Convention for Contracting States

Generally, all the provisions in the 1952 Convention[33] is only relevant for ships flying the flag of Contracting States and is exclusive from any domestic provisions in respect of the claims for which a ship may be arrested.[34] As previously depicted, according to Article

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[29] Chorley & Giles', note 1 at 6-7

[30] Jackson, note 5 at 376.

[31] Chorley & Giles, Shipping Law, 8th Edition, Pitman Publishing, at p.7`

[32] Jackson, D.C, Enforcement of Maritime Claims, 4th Edition, LLP, London,2005., page. 376.

[33] International Convention on the Arrest of Sea-Going Ships of 1952

[34] Francesco Berlingieri, Berlingieri On Arrest Of Ships (2nd edn, Informa Law from Routledge 1996) page 13

2 of the Convention[35] a ship flying from one of the contracting national may be detained in the jurisdiction of any of the Contracting state only with regard to the maritime claims, and not any other claims.[36]

Therefore, as set out in the Article 8, paragraph 3 of the Convention,[37] which permits the Contracting States absolutely or partially to eliminate from the benefits of the Convention any Government of a non-contracting State or any person who does not, at the time of the arrest, have his habitual residence or principal residence or principal place of business in one of the Contracting State.[38] In addition to that, as per the Paragraph 4 of the said Article, the Convention shall not be applicable against the Contracting State of her flag by a person who has his

customary residence or main place of business in that state.[39]

However, major ambiguity can be seen in Article 8 Paragraph 3, as to whether the convention does not emphasize that its provisions apply to vessels flying the flags of Contracting States, to vessels flying the flags of non-contracting States or both. It is questionable as to whether the principle has a connection with the provision contained in the previous paragraph, which deals with vessels flying the flags of non-contracting States. However, this explanation would not be possible if the paragraph 2 in Article 8 were to be implemented as to limit the application of the Convention to vessels flying the flags of a non-contracting State to Article 1 (1) which emphasize on the claims.

Nevertheless, even if the other provisions of the Convention apply to such vessels, it does not seem to create any uncertainty that the paragraph 3 applies for vessels flying the flag of Contracting States. The key ingredient of this provision is to influence and create pressure on other non-contracting States to ratify the Convention, and this result would never be sustained if the exclusion exercise on the vessels flying the flags of the Contracting States.

3.2.1.2 Provisions in 1952 Convention dealing with Ship that may be arrested

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[35] Article 2 of the International Convention on the Arrest of Sea-Going Ships of 1952

[36] Article 2 (2) of the International Convention on the Arrest of Sea-Going Ships of 1952

[37] Article 8 (3) of the International Convention on the Arrest of Sea-Going Ships of 1952

[38] See the Article 8 (3) of the International Convention on the Arrest of Sea-Going Ships of 1952 and Purpose of this provision is to exclude from the convention situations where there are no foreign elements.

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[39] Article 8 (4) of the International Convention on the Arrest of Sea-Going Ships of 1952

The vessel or vessels which may be arrested on the basis of the maritime claim can be recognized in Article 3 paragraph (1), (2) and (4) of the Convention. The significance of arrest of ship is where the ship may be arrested subjected to the ship owner being liable with regard to a maritime claim. The right to arrest shall only occur in circumstances where the claim has arisen with regard to the ship in question and as long as such claim recognized as a maritime claim. Therefore, the maritime claim and the vessel is a vital component in order to sustain in ship arrest.

According to the Article 3 paragraph 1, creates substantive provisions that "A claimant may arrest either the particular ship in respect of which the maritime claim arose, or any other ship which is owned by the person who was, at the time when the maritime claim arose, the owner of the particular ship…"[40] When considering this provision in detail, it implies that the claim must consider the particular ship in question, which depicted that arrest cannot be secured for one of the ships owned by him, in circumstances where such arrest relates to the maintenance or operation of his ship, which are not related to a particular ship.[41]

This was further emphasized by Lord Diplock in case of *The Eschersheim*[42] which states that: "it is clear that to be liable to arrest a ship must not be the property of the defendant to the action but must also be identifiable as the ship in connection with which the claim made in the action arose (or a sister ship of that ship)".[43]

However, the Article 3 (1) also implies on the first principle where the right to arrest was further protracted for the ships owned by the same owner, which is referred as principle of 'sister ship'.

It was considered as a compromise position introduced, for reducing the unlimited right of arrest of ships to other ships in the same ownership. Nevertheless, the position of right to arrest sister ship was recognized as an alternative remedy as depicted in the case of *The Monte Ulia (owners) V. The Banco & Other Vessels (owners), The Banco,*[44] in which Lord Denning MR states that "…the important word in that subsection is the word 'or'. It is used to express an alternative as the phrase 'one or the other'. It means that the Admiralty jurisdiction in rem may be invoked against the offending ship or against any

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[40] Article 3(1) of the International Convention on the Arrest of Sea-Going Ships of 1952

[41] Berlingieri, op.cit., p.59.

[42] The Eschersheim (1976) 2 Lloyd's Rep. 1 at p.7.

[43] Ibid p.7

[44] The Monte Ulia (owners) V. The Banco & Other Vessels (owners), The Banco (1971) 1 Lloyd's Rep. 49.

other ship in the same ownership but not against both."[45]

In fact, according to Article 3 (2) of the Convention emphasize on exceptional circumstances that arresting sister ship is always not the possible and the best solution, it is of the view that sister-ship rule does not apply when the maritime claim in question does not relates to the person owning ship or the ship is not fully owned by the same person. In addition to that, sister-ship cannot be arrested in instances where the shares of the ownership of one vessel are not as same as the shares owned by the other vessel. Therefore, it is sufficient that when the vessel is owned by one or more owners, and the fact that all of such person preserving right of the ship are not in line with said claims.[46]

Nevertheless, according to the Article 3 (1) of the Convention, the provisions relating to sister-ship arrest does not apply for maritime claims undertaken according to Article 1 (1) of the paragraph o, p and q, namely due to the claims subjected title to ownership of any ship, disputes between co-owners of any ship as the ownership, possession and employment of that ship and, the

mortgage and hypothecation of any ship.[47]

And also, according to the Article 3 paragraph 4 emphasized on claim against the demise of charterer, in which any other person may be liable, apart from the registered owner of a ship (or demise charter) is considered to be liable in respect of the maritime claim on the ship.[48] This provision can be depicted as vague and absence of clarity, whereas it implies that numerous parties may be liable for the action *in rem*; such as the time charterer[49] and voyage charterer[50].

In fact, Article 9 states that in occasions where the ship is sold after the maritime has arisen, while the arrest has not taken place before, such claim for arrest shall be refused, except for the fact that claim is secured under the *Lien and Mortgage Convention of 1926* by the maritime lien or where the arrest is allowed by the domestic law of the States.[51]

However, the claimant has to comply with two requirements, in order for the

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[45] Ibid

[46] Berlingieri, F., Berlingieri On Arrest of Ships: A Commentary on the 1952 and 1999 Arrest Conventions, 4th Edition, Informa, London, 2006.p.159

[47] Article 1 (1) of the International Convention on the Arrest of Sea-Going Ships of 1952

[48] Article 3(4) of the International Convention on the Arrest of Sea-Going Ships of 1952

[49] Based on the claims arising out of voyage charters, contract of carriage

[50] for claims arising out of loss, or damage to other ships or harbor installations

[51] Article 9 of the International Convention on the Arrest of Sea-Going Ships of 1952

arrest of ship to be effective;[52] firstly, the claimant has to establish that the claims falls within the consequences laid down in Article 1 (1) sub paragraph a – q and thereafter, the claimant must substantiate court that ship to be arrested has a adequate link with the claim. Therefore, it states that ship arrest is possible for the claimant; at the time of arrest, it was not possessed by the person who should be responsible for the claim, even the sister ship can also be arrested and cases which comprises of maritime lien.[53]

3.2.1.3 Significant features to be considered upon Release of Arrested Ships

Generally, there are three specific instances in which the arrested vessel shall be released, as stipulated in the Article 3 (3) of the Convention:[54] where the ship has already been arrested on same claim and hence no security is provided by the owner and claimant has failed to bought proceeding within the given time period.[55] But in special cases where the ship must be free from arrest is considered upon 1957 limitation Convention, on the basis that ship owner

has constituted the limitation funds through the Conventions.[56]

However, the defendant in an action *in rem*, must show that the defendant has the burden to proving before the arrest took place, the respective ship in question or any other ship of the same owner had been arrested or security has been incurred with regard to the maritime claim by claimant. On the other hand, claimant also has the opportunity to avoid the ship from releasing, by burden of proving that there a considerable purpose to maintain the arrest, the security given had been released and the courts have a good cause to continue arrest of ship.[57]

Nevertheless, Article 3 (3) of the Convention does not make any express provisions as to instances where the ship has been released without any security provided by or on behalf of the owner. Since, new arrest is permissible when the security has been released, the same rule ought to apply when the ship is released without security.[58]

In addition to that, the main rule pertaining to release of ship has been stated in the Article 5 of the Convention, emphasizing that the court or any other judicial authorities shall be permitted to release the ship "upon sufficient bail or other security being furnished" within the

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[52] Which are similar to the Section 20 of the Supreme Court Act 1981 of United Kingdom

[53] M.D. Lax," International Convention on Arrest of Ships", Lloyd's List, 18 August 1999.

[54] Article 3 (3) of the International Convention on the Arrest of Sea-Going Ships of 1952

[55] Ibid

[56] Berlingieri, op.cit., p.113 and together with 1976 Limitation Convention and 1969 Civil Liability Convention

[57] Ibid

[58] Ibid

jurisdiction of the ship.[59] In fact, by declaring the nature and amount of security along with the conditions on which the security may be enforced by the claimant requires to establish to substantiate on the security. [60]

However, the convention does not specifically state the sum of security that need to be provided in order to release the ship from arrest, whereas it is the obligation of the court to regulate the amount and nature of the bail. The Article 5 depicted that, such security can be a bail or 'other security', and it must be 'sufficient'. The bail is a payment made to court or the sum requested by the court, this can be taken by way of a bank guarantee or a letter of undertaking from the shipowner's Protection and Indemnity (P&I) Club are often recognized by the maritime claimant.

Importantly, there are certain restrictions which prohibits the release of arrested ship, according to Article 5 of Convention, when the arrest has been made on maritime claims specified in the Article 1 (1) (o) and (p). In such circumstances, the court within whose jurisdiction the ship has been arrested shall authorize the ship to continue in trading.[61]

3.2.2 Analysis on 1999 Arrest Convention

Most importantly, the 1999 Arrest Convention was introduced in order to enhance the practice of arrest of ships and to implement changes that have set out after 1952 Arrest Convention in maritime procedure. As emphasized in the preamble, the 1999 Convention was introduced as a legal instrument to establish international standardization on arrest of ships, considering the current developments in the maritime operations.[62] According to Article 8(1)[63] emphasize on the applicability of the convention, which implies that Convention will administrate on arrest of all ships in the jurisdiction of states party to the convention, irrespective of the flags of their states.[64] As a result on which the 'maritime claims' described in Article 1 (1)[65] was considered as a only basis on which state parties to the convention may arrest ships of any flags.[66]

In which, the 1999 Convention presented further elements to enhance uniformity in ship arrest, such as; introducing the notion of personal liabilities of the shipowner, once the vessel is under

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[59] Article 5 of the International Convention on the Arrest of Sea-Going Ships of 1952

[60] Berlingieri, op.cit., p.114

[61] Berlingieri, op.cit.,p 129

[62] Preamble to the 1999 Arrest Convention

[63] Article 8 (1) of the International Convention on the Arrest of Ships 1999

[64] Tetley, William, Maritime Liens and Claims, 2nd Edition, International Shipping Publications, Montreal, 1998. Page.1971.

[65] Article 1 (1) of the International Convention on the Arrest of Ships 1999

[66] Tetly, op.cit page. 1971.

arrest, presenting limited class of claims (including the maritime liens), as to instances where the ship owner is not personally liable for arrest and where and when the arrest is possible. In fact, the 1999 Convention was able to remove the uncertainty of substantive rights stipulated in 1952 Convention with regard to arrested ship and power to arrest reliant on the person liable on such claim.

3.2.3 Comparative analysis on right of arrest in 1952 and 1999 Convention.

Thus, the Article 1 of the 1999 Convention extended the number of maritime claims up to twenty-two, which was enlarged from the seventeen claims as per the old convention. This depicted on closed and comprehensive list of claims, which provides the claimant a right to arrest, by allowing them to claim for the loss suffered, been injured, or due to any unpaid arrest of ship.[67]

The term 'Arrest' was widely depicted in Article 1 (2) of the 1952 Convention, which includes on "restriction on removal" of a ship, which also contains of Mareva Injunctions shall be issued for the vessels.[68]

According to the element of 'particular ship' in the 1952 regime has been elaborated in the 1999 Convention, highlighting on the fact that component of personal liability is the main criteria which indicate on a ship that can be arrested or not. Which states that the arrest is admissible of any ship in respect of which the claim is declared and the person who owned the ship at the time when the maritime claim arose is liable for the claim and is owner of the ship when the arrest is affected.[69] Also, arrest is allowed when the claim in respect of a mortgage or charge of the same nature and where the claim relates to the ownership of the ship.[70]

Hence, 1999 Convention was able to cure the disagreement adopted in the Article 3 (4) of the 1952 Arrest Convention, specifically on 'sister ship arrest'. The term "a person other than the registered owner of a ship" in the 1952 Convention has created a lot of consequences, which was remedied by the 1999 Convention by recognizing the person as to demise charterer, time charterer or voyage

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[67] Apart from the 1952 maritime claims; the additional claims emphasized as follows; Damages or threat of damages to the environment, Dues and charges on port, dock and harbor, Insurance premiums (mutual insurance) of the ship, Any free or commissions on brokerages or agency in respect of the ship, Wreck removal costs and charges.

[68] Article 1 (2) of the International Convention on the Arrest of Ships 1999

[69] Article 3 (1) (a) of the International Convention on the Arrest of Ships 1999

[70] Article 3 (1) (c) & (d) of the International Convention on the Arrest of Ships 1999

charterer,[71] and makes provisions that sister-ship arrest does not apply to claims in respect of ownership of the ship.[72]

In addition to that, disparate of the 1952 Arrest Convention, the 1999 Convention provides that limitations on the amount of security to be required in order to release the ship considering upon the value of the arrested ship,73 and the provision with regard to re-arrest and multiple arrest has also provided limitations.74

3.2.4 Provisions relating to unjustified arrest and its effect towards the claimant.

According to the Article 6 (1) of the Convention[75] states that court in which the ship is arrested has the opportunity to request on the claimant as a requirement to provide counter security for the inconvenience suffered by the defendant due to the consequences of arrest, for which the claimant may considered to be liable.[76] These provisions emphasize on a negative approach for the rights of the maritime claimant, where the court authorized the claimant for damages for

'wrongful' or 'unjustified' arrest, or for 'unnecessary security' having been required as stipulated in the Article 6 (2) (a) & (b).[77]

In fact, the Article 6 (3) and the Article 6 (2) of the Convention[78] depicted on the loss grieved by the defendant due to arrest, depending on the law of the place of arrest and whether the court has jurisdiction to regulate liability in such instances, which emphasize on regulatory procedure on law of ship arrest.[79] Therefore, it is a question of law as to whether the defendant is able to recover the loss from the arresting party, who was improperly detained.[80]

The key case of The Evangelismos81 has implement a comprehensive response by Mr. Pemberton Leigh in the judgement of the Privy Council that "undoubtably there may be cases in which there is either mala fide or that crassa negligentia, which implies malice and gross negligence, which would justify a Court of Admiralty giving damages, as in an action brought at common law damages

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[71] Article 3 (2) (b) of the International Convention on the Arrest of Ships 1999

[72] Ibid

[73] Article 4 (2) of the International Convention on the Arrest of Ships 1999

[74] Article 5 (1) (a) of the International Convention on the Arrest of Ships 1999

[75] Article 6 (1) of the International Convention on the Arrest of Ships 1999

[76] Ibid

[77] Article 6 (2) (a) & (b) of the International Convention on the Arrest of Ships 1999

[78] Article 6 (3) and Article 6 (2) of the International Convention on the Arrest of Ships 1999

[79] Gaskel, N., & Shaw, R., note 131 at 473.

[80] Messon, Nigel, Admiralty Jurisdiction and Practice, LLP, London, 1993.page 154

[81] The Evangelismos (1885) 12 Moo. P.C. 352. (PC)

may be obtained."[82] In fact, Dr. Lushington also states that "it is well established rule in this Court that damages for arresting a ship are not given, except in cases where arrest has been made in bad faith, or with crass negligence."[83]

However, from 1991 Nigeria does not follow the rule mentioned in Article 6 of the Convention. Whereas, such similar provisions were addressed with the combined provisions of S.13 of the Admiralty Jurisdiction Act 1991 (Nigeria) and Order XI of the Admiralty Jurisdiction Procedure Rules 1993 (Nigeria). On the basis that, defendant is obliged to show that arrest was either unreasonable or lacking good reason, made on inadequate grounds, or the action was introduced without possible grounds, where claimant is considered to be liable in damages for wrongful arrest or unjustified arrest.[84]

3.3 Whether the court has power to determine the case, and changes implemented in 1999 Convention

Unlike in 1952 Convention, the Article 7 (1) of the 1999 Convention makes clear provisions stating that court on which the arrest has been made or security was obtained, has the right to hear and determine the case on its merits, except there is a valid jurisdiction or arbitration agreement.[85] And the provisions address further that, in circumstances where the refusal is allowable by the law of that state and court of other states accept its jurisdiction, the court may refuse to exercise its jurisdiction.[86] Also, in instances where the court in which the arrest was taken place and where the court of the state has no jurisdiction or declined to exercise its jurisdiction, the court may consider stipulated time period of which the claimant has to bring proceedings before a capable court or arbitration tribunal, or the ship arrested or security provided will be released.[87]

3.4 Discussion of the result of the analysis

3.4.1 Effect on the Maritime Claimants Due to Arrest Conventions

Presently, the sphere of Admiralty law plays a major role with regard to the rights and interest of the maritime claimants and shipowners. As stated already, arrest of ship is the most valuable mechanism in imposing maritime claims against the shipowner and the operator. Whereas, the 1952 and 1999 arrest convention objects to strike a

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[82] *Ibid*

[83] *Ibid*

[84] Ojukwu, C. N." Arrest and Detention of Ships and Other Property in Nigeria", 28 *Tulane Maritime Law Journal*,

247 (2003-2004) at p. 251.

[85] Article 7 (1) of the International Convention on the Arrest of Ships 1999

[86] Article 7 (2) of the International Convention on the Arrest of Ships 1999

[87] See Article 7 (3) of the of the International Convention on the Arrest of Ships 1999

balance between claimant and the shipowner in order to secure the free movement of ships and the right of the claimants to gain security for their claims.[88]

Therefore, the author seeks to describe and analyze on relevant provisions of the Convention, to ensure reasonable equilibrium and enable maritime claimants to acquire security from shipowners or operator and settling the substantial claim. When considering the above-mentioned explanations on practical provisions, it implies certain provisions which has instigated impediment on maritime claimant, and to obtain security and recover the due payments. In doing so, researcher wishes to emphasize on the applicability of the national law in this regard.

4. CONCLUSION

According to Professor D.C. Jackson in his book called "*Enforcement of Maritime Claims*" emphasized that: "Arrest is a powerful weapon. Its availability is consequent on the property being arrestable and the claim being enforceable by an action *in rem*."[89] In addition to that, Elyn Underhill in her 2013 article in context of Canadian Maritime law described that: ""Arrest is the secret and distinguishing weapon of the maritime lawyer.... Arrest is an extraordinary remedy that has been

available to plaintiffs in the admiralty court for hundreds of years."[90]

Also, T. J. Schoenbaum in his book named as *"Admiralty and Maritime Law"* depicted with regard to claimants evaluating that: "Maritime arrest is a powerful procedural tool in the hands of the plaintiff. The action in rem allows the arrest of the vessel even though the ship owner's only contact with the jurisdiction is the presence of the vessel. The vessel may be seized, in most cases, without notice to the ship owner or third parties. The plaintiff has a considerable tactical advantage because the ship owner must post bond to release the vessel, or alternatively, obtain the plaintiff's consent or stipulation for release. The plaintiff does not have to post bond to cover the cost of a wrongful or erroneous seizure…The ship owner may recover his expense only in a separate action for wrongful arrest, in which the standard for liability is bad faith."[91]

In this regard, the main question still remains as unsettled as to whether the provisions stipulated in the 1952 and 1999 Arrest Convention was implemented to standardize the procedure adopted in the international practice of ship arrest. However, when considering the discussion on relevant provisions of both the conventions depicted in the chapters, it implies that maritime claimants does not instigate as a powerful

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[88] Speech by the Deputy Secretary-General of UNCTAD, Preparation and Adoption of a Convention on Arrest on Arrest of Ships, see Berlingieri, note 9 at 434.

[89] Jackson, note 5 at 393.

[90] Underhill, Elyn, The Nuts and Bolts of Arrest, BarTalk Magazine, February 2013, page 13

[91] Schoenbaum, note 62 at 402.

tool in action in rem action. Whereas, the provisions mentioned in the convention relate to restrict the maritime claimants, in which they were barricaded from obtaining security for the claims and to recover the due debts. Nevertheless, the 1999 Convention has clarified most of the ambiguous provisions mentioned in the 1952 Convention, therefore many experts depict a positive stage towards maritime actions. In fact, some of the provisions of the 1952 and 1999 Arrest Convention will be merely emphasized on some convenient explanations in order to overcome the consequences of the claimant.

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6. ACKNOWLEDGEMENT

Impact of Lean Manufacturing Practices on Sustainability Performances in SMEs in Sri Lanka Special reference to apparel industry: Concept Paper

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ABSTRACT

Over the past few years, 'lean manufacturing' as a concept has garnered significant attention from both an academic and practical perspective. This research study focuses on the impact of Lean Manufacturing Practices on Sustainability Performances in Small and Medium Enterprises (SMEs) in the Apparel Industry in Sri Lanka. After the end of the third world war, many countries opened up their economies to industrialization, with the apparel industry playing a significant role in the growth of developing nations like Sri Lanka, India, and Vietnam. The apparel industry is famous for the exploitation of resources and unsustainable performances, where environmental and social losses are often ignored. To address this issue, the study aims to determine how Lean Manufacturing Practices influence Sustainability Performances in SMEs in the Apparel Industry in Sri Lanka. This paper primarily intends to utilize insights from the resource-based view theory to assess the relationship between Lean Manufacturing Practices and Sustainability Performances. This research further contributes to the existing literature by critically evaluating the concepts of 'Lean Manufacturing' and 'Sustainability Performance' from both an academic and practical perspective.

***Keywords* - Lean,Waste,Sustainability**

1. INTRODUCTION

This research will mainly focus on the impact of Lean Manufacturing Practices on Sustainability Performance in SMEs in the Sri Lankan Apparel Industry. Over the last decades, many new approaches have been introduced and it is archived through challenging many old ways of doing business. Lean Manufacturing Practices are undoubtedly considered as one of the well-grown-up management approaches which introduced and rapidly established across almost all organizations in different industries. Those lean manufacturing practices have greatly affected the Sri Lankan apparel industry which plays a key role in advancing the country's economy.

In the current world, where customers have more demand, lean manufacturing has been widely adopted. It leads to accomplishing different types of benefits which can be considered as "waste reduction, value

improvement, making products with fewer defects, customer focus (high quality, low cost, short time), and cost reduction" (Iranmanesh et al., 2019; Losonci & Demeter, 2013; Panwar et al., 2018).

The wastes are usually considered to as non-value-added activities. Lean practitioners identified seven types of waste which are commonly referred to as "Seven wastes" those are "overproduction, waiting, transportation, over-processing, excess inventory, defects, excess motion" (Silva et al., 2012; Kilpatrick, 2003)

The benefits of lean implementation can be broadly classified into three groups which are operational, administrative, and strategic improvements (Kilpatrick, 2003). However, most organizations implement and focus on lean to gain the operational improvements. However, according to the past research administrative and strategic benefits of lean are equally important.

The impact of lean strategy is mostly based on empirical evidence that it improves the competitiveness of the company. It is important that the impact of lean thinking as a strategy which is important in both manufacturing and the entire supply chain.

Lean manufacturing practices can be identified as "a set of key resources used to accomplish objectives of lean manufacturing implementation". So many manufacturing practices are normally connected with lean manufacturing. Some of them are "flexible resources, cellular layouts, uniform production level, pull systems, small lot production, quality control, total productive maintenance, quick setups, and supplier network".

Sustainability or sustainable development can be defined as a "development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs" (Iranmanesh et al., 2019). In a business context, Iranmanesh, et al. (2019) suggest that "a sustainable company creates profit for its shareholders while protecting the environment and improving the lives of those with whom it interacts". In recent times, most forward-thinking organizations are emerged to consider sustainability performance as their primary objective (Wang et al., 2015). Sustainability is now recognized as a key business imperative that drives both cost reduction and value creation. Also, these sustainability performances are adopted to satisfy multiple stakeholders of organizations (Ganapathy et al., 2014).

The modern technique to describe sustainable performance in organizations has advanced the "Triple Bottom Line (TBL) Approach" (Elkington 1998). To measure the performances of the organization based on the sustainable perspective the TBL adds social and environmental aspects to the most traditional economic aspect. It focuses "people, planet, and profit" instead of simply profit maximization.

Since Small and Medium Enterprises (SMEs) contribute to producing employment, increasing the speed of economic growth, reducing poverty, and reducing income inequality it has been recognized as a vital sector in the economic development of a country. In the Sri Lankan context, the number of employment

in SMEs was 29 % of the total employment of the industrial sector in 1983. It increased up to 45.7 % in 2013/14 showing a significant improvement. "Employment in SMEs in 2014 was 633,933 which is 50% higher than the number of SMEs' employment in 2004" (Premaratna, S.P., Priyanath, H.M.S., Kodippiliarachchi, P. 2017).

1.1 Problem Statement

In the current world because of the different categorical waste, most of the manufacturing firms incurred high operational costs and other related costs. (AbuShaaban, 2012). Apart from that in manufacturing industries, it has been identified lots of unsustainable performances like maintaining greater inventory levels, overproduction, defects, etc and it applies to the garment industry as well (Jordeva, et al., 2015).

To recognize and collect evidences on the unsustainable performances of SMEs in Sri Lankan Apparel Industry, the researcher conducted a preliminary study by interviewing different sets of owners of SMEs in the apparel industry, in Sri Lanka. Owner of Neveska Holdings, Mr. W.A.D.S.A Widanage said that "There are many issues like high cost in operation, decrease the growth in sales, high production cost, high usage of direct & indirect materials and quality issues in most of SMEs in Sri Lanka and those issues are arising due to unsustainable performances". So those stated issues can be identified as the indications of the problem, unsustainable performances in SMEs in the Sri Lankan Apparel Industry.

The victory of most apparel organizations mainly depends on factors like constant quality, lower production cost and other cost etc. These factors are vulnerable due to various defects occurs in the firms and these defects can be repairable that tends to defectives of product that leads to elimination. Worldwide, most of the garments products have been rejected and defective garment items having a high impact on overall industry budget due to wastes.

So by considering all above factors apparel firms are selected to this research study for identification and elimination of waste occurring in the garment industry and make sustainable by implementing lean manufacturing practices in all departments of garments.

1.2 Research Questions

RQ1: What is the Impact of Lean Manufacturing Practices on Sustainability Performances in Sri Lankan Apparel industrial SMEs?

RQ2: What are the Lean Manufacturing Practices effect on Sustainability Performances in SMEs in Sri Lankan Apparel Industry?

1.3 Research Objectives

RO1: To identify the Impact of Lean Manufacturing Practices on Sustainability Performances in Sri Lankan Apparel industrial SMEs.

RO2: To identify what are the different Lean Manufacturing Practices effect on Sustainability Performances in SMEs in Sri Lankan Apparel Industry.

2. LITERATURE REVIEW

Addressing different theories, definitions, and perspectives is the main objective of the below section. So, this is about the important theories and perspectives, which was noticed by various authors and scientists, with respect to Lean Manufacturing and Sustainability performances.

2.1 History of Lean Manufacturing

2.1.1 Craft Production

People used craft production techniques in order to manufacture items in the past. Craft or One-off Production is "the process of manufacturing by hand with or without the use of different tools". As an example, this method was used to produce luxury cars (Silva et al., 2012). The main disadvantage of this craft production is, that even the product is exactly match with the expectations of the customer the cost is too much for most of them to afford (Harrison, 1993). So then Frederick Taylor identified the main drawback of this Craft production and offered the basic scientific management tools for mass production in 1890s (Silva et al., 2012).

2.1.2 Mass Production

With the guidance received through Taylor's scientific management tools, Henry Ford who is the originator of Ford Motor Company was able to place the basis for Mass Production (Silva et al., 2012; Kilpatrick, 2003). He introduced the assembly line process in 1913 (Silva et al., 2012; Dyrud, 2015)

But Mass production led to a high level of inventory and since the production is identical it was unable to meet the customer expectations through product variations. As an example, "the Model T cars were just limited to one colour as well as one specification. So all Model T cars were identical at the end of the production in 1926. Indeed it appears that practically every machine in the Ford Motor Company worked on a single part number and there were no changeovers" (Silva et al., 2012).

2.1.3 Toyota Production System (TPS)

TPS is defined as, the absolute elimination of waste as an effort to make product in continuous flow with minimum interruptions" by Ohno. This helped to acquire les cost, larger variety, high quality and smaller lead times to respond to quick changes in customer needs and desires (Silva et al., 2012; Dekier, 2012).

2.1.3 Lean Enterprises

Now today TPS has enter next step of development which is called as lean enterprises. Which means that TPS will stretch out from the manufacturing facility to all the stake holders including customers and suppliers. Then it will help to gain the ultimate TPS through collective effort (Silva et al., 2012).

2.2 Overview of Lean Manufacturing

The term "lean manufacturing" or "lean production" was first popularized by the book which is titled as "The Machine that Changed the World" which was published by Massachusetts Institute of Technology, USA in year 1990 (Vamsi & Jasti, 2014;

Saumyaranjan Sahoo, 2017). In order to set the basis for this particular study, let's begin with the definition of Lean, according to the "National Institute of Standards and Technology Manufacturing Extension Partnership's Lean Network", Lean is "A systematic approach to identifying and eliminating waste through continuous improvement, flowing the product at the pull of the customer in pursuit of perfection." In the article, Iranmanesh, et al. (2019) defined lean manufacturing as "a business strategy and methodology that increases process performance resulting in enhanced customer satisfaction and improved bottom line results." As implied in article Büyüközkan, et al. (2015) lean "is a series of activities or solutions to eliminate waste, reduce non-value added operations, improve value added processes and maximize performance".

In the article of Wu, et al. (2015) lean is defined as "an integrated manufacturing system that is intended to maximize the capacity utilization and minimize the buffer inventories of a given operation through minimizing system variability (related to arrival rates, processing times, and process conformance to specifications)". Taiichi Ocno once said that "Lean manufacturing is all about looking at the time line from the moment the customer gives us an order to the point when we collect the cash. And we are reducing that time line by removing the non-value added waste" (Silva et al., 2012). The term 'lean' was introduced as the new paradigm of manufacturing in the beginning of the 1990s. Filho, et al. (2016) defines the term 'lean' as " a way to do more and more with less and less which means less human effort, less equipment, less time and less

space while continuously coming closer and closer to provide customers with exactly what they want as their needs". When researcher studied various lean manufacturing related articles lean is defined by using different terms. If I shortened the terms that used to define lean, it had been define as, a process, a way, a program, a set of tools, set of techniques, a philosophy, a concept, a system, manufacturing paradigm, a model, an approach, a practice, a set of principles.

So by looking at all the above mentioned definitions and if we put more attention we will be able to identify that there is no one perfect definition for lean management concept but there are different efforts taken to define this concept in a better way according to Mclaughlin (2013) and Hasan, et al. (2019). But ultimately it is focus on waste reduction through removing of any kind of non-value-added activities from the processes and value-added maximization (Iranmanesh et al., 2019; Nawanir et al., 2010).

First it is basically focused on "Inventory Management" methods and "Just-In-Time" production concept and then it was then extended to the whole manufacturing management process (Iranmanesh et al., 2019). Now it has led to a wonderful impact on the effectiveness of both production and service systems even originally derived from manufacturing operations (Büyüközkan et al., 2015; Matloub Hussain, Raid Al- Aomar, 2019). And also even lean practices began in the automobile industry, different lean practices implementation has been expanding in wide range of sectors, such as forging

companies, process industries, clothing, hi-tech companies, aviation/aerospace, healthcare so on (Filho et al., 2016). But according to Panwar, et al. (2018) some academics mentioned that lean is supposed to be rather useful for different process industries such as steel, food, pharmaceuticals and apparel than others.

Nowadays, applying lean manufacturing philosophy is recognized as "one of the most important concepts that help companies to compete" (Mclaughlin, 2013), because lean manufacturing has generally looking for different cost savings and processing time reductions and effort which are dedicated optimization of objectives (Büyüközkan et al., 2015). And according to Hasan, et al. (2019) and Saumyaranjan Sahoo (2017) "it involves reducing inventories and lead time and improving quality and productivity".

Now in today context when customers have high demand, lean manufacturing has been widely used by many firms. It leads to accomplish different benefits such as "waste reduction, value improvement, making products with fewer defects, customer focus (high quality, low cost, short time), and cost reduction" (Iranmanesh et al., 2019; Losonci & Demeter, 2013; Panwar et al., 2018).

However, lean implementation cannot be actually named as a quick win (Rowlands, 2006). The greatest challenge to an organization adopting lean is to achieve the maximum possible stability in a changing environment (Mclaughlin, 2013).

2.3 Lean Manufacturing Practices

The overarching objective of lean manufacturing is to enhance business performance by eliminating various forms of waste, as highlighted by Nawanir et al. (2010) and supported by scholars like Silva et al. (2012), Kilpatrick (2003), and Sofia et al. (2020), who identify overproduction, waiting, transportation, over-processing, excess inventory, defects, and excess motion as the key types of waste to be eradicated. To attain these objectives, organizations employ a diverse set of interconnected, internally stable, and mutually assisting practices, as emphasized by Wu et al. (2015). McLaughlin (2013) categorizes these practices as sub-sets of the overarching lean philosophy, which has evolved and merged over time to form a comprehensive body of best practices. While the relative importance of specific practices may vary, there are commonly used lean practices proposed by different studies, ensuring a consistent focus on waste reduction and operational efficiency.

Lean manufacturing represents a collection of practices (Iranmanesh et al., 2019), with certain fundamental practices considered essential for achieving improved business performance (Nawanir et al., 2010). These practices are recognized as a manufacturing philosophy that can grant organizations a competitive advantage and enable global manufacturing (Hasan et al., 2019), embodying the principles of lean in practical implementation (Sakapas Saengchai, 2019). Notably, the number of these practices can differ between studies, but they collectively serve as strategic

resources employed to realize lean manufacturing goals.

A review of the literature reveals a range of practices associated with lean production, with various best lean practices proposed, including flexible resources, cellular layouts, uniform production levels, pull systems, small lot production, quality control, total productive maintenance, quick setups, and supplier networks. While interpretations of lean manufacturing practices may vary, the fundamental principles of lean remain consistent across organizations. Some companies choose to implement a full array of lean practices, while others opt for a selective approach based on their specific needs (Matloub Hussain, Raid Al-Aomar, 2019). Certain practices, such as 5S and kaizen, aim to enhance a company's overall agility, resilience, and adaptability, serving as a foundation for the adoption of more specialized practices like 'pull production' (Panwar et al., 2018).

Furthermore, Panwar et al. (2018) introduce the concept of HRM and TPM lean bundles consisting of general lean practices that lay the groundwork for the adoption of TQM and JIT bundles, focusing on specific performance enhancements. Importantly, not all lean practices need to be implemented for improvements, and even partial adoption within certain operational constraints can lead to significant positive outcomes for an organization. In summary, lean manufacturing practices encompass a diverse array of tools and techniques aimed at reducing waste and enhancing operational efficiency, with flexibility in their implementation while maintaining a consistent emphasis on lean principles and objectives.

2.4 Sustainability Performances

In the current competitive market, businesses prioritise increased production efficiency and decreased operating expenses as a means of maintaining an advantage over their rivals (Sofia et al., 2020). They are building strong communication networks with internal and external stakeholders and utilising information technology to share information effectively. Additionally, in order for businesses to succeed in the long run and maintain their competitiveness in their sector, they must give priority to sustainability due to the growing importance of social and environmental concerns. Manufacturing companies are being pushed to implement sustainable practises by governments, non-governmental organisations, and customers (Iranmanesh et al., 2019). The "Triple Bottom Line," which considers people, profit, and planet, is incorporated into this modern emphasis on sustainability, highlighting not only economic significance but also social and environmental sustainability.

Development that meets the demands of the current generation without endangering the ability of future generations to fulfil their own needs is known as sustainability, or sustainable development (Iranmanesh et al., 2019). Within the realm of business, a sustainable enterprise is one that makes money for its investors while also protecting the environment and improving the welfare of its constituents.

According to Wu et al. (2015), there are three main components of sustainability: social responsibility, ecological balance, and economic prospects. Finding a harmonious balance between these factors is what sustainability means in order to guarantee continued growth for society and industry. It is essential to consider and incorporate all three viewpoints in order to succeed in the market (Niall Piercy, 2018).

The profitability and long-term viability of a business are the main topics of this dimension of economic sustainability. It places a focus on cutting operating expenses, making short-term resource savings, and expanding sales and market development to raise the organization's perceived worth and financial earnings, which will eventually result in profit growth. The goal of environmental sustainability is to reduce the negative effects that company operations have on the environment. It entails cutting back on emissions, waste, energy use, and material use. This aspect seeks to reduce any detrimental effects on the environment, including resource consumption and pollution, by doing away with non-value-added operations and using eco-friendly practices. Social sustainability pertains to the welfare of workers, the nearby community, and the wider area in which an organization conducts business. It entails protecting the health and safety of employees, cultivating positive working relationships to increase employee engagement and happiness, funding staff training and skill development, and providing the community with high-quality, safe products to lower customer complaints. Social sustainability is the use of ethical and responsible business practices to improve the workers, the local community, and society at large (Iranmanesh et al., 2019).

2.5 Sri Lankan Wearing Apparel Industry SMEs

The manufacturers and suppliers of Sri Lankan apparel industry have gained a strong reputation worldwide for ethical manufacturing of high-quality apparels trusted by the iconic global fashion brands throughout the years and it has shown steady growth over the past three decades (Embuldeniya, 2018).

This industry can be identified as the Sri Lankan largest manufacturing activity in terms of employment, output, export, and foreign currency earning which means this industry contributes largely to the economy of the country. There are 50,300 total establishments that offer around 401,500 employment opportunities around the country (Non-Agricultural Economic Activities in Sri Lanka Economic Census Ministry of Policy Planning, 2014).

3. CONCEPTUALIZATION

3.1 Effect of Lean Manufacturing Practices on Sustainability Performances

When studying about the impact of lean manufacturing practices on sustainability performances previous researchers had put forward their views on the relationship between lean manufacturing practices and sustainability performances in deferent contexts. And those will also be useful to complete this study successfully.

According to the findings of the research Iranmanesh, et al. (2019) which was completed by considering the Malaysian manufacturing firms and based on the study of Niall Piercy (2018) there is a positive relationship between lean manufacturing practices and sustainability performances. Researches which was conducted to see the relationship between lean manufacturing practices and sustainability performances in Indian manufacturing SMEs (Sajan et al., 2017; Saumyaranjan Sahoo, 2017) and Brazillian manufacturing SMEs (Filho et al., 2016) it shows the positive relationship between these two variables.

And also studies which were conducted to "assess the impact of lean practices on the sustainability performances of hotel supply chains" (Matloub Hussain, Raid Al-Aomar, 2019) and "to measure the impact of integrated practices of lean, green, and social management systems on firm sustainability performances of Chinese fashion auto-parts suppliers" (Wu et al., 2015) again there is a positive relationship between the lean manufacturing practices and sustainability performances.

The paper done by Piercy & Rich (2015) on "the relationship between lean operations and sustainable operations" which is the multi-case investigation of "how lean operations demonstrate significant sustainability benefits". It proves that there is a positive interconnection between lean implementation and sustainability performances.

The research conducted to see "the relationships among transformational leadership, sustainable leadership, lean manufacturing and sustainability

performance in Thai SMEs manufacturing industry" by Burawat (2019) clearly proves that there is a positive relationship between lean manufacturing and sustainability performances.

According to the findings of the research paper done by Ruiz-Benitez, et al. (2019) in regards to "Achieving sustainability through the lean and resilient management of the supply chain", it can be concluded that economic sustainability is the easiest one to improve by implementing different lean practices. And also environmental sustainability can be improved by using different lean practices but accordingly social sustainability is hard to achieve other than safety and health of the people. But in the article of "Agility and lean practices as antecedents of supply chain social sustainability" presented by Nath & Agrawal (2020) proved that lean practices are significantly impact on social sustainability orientation as well as social sustainability performance. Research completed to measure the "Impact of lean practices on organizational sustainability through green supply chain management – an empirical investigation" by Singh, et al. (2020) stated that economic sustainability, and environmental sustainability can be significantly improved by implementing lean practices.

According to the research study conducted by (M.P & P.R, 2020) using 4 companies stating that there is a positive relationship between lean manufacturing practises and sustainability performance where it increases efficiency levels based on the situations considered by the researcher. "Lean Manufacturing Practices And Their

Effect On Sustainability Performance: Insight From Selangor Manufacturing Industry" research study conducted by (Xiang & Nor, 2021) mentions that this study provides practical insights for practitioners by examining how the adoption of lean manufacturing practices can positively impact a company's sustainability performance in terms of the Triple Bottom Line (TBL). Furthermore, it offers valuable information to manufacturers regarding the extent to which lean manufacturing practices can be effectively implemented.

The research article published by Rafael Henao and William Sarache emphasises that there is a strong positive relationship and a significant relationship between lean manufacturing and sustainability performance where achieving long-term success within a Triple Bottom Line (TBL) framework requires an equal and wholehearted embrace of all sustainability pillars (Henao & Sarache, 2023).

Figure 1. Proposed Conceptual Framework

Source- Developed by the Author

Hypothesis 01

H1 : Flexible Resources has a positive impact on Sustainability Performances in SMEs in Sri Lankan Apparel Industry.

H0 : Flexible Resources has no impact on Sustainability Performances in SMEs in Sri Lankan Apparel Industry.

Hypothesis 02

H2 : Pull System has a positive impact on Sustainability Performances in SMEs in Sri Lankan Apparel Industry.

H0 : Pull System has no impact on Sustainability Performances in SMEs in Sri

Hypothesis 03

H3 : Small Lot Production has a positive impact on Sustainability Performances in SMEs in Sri Lankan Apparel Industry.

H0 : Small Lot Production has no impact on Sustainability Performances in SMEs in Sri Lankan Apparel Industry.

Hypothesis 04

H4 : Quick Setups has a positive impact on Sustainability Performances in SMEs in Sri Lankan Apparel Industry.

H0 : Quick Setups has no impact on Sustainability Performances in SMEs in Sri Lankan Apparel Industry.

Hypothesis 05

H5 : Supplier Network has a positive impact on Sustainability Performances in SMEs in Sri Lankan Apparel Industry.

H0 : Supplier Network has no impact on Sustainability Performances in SMEs in Sri Lankan Apparel Industry.

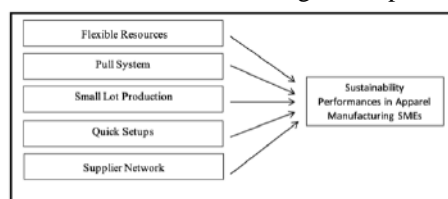## 4. IMPLICATIONS OF THE STUDY

4.1 Flexible Resources and Sustainability Performances

According to the findings of previous studies such as Sakapas Saengchai (2019) and Wu, et al. (2015) suggested that flexible recourses has a greater positive

impact on sustainability performances.

The study conducted by (Combs et al., 2011) stating that flexible resources are increasing the sustainability performance and there is a positive relationship among the two variables.

4.2 Pull System and Sustainability Performances

Iranmanesh, et al. (2019) study examine the relationship between pull system and sustainability performances and the results recommended that pull system is directly affect positively on sustainability performances. According to that pull system can be categorized under the broader lean practice of manufacturing planning and controlling. According to Iranmanesh, et al. (2019), "pull approach, may reduce post-process and in-process inventory, which leads to fewer damaged products and consequently to sustainable performance improvement".

Based on the research study conducted by (Dieste et al., 2019) stating that there is a positive relationship between the lean practices and sustainable performance while also mentioning the pull systems impact and the sustainability performance.

4.3 Small Lot Production and Sustainability Performances

The results of earlier investigations, exemplified by the work of (Shah & Ward, 2007) propose that the utilization of small lot production exerts a significantly favourable influence on sustainability performance.

According to the research carried out by (Nawanir et al., 2016), the enhancement of sustainability performance is linked to the utilization of small lot production, showcasing a positive association between these two variables.

4.4 Quick Setup and Sustainability Performances

According to the previous research study as defined by Iranmanesh, et al. (2019), it is proved that there was a significant directional relationship with quick setup / shortening set-up times which comes under the broader category of process and equipment practices and firm's sustainability performances.

In the research conducted by (Kamble et al., 2020), it was found that a favourable correlation exists between the implementation of lean practices. The study also highlighted the influence of Quick setup on sustainability performance, underscoring their positive impact in this context.

4.5 Supplier network and sustainability performances

Iranmanesh, et al. (2019) study examine the relationship between supplier network and sustainability performances and the results recommended that supplier network is directly effect on sustainability performances. According to Iranmanesh, et al. (2019) closer contacts with suppliers from the very beginning of the product development ultimately enhance process quality and reduce waste. Supplier competency on meeting the industrial social standard requirements will increase through

knowledge sharing. Particularly it is for those suppliers with lack of resources and absence of both information and attentiveness with regards to several social issues. Additionally, strong supplier network can also improve the reputation of the firm in the eyes of both suppliers and consumers. Manufacture and supplier can share different technologies and rewards, not only that they can share the risk through maintaining long term relationships with each other. Finally suppliers need to involve in product design and development and paying attention to their concerns and feedback can indicate a firm's responsibility toward ethical business

Study of (Nawanir et al., 2016) stated that "If suppliers fall down, then organizations will surely fall down as well". So, the success in implementation of the supplier network is one of the important to the success of the lean manufacturing as whole.

5. CONCLUSION

In conclusion, this concept paper has explored the vital intersection between Lean Manufacturing Practices and Sustainability Performances within the context of Small and Medium-sized Enterprises (SMEs) in the Sri Lankan apparel industry. By delving into the unique challenges and opportunities presented by this sector, we have aimed to lay the groundwork for a comprehensive study that examines how the implementation of Lean principles can contribute to the sustainable development of SMEs in Sri Lanka.

It is anticipated that the research will shed light on the specific ways in which Lean Manufacturing Practices can be tailored and

optimized to enhance sustainability performances. By doing so, this study aspires to provide actionable insights and recommendations for practitioners, policymakers, and industry stakeholders who seek to foster both efficiency and environmental responsibility in the apparel manufacturing sector.

Moreover, understanding the impact of Lean practices on sustainability in SMEs holds broader implications for economic growth, social equity, and environmental stewardship. As Sri Lanka and its SMEs continue to navigate the challenges and opportunities in the global market, embracing Lean Manufacturing Practices aligned with sustainability objectives becomes not only a strategic imperative but also a pathway towards long-term resilience and competitiveness.

In summary, this concept paper lays the foundation for an in-depth exploration of the interplay between Lean Manufacturing Practices and Sustainability Performances in the Sri Lankan apparel industry's SMEs. The forthcoming research endeavours to contribute valuable insights that can inform strategies, policies, and practices to promote a harmonious balance between economic viability and environmental responsibility in the context of small-scale manufacturing enterprises.

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The Impact of Xenocentrism on the Green Purchasing Intentions of Zoomer Consumers

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ABSTRACT

The recent trends in the ecological environment have led towards a change in the purchasing patterns of consumers and this change is identified to be prominent among Generation Z, also known as Zoomers. As such, there is a growth in the availability of brands that identify themselves to be environmentally concerned. However, when purchasing green products, consumers are still concerned about their quality and brand aspects. A modern branch of literature is now looking into the aspects of consumerism in terms of ethnocentrism and Xenocentrism, where Xenocentrism is regarding the preference of people to purchase foreign products over locally produced items. However, as a novel branch of research and a less debated concept, there is a lack of literature on the impact that Xenocentrism has on purchasing behavior of consumers. Hence, this study aims to analyze the impact that Xenocentrism has on green purchasing intentions through the application of the Theory of Planned Behavior (TPB). Subsequently, the conceptual framework identifies the impact that Xenocentrism has on the attitude, subjective norms and perceived behavioral control that leads towards generating green purchasing intentions. A quantitative research design is applied to examine the identified relationships under a positivist paradigm. A self-administered questionnaire was employed for data collection, targeting the sample of Generation Z consumers. XSCALE was utilized to operationalize Xenocentrism, while the analysis of the research employs partial least square structural equation modelling. The findings of this study hold important contributions to the literature on Xenocentrism as well as green purchasing intentions while contributing to practitioners in understanding the impact that Xenocentrism can have on their products.

Keywords - **Xenocentrism, attitudes, subjective norms, perceived behavioral control, green purchasing intension.**

1. INTRODUCTION

The younger generations of an economy are the potential customers that businesses would target and such novel customer segments are understudied, hence the insight available on them are limited. With the rising environmental disruptions, there is a noticeable increase in the empirical studies on the green purchasing and consumption behaviours focusing on various antecedents and varying relationships between variables (Fauzi et al., 2021; Emecki, 2018). Moreover, in addition to the interest of academics, the corporate sector is adopting strategies that enable businesses to gain an advantage over their competitors through acknowledging modern trends and interest in green businesses (Herath & Rajumesh, 2022; Kautish & Khare, 2022; Rodrigo & Mendis, 2023).

The Millennial generation also known as generation X is the generation preceding the Baby Boomers and the generation prior to the Generation Z (Nguyen & Nguyen, 2020; Bulut et al., 2021), and the generation Z includes the youngest consumers in the market who are preceding the Millennials (Djafarova & Foots, 2021). Among the various factors that impact purchasing intentions is the influence that generational ideologies and trends have on such intentions (Irfany et al., 2023; Alotaibi & Abbad, 2022; Nguyen & Nguyen, 2020). For instance, Sharma et al. (2022), state that even though the Millennial generation took the leading initiative in implementing social change focusing on green purchasing behaviours, the generation Z demonstrate a high level of environmental concern and are

more favorable towards purchasing green products. Moreover, as a generation that grew up with technology, millennials are more likely to share similar ideologies and interests (Nguyen & Nguyen, 2020). Generation Z is considered to be well educated and community-centred in their behavior (Sharma et al., 2022). Therefore, it is essential to explore the features of generation Z which may prove to differ from that of other generations (Nguyen & Nguyen, 2020).

Considering the importance of gaining insight on generation Z, this study addresses the presence of Xenocentrism among the consumers of generation Z through the Theory of Planned Behavior. Due to the high connectivity among the global population of this generation, the younger generations are considered to have high levels of shared values and ideas (Bulut et al., 2021). The theory of planned behavior is extensively applied in various contexts to study different aspects of green consumption intentions and behavior (Bulut et al., 2021; Rodrigo & Mendis, 2023; Costa et al., 2021). Hence, the theory of planned behavior is applied for this study to identify the impact of Xenocentrism on the attitude, subjective norms and perceived behavioral control which leads to the green purchasing intentions of the consumers from generation Z.

The environmental concerns of generation Z are popularly higher than any of their sequel generations as a survey by First Insight (2021), identified that 73% of the consumers from generation Z are willing to pay more for sustainable products. In contrast, only 42% of Baby Boomers, 55%

of Generation X and 68% of Millennials agreed on the same. While these statsistics emphasize the fact that generation Z is more concerned for the environment and consider green purchasing intentions, as a survey from Deloitte (2023), suggest that the increased connectivity among the generation Z has led towards their interest in the diversity of identity as well as cultural orientation, thereby bringing forward the concept of Xenocentrism (Camacho et al., 2022). Therefore, there is a problem whether the generation Zs' intention to purchase green products would be affected by Xenocentrism in terms of the impact Xencentrism may have on the attitude, subjective norms and perceived behavioral control towards green purchasing intentions. Hence, the following questions are developed to address these questions;

1. What is the moderating impact of Xenocentrism on the relationship between attitude and green purchasing intention?
2. What is the moderating impact of Xenocentrism on the relationship between subjective norms and green purchasing intention?
3. What is the moderating impact of Xenocentrism on the relationship between perceived behavioral control and green purchasing intention?

Therefore, this research presents a novel application of the theory of planned behavior through testing the model with xencentrism as a moderating variable in the context of generation Z, adding to the empirical studies on green purchasing intention. Hence, the insight generated from

this study is applicable for business entities in comprehending the upcoming consumer generation and strategizing accordingly.

The subsequent sections of this paper include the literature review and hypothesis development, methodology, data analysis, discussion, theoretical implicaitons, managerial implications, limitations, areas for future research and conclusion.

2. LITERATURE REVIEW

2.1 XENOCENTRISM

Globalization has paved many organizations to take advantage of other cultures. Consumer Xenocentrism is a concept that was brought on to describe the consumers' unwillingness or disinterest towards domestic products and interest in foreign products. Numerous studies have consistently demonstrated a correlation between consumers' preference for global goods and their perceived global status (Zhang & Khare, 2009). These consumers believe purchasing foreign brands enhances their international image and facilitates interaction with a worldwide audience. Consequently, consumers' global cultural orientation significantly influences their behavior, leading them to admire and idolize foreigners, ultimately leading to Xenocentric attitudes (Strizhakova & Coulter, 2019). Xenocentrism was initially considered a counterpart of ethnocentrism, which suggests that people like other ethnic societies over their own (Kent & Burnight, 1951). Mueller and Broderick (2009) define consumer Xenocentrism as an individual's preference for products originating from a country (or region) different from their own. When assessing products, they base

their ratings and comparisons on the foreign country rather than their place of origin. Per Kent and Burnight's (1951) definition, Xenocentrism refers to an unrestrained and imbalanced fascination with foreign cultures, wherein individuals exhibit an excessive and unexamined focus on aspects outside their own culture. According to the relatively recent definition formulated by Prince et al. (2016), Xenocentrism is characterized by a strong inclination towards favoring a particular group or groups while simultaneously exhibiting detachment or indifference towards the cultural group to which individuals themselves belong.

Although many scholars have pointed out that Xenocentrism is a new phenomenon (Cleveland and Balakrishnan, 2019), some oppose saying that this has existed for a long time (Mueller et al., 2016), citing the historical context of Xenocentrism. Numerous scholars posit that Xenocentrism arises as a response to various country-specific factors, including political, economic, familial, and moral contexts. (Kent & Burnight, 1951; R. D. Mueller et al., 2016). Mueller et al.'s (2016) Research has discovered that Xenocentrism is widespread in developing countries, with a more substantial presence among the emerging affluent class, younger consumers, and the local elites. The world's "super exporters," such as the USA, the UK, and Germany, are favored over those in developing and transitional economies, thereby contributing to the formation of Xenocentrism (Rojas-Méndez & Chapa, 2020).

According to Camacho, Salazar-Concha, and Ramírez-Correa (2020), an ethnocentric individual perceives ethical standards even when they may not be inherently present. On the other hand, Xen behavior involves perceiving deficiencies or shortcomings where none exist. Kent and Burnight (1951) believe Xenocentrism manifests in individuals when they experience a sense of detachment from their societies and favor a particular group to which they belong. It can also arise when a person perceives a conflict between their beliefs and cultural norms. Excessive focus on Customer Xenocentrism (Xenocentrism) may diminish confidence and pride in domestic manufacturing, potentially leading to the erosion of local industries. This decline in demand for traditional products can increase reliance on foreign goods (Mueller et al., 2016; Zhang, Chen, and Grunert, 2022). Research has discovered that Xenocentrism positively correlates with variables like materialism and social dominance orientations, while it is negatively linked with variables such as collective self-esteem and consumer ethnocentrism (Balabanis & Diamantopoulos, 2016; Prince et al., 2016).

For some time, studying Xenocentrism has posed challenges due to the absence of a suitable measurement scale (Prince et al., 2016). Nevertheless, recent efforts have introduced proposed measurements to examine Xenocentrism more effectively (Balabanis & Diamantopoulos, 2016; Prince et al., 2016; Rojas-Méndez & Chapa, 2020). According to Balabanis and Diamantopoulos (2016), C-XENSCALE measures two dimensions: Perceived inferiority and social aggrandizement.

According to Rojas-Méndez and Chapa (2020), while perceived inferiority can be seen as a primary characteristic of Xenocentrism, some may be hesitant to include social aggrandizement as a component. The reason is that social aggrandizement is linked to consumption, and establishing proper validation for its inclusion still requires further development. On the other hand, the X-scale examines foreign admiration and domestic consumer rejection perspectives. (Rojas-Méndez & Chapa, 2020).

2.2 THEORY OF PLANNED BEHAVIOR

The Theory of Planned Behavior (TPB) was developed subsequent to the Theory of Reasoned Action by Ajzen (1991), to present the relationship between intention and behavior taking into consideration three antecedents which impact intentions (Khalid et al., 2022). The antecedents to intention include attitude, subjective norm and perceived behavioral control (Ajzen, 1991; Costa et al., 2021). The TPB is a preferred theory among the researches which explore the green purchasing behaviors, ethical behaviors and a multiplex of consumer behaviors (Sharma & Forporn, 2018; Costa et al., 2021; Emecki, 2018; Fauzi et al., 2022).

The TPB states that the attitude, subjective norms and perceived behavioral control are deciding factors of generating presumptions regarding intentions to behave in a selected manner (Khalid et al., 2022; Pundir et al., 2020). However, in the context of green purchasing behaviors, there are research which suggest that there is a gap between the intention and behavior of consumers. Hence, factors such as psychological,

internal and external attributes as well as individual factors such as awareness, values and beliefs as well as product attributes and social factors are identified to have an impact on whether a consumer follows through with the intention to purchase a green product (Zhang & Dong, 2020).

Moreover, the reluctance of consumers to execute green purchasing behaviors has been accommodated with the fact that individuals may be reluctant to change their habits which have been developed over a span of several years (Barbarosa & Pastore, 2014). Furthermore, Duong (2021) stated that the gap between green purchasing intention and behavior is associated with big five personality traits. Hence, there is empirical evidence that the intention does not at all times lead to green purchasing behaviors. However, the focus of this study is on the relationship between attitude, subjective norms and perceived behavioral control on the green purchasing intention.

An intention is defined in TPB as the motivation to conduct a selected behavior which determines the effort that an individual is willing to dedicate for a selected conduct (Ajzen, 1991; Arora & Sahney, 2016). Hence, the green purchasing intention refers to the intended level of effort a consumer is willing to put forth to purchase a green product (Prakash et al., 2023; Sakaya, 2022).

2.3 Attitude and Green Purchasing Intention

The attitude refers to the favorability of unfavourability with which an individual would view a certain behavior (Ajzen, 1991). For instance, the brand attitude

which refers to the favorability towards a brand determines whether a customer intends to purchase the product or not (Arachchi & Samarasinghe, 2022). Furthermore, empirical studies identified that the attitude can be manipulated by various variables including word-of-mouth, trust and involvement of customers (Anisimova & Weiss, 2022). Adding to this, the research on the openness of employees to change by Huang (2022), identified that the attitude is affected by perceived competence which was drawn from perceived autonomy and perceived relatedness. Hence, empirical evidence suggest that attitude of individuals is determined by various internal and external attributions.

As a ramification of globalization, global brands are currently extensively available in markets. Global brands are given priority by locals as it is conceived as a better path of expressing their identities and such global brands are considered to provide better signaling and visibility than local brands (Makri et al., 2018). Moreover, consumers perceive global brands to have more authenticity and therefore consider such brands to have higher brand value (Riefler, 2019). Hence, whether the product is a global or local product is a determinant of whether the customer develops a favorable attitude towards purchasing the product (Vaziri et al., 2021; Makri et al., 2018; Arachchi & Samarasinghe, 2022; Riefler, 2019). Therefore, as per the TPB, this study identifies that,

H1: The relationship between attitude and green purchasing intention is moderated by Xenocentrism.

2.4 Subjective Norms and Green Purchasing Intention

According to the TPB, subjective norm is the pressure from the society to either execute a behavior or not (Ajzen, 1991). Moreover, social norm defines whether a product is important to a consumer (Bananuka et al., 2019) and both subjective and moral norms have been identified as deciding factors that impact intentions (Pathak et al., 2022). Social pressure is likely to govern the consumers' purchasing intentions, whereas consumers would prefer to have ownership of unique products based on the ongoing social pressures (Urbina, 2021). Moreover, subjective norms in terms of social influence, along with environmental concerns and altruism are considered as factors that impact the purchases of eco-friendly products (Farzin et al., 2022).

The importance of managing social pressures on the consumers' purchasing intentions has led many brands to embrace corporate social responsibility because the approval of the society is considered by a consumer before making a purchase (Battacharya et al., 2020). A study on post 1990s consumers has identified that young consumers prefer to follow trends set within the online culture rather than the traditional and conventional patterns of following local trends set through an upper class (Ruiz & Cruz, 2023). Hence, adding to the relationship between subjective norms and intentions identified by the TPB, this study suggests that,

H2: The relationship between subjective norms and green purchasing intention is moderated by Xenocentrism.

2.5 Perceived Behavioral Control and Green Purchasing Intention

Combining the impact of past experiences and the expected difficulty of performing the behavior, the perceived behavioral control is considered to be factor which determines the intention to perform a behavior (Ajzen, 1991). Literature suggests that if consumers perceived that the product is easy to use and the product will prove to be useful, then they are more likely to consider the purchase (Ariffin et al., 2021). Moreover, if the consumers consider a product to be difficult to use or that there is a lack of opportunities or resources needed for consumption of the product, then they are unlikely to develop purchasing intentions towards such products (Abbasi et al., 2020). Adding to this, literature identifies that having the necessary support to execute the intention encourages individuals to have a positive perception towards the selected behavior (Otchengco & Akiate, 2021).

Extent literature suggest that consumer perceive global brands to be more reliable as there is less risk of functional defaults and global brands are considered to have less social risk as a symbolic item (Lomeli et al., 2019). Furthermore, empirical studies identify demographic factors have an impact on the perceived behavioral control which leads to purchasing intentions (Rizwan et al., 2021), and globally recognized brands are perceived to have a better brand image than other products (Guha et al., 2021). Hence, drawing on the relationship between perceived behavioral control and intentions highlighted through the TPB, this study suggests that,

H3: The relationship between perceived behavioural control and green purchasing intention is moderated by Xenocentrism.

2.6 Conceptual Framework

The conceptual framework for this study is based on the Theory of Planned Behavior while accommodating the moderating impact of Xenocentrism on the antecedents to green purchasing intention. Hence, these relationships are demonstrated in Figure 1.
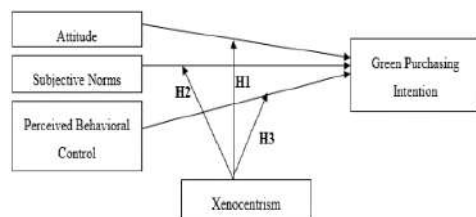
Figure 1: Conceptual Framework

Source: By Authors. (2023).

3. METHODOLOGY

3.1 Measures

Scales and constructs used were adopted from predeveloped literature. All the indicators were measured using 5-point scales. The ten-indicator scale measuring Xenocentrism was adopted from Rojas-Méndez and Chapa (2020), (5 = "strongly disagree," 1 = "strongly agree"). The authors have measured Perceived Behavioral Control with two indicators from Emekci et al. (2018), (5 = "strongly disagree," 1 = "strongly agree"). We have measured attitude using three indicators adopted from Emekci et al. (2018), (5 = "strongly disagree", 1 = "strongly agree"). Subjective Norms were measured using three indicators borrowed from Emekci et

al. (2018), (5 = "strongly disagree", 1 = "strongly agree").

3.2 Pilot Study

To ensure the applicability of the selected scales within the Sri Lankan context and to assess their validity and reliability, a pilot study was conducted involving a sample of 30 students from the National School of Business Green University in Sri Lanka (hereafter referred to as NSBM). The questionnaire was initially formulated in English and subsequently reviewed by language experts employed at NSBM. Prior to the commencement of the survey, participants were assured of the confidentiality and anonymity of their responses. They were instructed to provide answers based on their individual perspectives and were informed of their right to withdraw from the survey at any point if they so wished. The survey questionnaire was administered using Google Forms and distributed among undergraduate students. Convenient sampling was employed for data collection, with university students considered appropriate participants due to their relevance to the study's focus on measuring the Xenocentric behavior of Generation Z. The pilot study yielded a total of 33 responses. The collected data was then analyzed using SPSS software to determine the reliability of items through Cronbach's Alpha values. The outcomes of this analysis are presented in Table 1.

Table 1: The Results of Reliability Analysis

Variable	Cronbach's Alpha
Xenocentrism	0.713
Attitude	0.853
Subjective norms	0.894
Green Purchasing Intention	0.702

Source: SPSS.

Cronbach's Alpha must be above 0.7 (Rust & Cooil, 1994), and the items considered for this study have all complied with this requirement; therefore, the questionnaire is considered suitable for the study.

3.3 Population and Sample

Following the pilot study and the adjustments made based on its outcomes, the authors retained the identical constructs as outlined in the conceptual framework. The survey participants comprised undergraduate students enrolled in degree programs at NSBM. This student cohort originates from various geographical and psychological backgrounds, rendering the sample representative of the diversity within Sri Lanka. More importantly, the study sample facilitates the generation of the study based on. Demographic details such as age, gender, and educational level were incorporated as descriptive statistics for analysis and response screening. We have received a total of 352 responses, of which 22 were removed during the data-cleaning stage due to outliers and missing data. Tables X, Y, and Z indicate detailed information about the respondents. The sample is relatively educated and young.

3.4 Statistical Method

The primary analyses were conducted using SPSS version 26 and SmartPLS 4. SPSS was used initially to clean the data, and PLS

4 was used later to run the primary analysis. We opted for the Partial Least Squares (PLS) technique to investigate the hypothesized relationships within the research model. PLS is recognized as suitable for examining models where a single moderator influences multiple pathways. Adhering to the principles outlined by Hair et al. (2017), we assessed both the measurement and structural models, subsequently estimating moderation effects based on the approach outlined by Henseler and Chin (2010). To accomplish this, we employed SmartPLS 4.0 software.

4. Data Analysis

4.1 Data Preparation and Analysis

The data collected was prepared for analysis through the SPSS software prior to the analysis conducted with SmartPLS software. Hence, the following pre-tests were conducted for the data collected.

As missing value in the data would affect the possibility of analyzing and interpreting the results, the missing vale treatment provides a guarantee that all the items are answered by respondents and there are no items overlooked by respondents (Hippel, 2004). As per the results of the analysis, it is confirmed that there are no missing values for the data in consideration.

An outlier refers to an extreme value identified among the data collected, which would result in misleading the results generated through analysis (Saunders et al., 2009). As per the analysis, it was identified that case numbers 233 and 280 are repeatedly presented as outliers for all variables considered. Hence, they were

removed from further analysis and a total 332 responses were analyzed further.

In addition to aforementioned tests, the data was analyzed to identify the common method bias and non-response bias. Moreover, the multivariate assumptions were tested including the tests for normality and linearity as well as the homoscedasticity and multicollinearity.

4.2 Demographic Profile

4.2.1 Year of Birth

As this research focuses on the Generation Z of Sri Lankan consumers, the consumers born between the years 1995 to 2009 were considered.

Table 2: Year of Birth

Variable	Categories	Frequency	Percent (%)
Year of Birth	1995 - 1999	45	12.0
	2000 - 2004	56	14.9
	2005 - 2009	91	24.2

Source: SPSS

4.2.2 Gender

From the total population of Sri Lanka, 51.8% are considered to be female and 48.2% are males (Kemp, 2023). On this basis, the responses collected for this study confirms the representation of the population of the country as per Table 3.

Table 3: Gender

Variable	Categories	Frequency	Percent (%)
Gender	Male	224	67.3
	Female	106	31.8
	Other	3	.9

Source: SPSS

4.2.3 Highest Educational Qualification

As per Table 4, from among the sample considered a majority have the educational capacity to understand the concepts addressed in the study, including Xenocentrism and the importance of adopting green purchasing intentions in addressing the prevailing environmental issues.

Table 4: Distribution of Educational Qualifications

Variable	Categories	Frequency	(%)
	Diploma	22	6.6
	Graduate degree (Bachelors)	64	19.2
Highest			
Edu.	Passed advanced level	98	29.4
Qualification			
	Passed ordinary level	144	3.2
	Professional Qualification	5	1.5
	Diploma	22	6.6

Source: SPSS.

4.3 Analysis of Structural Equation Modelling

Subsequent to the data preparation through SPSS software, the collected data was subjected to analysis through SmartPLS software. This research uses partial least squares SEM (PLS-SEM) as it provides a linear analysis and is recommended for regression analysis due to its application of weight sums for measurement error (Hair et al., 2021).

As a study based on the Theory of Reasoned Action, this study employs the variables of the theory namely attitude, subjective norms and behavioural intentions in terms of the green purchasing intention, while accommodating the moderating influence of Xenocentrism. Due to this employment of theory, PLS-SEM is considered to be more suitable than the analysis through non-normal data such as LISREL and AMOS (Hair et al., 2019).

The path model created in SmartPLS has two components: a measurement model and structural models, which indicated the paths required for the study (Hair et al., 2015). Prior to applying the developed model for analysis, the perquisites for validity and reliability of the model have to be conducted and therefore, the results of these tests are discussed in the below sections.

4.3.1 Validation of the Measurement Model

The validation of the measurement model is of importance as it ensues the validation of the results generated for testing the hypotheses of this study (Hair et al., 2021). The model was validated based on the AVE values generated and on account of these results, the AVE value for Xenocentrism was below 0.5 and therefore adjustments were made to the measurement items through trial and error until the values improved.

Table 5: Construct Reliability and Validity

	Cronbach's alpha	(rho_a)	(rho_c)	(AVE)
Attitude	0.925	0.925	0.947	0.817
Green Purchasing Intension	0.846	0.850	0.907	0.765
Perceived Behavioural Control	0.521	0.523	0.807	0.676
Subjective Norms	0.895	0.899	0.935	0.827
Xenocentrism	0.842	0.855	0.882	0.522

Source: Survey Data

2017). As presented in Table 6, the values generated for the variables of this study ensure convergent validity.

Table 6: Outer Loadings for Convergent Validity

	Outer loadings
A1 <- Attitude	0.895
A2 <- Attitude	0.906
A3 <- Attitude	0.906
A4 <- Attitude	0.909
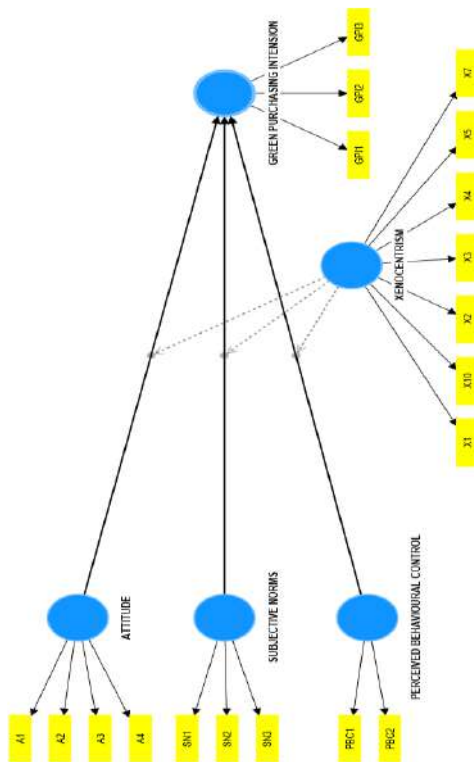
Figure 2: Measurement Model

Source: Survey Data

4.3.2 Convergent Validity

The convergent validity was measured through the values of outer loadings which identifies the inter-relationship between variables of the study and is required to be above the benchmark of 0.708 (Hair et al.,
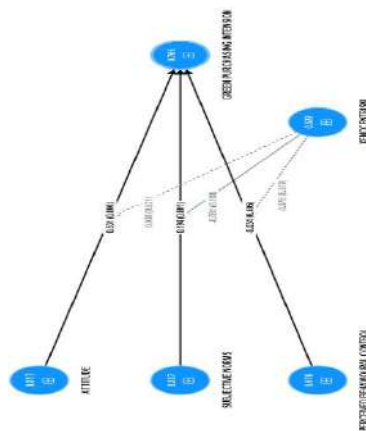
	Outer loadings
Gpi1 <- Green Purchasing Intension	0.841
Gpi2 <- Green Purchasing Intension	0.907
Gpi3 <- Green Purchasing Intension	0.875
Pbc1 <- Perceived Behavioural Control	0.807
Pbc2 <- Perceived Behavioural Control	0.837
Sn1 <- Subjective	0.859

Norms
Sn2 <- Subjective
Norms   0.943
Sn3 <- Subjective
Norms   0.924
X1 <- Xenocentrism   0.749
X10 <- Xenocentrism   0.471
X2 <- Xenocentrism   0.737
X3 <- Xenocentrism   0.766
X4 <- Xenocentrism   0.819
X5 <- Xenocentrism   0.788

Source: Survey Data

4.3.3 Discriminant Validity

The discriminant validity measured through the Hetrotrait-Monotrait (HTMT) values provides an estimate of the true correlation between two perfectly measured and therefore reliable variables (Hair et al., 2017). The HTMT values should ideally be below 0.90 (Hair et al., 2017) and as per the values obtained for variables as presented in

Table 7, the measurements of this model prove discriminant validity.

Table 7: HTMT Ratios

	HTMT Ratio
Green Purchasing Intension <-> Attitude	0.757
Perceived Behavioural Control <-> Attitude	0.113
Perceived Behavioural Control <-> Green Purchasing Intension	0.158
Subjective Norms <-> Attitude	0.597
Subjective Norms <-> Green Purchasing Intension	0.591
Subjective Norms <-> Perceived Behavioural Control	0.105

Xenocentrism <-> Attitude	0.364

Source: Survey Data

4.4 Hypothesis Testing

The hypothesis was tested through the SmartPLS software and the results are presented in Table 8. Moreover, the results are presented in Figure 3 which denotes the R2 statistic and the P-value of each of the relationships analysed in this study.

Figure 3: Hypothesis Results of the Study

Source: Survey Data

Table 8: Results of Hypothesis Testing

		(O)	P Value	Decision
H1	Xeno x Attitude -> GPI	0.038	0.531	**Not Supported**
H2	Xeno x Subjective Norm -> GPI	-0.081	0.188	**Supported**
H3	Xeno X PBC -> GPI	-0.076	0.078	**Supported**

Source: Survey Data

As per the results, the H1 stating that Xenocentrism moderates the relationship between attitude and green purchasing intention is rejected because the positive moderating impact is not a significant value.

The H2 stating that Xenocentrism moderates the relationship between subjective norms and green purchasing intention is accepted at 0.5 confidence level and it denotes a positive moderating impact.

Finally, the H3 which states that Xenocentrism moderates the relationship between perceived behavioural control and

green purchasing intention is accepted at 0.5 confidence level.

5. DISCUSSION

The primary objective of this study was to assess how Xenocentrism mediates the impact of attitudes, Subjective Norms, and perceived Behavioral Control on Green Purchase Intentions. An examination of the demographics reveals that the majority of respondents were born between 2005 and 2009, affirming the study's successful concentration on analyzing the consumer behavior of the Zoomer generation. The research outcomes demonstrate that results partially support the model developed.

5.1 Attitude and Green Purchase Intension

Contrary to the authors' initial hypothesis, the analysis of the data indicates that Xenocentrism does not serve as a moderator in the relationship between attitude and green purchase intention. The findings suggest a positive moderating effect, but statistical significance is not achieved (0.531>0.5 significance level). Previous research has consistently pointed out that numerous consumers tend to favor global brands, as they are associated with elevated brand value and authenticity. Consequently, this fosters a favorable attitude towards the acquisition of global products. The study did not uncover any significant connection between Xenocentrism acting as a mediator between attitude and Green Purchase Intentions, contrary to previous findings in studies such as those conducted by Vaziri et al. (2021), Makri et al. (2018), Arachchi & Samarasinghe (2022), and Riefler (2019). One potential explanation for this notable

disparity between our results and prior research may be attributed to the enduring influence of ethnocentrism as suggested by Nguyen & Pham (2021). Jayasinghe et al. (2019) found that in Sri Lanka consumer ethnocentrism was discovered to exert a favorable influence on brand loyalty towards local brands. Moreover, it was identified that cosmopolitanism, collectivism, and dogmatism play a constructive moderating role in the connection between consumer ethnocentrism and brand loyalty towards local brands. Therefore, the authors were able to deduce that a strong inclination among residents to purchase local products played a role in refuting the hypothesis.

5.2 Subjective Norms and Green Purchase Intension

The data analysis reveals that Xenocentrism indeed exerts a negative moderating influence on the relationship between Subjective Norms and Green Purchase Intention, aligning with the authors' initial hypothesis. The findings indicate a negative moderating impact, quantified at -0.0081, and this effect holds statistical significance (p-value of 0.188, which is below the 0.5 significance level). This observed moderating effect is in line with the findings of previous researchers in this field (Urbina, 2021; Battacharya et al., 2020) suggesting social pressure is influenced by Xenocentrism plays a pivotal role in influencing individuals' engagement in Green Purchasing behavior. This data implies that societal pressures have prompted people to adopt corporate social responsibility, as they consistently prioritize

society's values when making purchasing decisions.

5.3 Perceived Behavioral Control and Green Purchasing Intension

Based on the analyzed data, it appears that the author's hypothesis holds true, indicating that Xenocentrism does indeed moderate the connection between perceived behavioral control and Green Purchase Intention. This assertion finds support in the data, as it reveals a negative moderation effect (-0.076) with statistical significance (p-value of 0.078, which is less than the 0.5 threshold), indicating that Xenocentrism has an adverse impact on the relationship between perceived behavioral control (PBC) and Green Purchase Intention. This evidence supports the existing body of research, indicating that demographic variables influence perceived behavioral control, subsequently affecting purchase intentions (Rizwan et al., 2021). Furthermore, it is well-established that globally renowned brands are generally associated with a more favorable brand image compared to other products (Guha et al., 2021). Consequently, it can be asserted that the accessibility and convenience of foreign-origin goods and services could sway consumers towards choosing global products over local ones.

6. THEORETICAL IMPLICATIONS

The concept of green consumerism has been at the center of attention among a majority of academia in the recent years, which has led to the study of green purchasing intentions, behaviors and various antecedents which determine the green purchasing decisions of consumers.

Moreover, the generational differences when making green purchasing decisions has drawn considerable attention in empirical literature as there are discoveries which bring forth variations in the perspectives and motivators among generations.

Taking into consideration these developments in literature, this study brings forward a novel concept which is likely to have an impact on the green purchasing intentions of consumers. Xenocentrism as studied in this paper refers to the preference of foreign products in place of domestically produced items. Hence, this study adds to the existing literature which analyses various antecedents to green purchasing intention.

The impact of Xenocentrism is studied through the Theory of Planned Behavior as the antecedents to the theory of planned behavior have not been addressed through the lens of Xenocentrism in previous studies.

As per the findings of this study, Xenocentrism of Generation Z influences the subjective norms of consumers which determine their willingness to purchase green products. However, the relationship between the two variables is negative, which implies that the impact that the society and other influential factors which the consumers consider when making a purchasing decision tend to discourage their tendency to prefer foreign products. A similar fate is identified for perceived behavioral control as well since the moderating impact of Xenocentrism on the variable was negative. It can be deemed that the consumers perceive that more effort

needs to be made when purchasing foreign products than for the domestically produced items. However, Xenocentrism has a positive moderation with the attitude of Zoomer consumers towards green purchasing intentions, which implies that their attitude towards foreign products is favorable when compared with domestic products. Even so, the moderation of Xenocentrism between attitude and green purchasing intention is not significant, implying that the consumers do not have a string preference towards adopting purchasing intentions based on foreign cultures or influences in terms of green products.

7. MANAGERIAL IMPLICATIONS

The findings of this study add to the literature on Zoomer consumers and the current studies of Xenocentrism. This knowledge can be adopted by organizations when setting trends and designing marketing strategies to attract Zoomer consumers. As per the findings, it is evident that subjective norms in considering the social perspectives, the Zoomers reject Xenocentrism. Hence, organizations can bring their focus towards promoting products aligned with domestic culture and domestically sourced products. This is likely to motivate consumers to develop purchasing intentions towards green products provided that the society accepts the importance of purchasing domestically sourced products and prioritizing local cultures.

Moreover, the era of Zoomer consumers is a novel segment of consumers that organizations are tackling as they have entered the markets quite recently when compared with the older generations such as millennials and Gen X. Hence, this study explored the characteristic of Xenocentrism which is a novel concept which has come into light recently. As per the results of this study, it is evident that Zoomer consumers have a low preference towards foreign cultures and products when compared with locally based products. Moreover, this is likely to encourage the adoption of local production methods, to bring forth local products and industries and strategize to embrace the local culture when serving the Zoomer consumers. Hence, this study presents important managerial implications through the findings of Xenocentrism in green purchasing intentions of Zoomer consumers.

8. LIMITATIONS

A limitation which can be identified for this study is that the sample considered is a group of undergraduates who represent the Zoomer generation and they are likely to be unfamiliar with the concept of Xenocentrism which would affect their responses to the questionnaire. Moreover, the sample consists of a young crowd who may not have comprehended the purpose of the research and this had to be accommodated as Zoomers are a group of the youngest consumers. Finally, the sample consists only of the consumers from Sri Lanka and focusing on green products and therefore the findings may differ for other countries, cultures and products.

9. AREAS FOR FUTURE RESEARCH

The scope of this research focuses on the impact of Xenocentrism on the antecedents of green purchasing intention of the

Zoomer consumers. As per the Theory of Planned Behavior, the attitude, subjective norms and perceived behavioral control generates behavioral and intentions and these intentions lead towards the execution of behaviors. Hence, the conceptual model of this study can be expanded to include the green purchasing behaviors and the influence of Xenocentrism.

Moreover, this study does not specify a type of product and considers green products as a general term of reference. Therefore, future studies can specify a selected industry or type of product such as fashion items, electronic products, sports items etc. in the study of Xenocentrism. The perceptions of Xenocentrism are likely to differ for various product types and customer segments.

Furthermore, this study is focused on the Zoomer customers and further studies on other generations would add to the empirical literature available on this front. This can be further enhanced by specifying the context of the study because this study provides generalization of findings from the Sri Lankan consumers.

10. CONCLUSION

This research is a study that addresses the green purchasing intention of Zoomer consumers through the Theory of Planned Behavior. A novel concept was accommodated to the model of the Theory of Planned Behavior and thereby the moderating impact of Xenocentrism on the attitude, subjective norms and perceived behavioral control which generate the green purchasing intention. The findings of this study suggest that Xenocentrism has a

negative moderating impact on the subjective norms and perceived behavioral control of Zoomers whereas the moderating impact Xenocentrism on the attitude of consumers is insignificant.

This study contributes to literature in terms of bringing in Xenocentrism to the study of green consumerism and expanding the Theory of Planned Behavior. Moreover, this paper focused on the scope of one specific generation, allowing for generational characteristics to be highlighted for the young generation of Zoomers. Hence, there are immense contributions to theory as well as for practitioners who are exploring the facets of green purchasing.

The findings of this study imply that the presence of Xenocentrism among Zoomer consumers is low and these consumers do not hold a strong preference for foreign cultures and products over domestic cultures and products. Moreover, the negative moderating impact of Xenocentrism on the relationship between subjective norms and green purchasing intention implies that the Zoomers belief that the society and persons that influence purchasing decisions would not approve of Xenocentrism behaviors. Furthermore, as the moderating impact on perceived behavioral control is also negative, it implies that the Zoomers perceive that more effort needs to be spent on Xenocentric behaviors. Finally, as the attitudes towards green purchasing intentions was positive yet not significantly moderated by Xenocentrism, it implies that the attitudes of consumers are not significantly favorable

towards preferring foreign products over domestic products.

Hence, in conclusion, this study is one of the few in literature which contributes towards the study of green purchasing intention combined with Xenocentrism which particularly focuses on the Zoomer generation.

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Real Time Inventory Management System for Maker's Space of Technology

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ABSTRACT

In the realm of technology-based startups, prototyping stands as a crucial milestone, serving as a proof of concept in the product development process. Electronics components play a pivotal role in the creation of any technology-driven product. Technology-based Incubation centers provide invaluable support to startup development through their makerspace facilities, equipped with an array of tools, measuring and testing equipment, along with essential electronics components and development boards.

Currently, makerspaces operate on manual inventory systems, relying on traditional methods for issuing components and monitoring inventory.

With the rapid advancement of technology, there is a compelling need to modernize these systems into a more user-friendly and efficient framework. The Inventory Management System (IMS) emerges as a transformative tool, converting traditional manual operations into a digital platform.

Navigating the manual process of searching for specific components for prototype development can be cumbersome, exacerbated by the lack of a well-maintained database documenting component issues and availability. This inefficiency in the traditional system can impede the overall progress of prototype development, potentially compromising startup deadlines.

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Those responsible for overseeing makerspaces must continually organize and update inventory while also monitoring the lending and borrowing of components. The introduction of a real-time IMS proves invaluable, allowing startups to remotely check component availability for prototyping and submit issue requests through a mobile application. The administrator, upon receiving a request notification, can promptly acknowledge and allocate a specific time for issuing the requested components, thereby saving precious startup time.

Additionally, real-time IMS empowers makerspace personnel to monitor inventory levels in real-time and manage stock dynamically based on project requirements. This paper presents a significant contribution to the digitization of makerspace inventory management systems within Technology Business Incubators, enhancing efficiency and fostering a more streamlined approach to component tracking and issuance.an issue request, remotely, through a mobile application. Admin, upon getting the request notification, will acknowledge the raised request by the startup and allot the specific time for issuing it with which a precious time of the startup can be saved. Further makerspace person can monitor the inventory in real time and manage the inventory stock as per the requirement. This paper contributes the digitization of the maker's space inventory management system of the Technology Business Incubators.

Keywords - **Maker's Space, Inventory Management System, IoT**

1. INTRODUCTION

Figure 1 :Conceptual view of Maker's Space

Technology Business Incubators provides the services to the startup to pre-incubate, incubate and upscale the startups. These services may include, mentoring support, funding support, legal and IPR support, marketing support, co-working space, support for prototyping through the maker's space facilities and many mores. The 'Makers' space', the word is self-explanatory, 'a space for maker's 'and these makers are the startups or the users of this maker's space where they can explore their innovation. Here, they can do the hands-on projects as part of a learning process or the development of an idea or product. Maker's space may be either Electronics Makers space or Mechanical Makers space. Maker's space is an electronics components store where one can get Sensors, Boards, Batteries, 3D Printer, Electric Extension boards whereas Mechanical maker's space can avail Metal and Wood workshop, Mechanical tools. It also provides Computing Facilities, Internet Connectivity, Storage, Sitting arrangement and many mores. (Kumar A. 2021).

The traditional functioning of the maker's space requires manual intervention for issuing components, monitoring inventory, and raising purchase requirements. Maintaining an on-paper record of the components inventory is difficult, especially after components are issued. Users face challenges in finding available components and determining which components have been issued. This process is time-consuming and may lead to delays in developing prototypes. Inventory management is crucial for the smooth operation of daily incubation activities. While computer-based inventory monitoring is available, it is not a real-time process. Users must access reports and accession registers to check component availability. To improve the process, it is necessary to arrange the inventory in a proper manner and have a system in place for real-time availability checking.

The Real Time Inventory Management System (RTIMS) is a mobile application that streamlines inventory management for TBI staff/startups. It allows remote monitoring and management of the maker space inventory, and provides users with the ability to check availability and update details. The admin is responsible for adding/viewing/deleting/updating details in the database and granting users access to the system. The RTIMS also offers additional features such as component history, returns, and issues tracking, and always updates the inventory stock status. It is a cloud-based system, providing real-time inventory management benefits, including accurate order generation, efficient inventory management, dynamic load balancing, and high reliability. The

system also offers convenience and accessibility through intelligent terminals. Overall, RTIMS improves efficiency, reduces costs, and enhances the inventory management process for makers.

2. RELATED WORKS

Most of the research and literary works on library management have focused on academic libraries, with minimal attention directed towards the administration of public libraries. The availability of literature for the management of inventory in makerspaces is scarce. The proficiency and approach of the Makerspace staff in managing the inventory significantly impacts the culture of these spaces. (Hernon P 2006).

At present, there is no accessible catalogue for startups to utilize within the Makerspace. Startups are required to visit the Makerspace physically, submit a request, and the staff checks the availability of components. If the components are not available, there is a wastage of time as the startup must wait for their availability. Several attempts have been made to modernize the inventory management system. (Rencher, N. R. 2020)

According to Hartono (2016), library and information management is a study of the practical and theoretical aspects of managing libraries, documents, and information efficiently and effectively. The effective storage and preservation of library materials are an integral part of library inventory management (Pown, 2014).

RFID tags have been proposed for book management systems by Curron and Potter in their research on "fast book finding,"

which utilizes RFID and ZIGBEE to locate and manage library materials (Hernon, P 2006). However, this system faces challenges with detection range and the cost of RFID tags (Weihong Yang, 2015).

Butters proposes the "efficient shelf management service" in their research, which utilizes a smart shelf that is capable of managing a large number of books. However, limited access is granted to this service at any given time (Rencher, N. R. 2020).

With the advancements in computer technology, there has been a significant increase in the popularity and usage of inventory management software. This software records data as products are scanned in and out of warehouses and has evolved into a comprehensive inventory management solution by the early 2000s. However, even with these advancements, the inventory management system requires regular updates and upgrades to improve its throughput. This has been observed by several researchers, including Rebort Lockard (2012), Khan (2022), and Masenya and Chisita (2022).

3. PROPOSED SYSTEM

The proposed system will serve as an effective tool for monitoring live inventory stocks of components. It will aid both users and administrators in this regard. An administrator can easily notice a request for issue raised by a user and check the availability of components in the inventory. In case the components are available, the administrator can acknowledge the request. Users will be able to view the details of components issued by them, including the date and time for collection. As depicted in

Figure 2, the system will provide a schematic view of the proposed system. The system will be beneficial in ensuring efficient inventory management.

3.1 METHODOLOGY

The data collection process for generating the Makers' space component library requires the admin to update the components catalogue and specify the initial quantity of all available components (Tan, W. J., 2022). Once the catalogue is updated, users can easily check component availability by scrolling through the component library. Refer to figures 3 and 4 for a visual demonstration of the process.
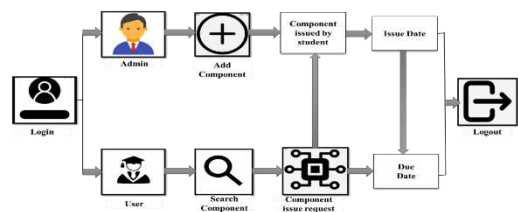
Figure 2: Admin login

Figure 3: User login

3.1.1 User Module:

This module is further divided into various sub-modules describing the user in a better way(Pallaris, G 2022):

➢ New user registration: To sign up a new user to this system.

➢ User Login: So as to confirm that only an authenticated user is using the Application.

➢ Component Selection: The user can search component based on component name.

➢ Issue Component: After accepting request the user get the required component.

➢ Return Component: To return the component before the last date without fine, or after the specified time duration with a late fine.

Figure 5 shows the overall functioning of the RTIMS which illustrates the process of issuing the components to the user an updating of the inventory.

It is to be operated by the admin with a unique id and password. The admin is the person who decides authentication and authorization for all the different users of the application. They only have authority to operate all application process. It works as
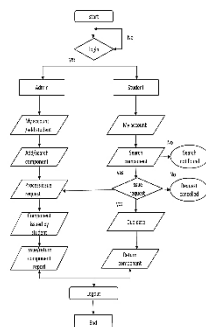
follows,

3.1.2 Admin Module:

➢ Register user: To sign up a new user to this system.

➢ Issue Components: After accepting request, the user get the required component.

➢ Maintain components: After issuing components in a stock, which means record the availability of components, issued/return components.

3.2 System Development Process

The following system requirements are needed for development:

1. **VS Code Studio**: Visual Studio Code is a user-friendly source code editor that offers advanced developer tools such as IntelliSense code completion and debugging capabilities [7].

2. **Android Studio:** Designed specifically for Android development, Android Studio enhances your development process and empowers you to create high-quality apps for various Android devices.

3. **Android and Flutter SDK:** Flutter presents an excellent solution for developing apps that run on both Android and iOS platforms, eliminating the need for separate codebases. Moreover, with the same codebase, you can also build web apps for browsers and native programs for Windows, Linux, and macOS.

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4. RESULTS

Figure 6: Admin side view of RTIMS: a) Registration/login b) Catalogue/User Management c) Catalogue updation

Figure 7 : User side view of RTIMS: a) Cataligue View b) Component Selection c)Item Status

4. CONCLUSION AND FUTURE SCOPE:

This study emphasizes the crucial role of prototyping in technology-based startups and emphasizes the significance of electronics components in product development, calling for the modernization and streamlining of traditional manual maker's space management systems. The proposed Inventory Management System (IMS) aims to digitize and optimize this essential aspect of startup operations.

The research highlights the challenges encountered in the traditional system, including difficulties in component location, inadequate database maintenance, and potential delays in prototype development. It emphasizes the importance of real-time IMS in addressing these issues by enabling startups to remotely check component availability, request items, and save valuable time. Additionally, it emphasizes the benefits of IMS for efficient inventory monitoring and stock management by maker's space personnel, tailored to specific requirements.

Ultimately, this paper showcases the potential of IMS to revolutionize inventory management in maker's spaces within Technology Business Incubators. By digitizing and enhancing component allocation and tracking efficiency, IMS promises to facilitate smoother and more streamlined product development processes, thereby contributing to the overall success of technology-based startups.

To further enhance the performance of real-time IMS, integration with cutting-edge technologies such as blockchain and data analytics is recommended. Additionally, attention should be given to strengthening the security and privacy aspects of IMS to safeguard sensitive data and ensure compliance with relevant regulations.

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ACKNOWLEDGMENT

The GRIDS Approach: A Comprehensive Framework for Advancing Green Technologies and Sustainable Progress

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ABSTRACT

In the face of escalating global environmental challenges, the adoption of green technologies has become an undeniable imperative. This paper delves into the nuanced dimensions of green technologies, spanning a spectrum from revolutionary energy solutions to innovative waste management strategies. Through a comprehensive examination, we evaluate the profound benefits these technologies offer, while also dissecting the implementation hurdles that often impede their widespread integration.

The study employs "The GRIDS Approach," a comprehensive framework designed for advancing green technologies and fostering sustainable progress. This framework provides a structured lens through which we analyze the multifaceted aspects of green technologies, emphasizing the

interconnected domains of Governance, Research and Development, Infrastructure, Deployment, and Stakeholder Engagement.

Real-world case studies are employed to offer valuable insights into successful integrations and breakthrough innovations within the realm of green technologies. These cases serve as exemplars, showcasing the transformative potential of sustainable solutions in diverse contexts.

As the paper progresses, it becomes evident that green technologies play a pivotal role in achieving environmental sustainability. However, the road to widespread adoption is riddled with challenges, ranging from policy gaps to technological barriers. The study sheds light on these hurdles, encouraging a pragmatic discussion on overcoming obstacles and streamlining the implementation process.

In conclusion, the research underscores the

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urgent need for collective responsibility among global stakeholders. Emphasizing collaboration and proactive engagement, the paper advocates for the mainstreaming of green technological solutions as a linchpin for a sustainable future. The forward-looking perspective presented in the conclusion serves as a call to action, urging stakeholders to prioritize the integration of green technologies in addressing the pressing environmental crises of our time.

Keywords **- Green Technologies, Environmental Sustainability, Renewable Energy, Waste Management, Water Conservation, Sustainable Transportation, Eco-friendly Construction.**

1. INTRODUCTION

In the pursuit of sustainable living and environmental resilience, green technologies have emerged as indispensable tools. At their core, green technologies encompass innovative tools, practices, and systems designed to mitigate environmental impacts. Originating as a response to escalating environmental concerns, their historical narrative is punctuated by significant milestones, including the harnessing of wind and solar energy, alongside more recent breakthroughs such as the development of bio-degradable materials and waste-to-energy processes.

1.1. Aim

This paper aims to comprehensively explore and underscore the fundamental importance of green technologies in mitigating environmental challenges and advancing sustainable living. Central to this exploration is the application of "The GRIDS Approach," a comprehensive framework crafted to propel the adoption of green technologies and drive sustainable progress.

1.2. Objectives

1. To analyze the historical evolution of green technologies, emphasizing key milestones and innovations.

2. To elucidate the interconnected domains of Governance, Research and Development, Infrastructure, Deployment, and Stakeholder Engagement within The GRIDS Approach.

3. To critically evaluate the multifaceted dimensions of green technologies, considering both their benefits and the challenges impeding widespread implementation.

4. To showcase real-world case studies exemplifying successful integrations and breakthroughs within The GRIDS Approach.

5. To emphasize the evolving necessity of green technologies in the face of escalating threats from climate change and the rapid depletion of natural resources.

1.3. Purpose

This research seeks to contribute to the discourse on sustainable living by providing a comprehensive understanding of the pivotal role played by green technologies. By employing The GRIDS Approach as a lens, the study aims to guide policymakers, businesses, and

communities in navigating the complexities of integrating green technologies into diverse contexts.

1.4 Findings from The GRIDS Approach:

The findings from The GRIDS Approach illuminate the transformative potential of green technologies. They reveal that these technologies are not merely facilitators of sustainable lifestyles but have become imperative in addressing the fragility of our global ecosystem. The framework highlights the reduction of ecological footprints, conservation of resources, and the facilitation of a harmonious balance between societal progress and environmental responsibility as key outcomes of effective green technology integration.

In conclusion, the significance of green technologies as a cornerstone for a sustainable future becomes evident through the lens of The GRIDS Approach. This research advocates for proactive engagement and collaboration among global stakeholders, emphasizing the urgency of mainstreaming green technological solutions to navigate the challenges posed by climate change and resource depletion.

2. CLASSIFICATION OF GREEN TECHNOLOGIES

Green technologies can be classified into several categories based on their application: Energy, encompassing solar, wind, hydro, and geothermal solutions; Waste Management, including recycling, composting, and waste-to-energy processes; Water Conservation, with techniques like rainwater harvesting and wastewater treatment; and Transportation, featuring electric vehicles and biofuel innovations.

2.1 Energy

Energy derived from renewable sources plays a pivotal role in sustainable development and environmental conservation.

Solar technology harnesses sunlight, converting it into electricity using photovoltaic cells, offering a clean and abundant energy source.

Wind energy taps into the kinetic power of wind using turbines, transforming it into electrical energy. This is a sustainable solution, particularly potent in regions with consistent wind patterns. (Quangdung Tran, 2020)

Hydroelectricity leverages the energy of flowing water, often from dams, to generate power, serving as a reliable and large-scale energy resource.

Lastly, geothermal energy exploits heat from beneath the Earth's crust, typically from hot springs or magma-heated rocks, providing a constant and efficient energy source.

Together, these technologies present a mosaic of renewable solutions, reducing dependency on fossil fuels and minimizing environmental degradation. (Justice Kofi Debrah, 2021)

2.2 Waste Management

Waste management is pivotal in minimizing environmental impact and promoting sustainability.

Recycling technologies play a crucial role in repurposing discarded materials, reducing the need for virgin resources and curbing landfill waste. This includes processes like melting plastics or refining metals for reuse.

Composting techniques transform organic waste into nutrient-rich compost, diverting substantial waste from landfills and rejuvenating soil health.

Waste-to-energy processes offer a dual benefit: they mitigate the volume of trash in landfills while producing energy. By burning or biologically processing waste, these techniques generate electricity or produce biogas, presenting a sustainable approach to managing waste while harnessing its inherent energy value. (Wen Bin Lim, 2020)

2.3. Water Conversation

In the face of global water scarcity, conservation strategies are paramount.

Rainwater harvesting involves collecting and storing rainwater, reducing reliance on ground or municipal water and aiding in replenishing groundwater tables.

Wastewater treatment and reuse encompass processes that purify used water from households and industries, turning it into a resource suitable for agriculture, landscape irrigation, or even potable use with advanced treatments. (Good, 2011)

Efficient irrigation technologies, such as drip or sprinkler systems, optimize water use in agriculture, ensuring plants receive requisite moisture while minimizing wastage. By implementing these

strategies, societies can combat water shortages, promote sustainable use, and ensure water remains an accessible resource for future generations. (Sarfraz, 2021)

2.4 Transportation

The transportation sector, a significant contributor to global emissions, is undergoing transformative change to reduce its carbon footprint.

Electric vehicles (EVs), powered by electricity stored in batteries, offer a cleaner alternative to traditional gasoline engines, dramatically reducing pollutants and greenhouse gas emissions.

Biofuels, derived from organic materials such as plants or algae, serve as renewable alternatives to conventional fossil fuels, helping in decreasing carbon emissions when burned.

Public transportation innovations, like efficient rapid transit systems or shared mobility solutions, alleviate urban congestion and reduce the number of individually operated vehicles, leading to lower emissions and more sustainable urban environments. Together, these advancements work synergistically, paving the way for a greener transportation future. (Nicholas Burge, 746-807)

2.5. Building and Construction

The building and construction sector plays a critical role in environmental impact, with immense potential for sustainable transformations.

Green architecture and sustainable building materials focus on designs that

minimize waste and energy consumption, utilizing materials like bamboo, recycled metal, or reclaimed wood, which have lower environmental footprints.

Energy-efficient appliances, such as LED lighting or Energy Star-rated devices, reduce the energy demands of buildings, translating to less electricity consumption and reduced greenhouse gas emissions.

Passive solar design refers to architectural strategies that leverage the sun's energy for natural heating and lighting, utilizing features like strategically placed windows, thermal mass, and shading devices.

These designs optimize indoor temperatures, reducing the need for artificial heating or cooling. Collectively, these innovations represent a holistic approach to sustainable building, balancing functional, aesthetic, and environmental considerations.

3. ADVANTAGES OF GREEN TECHNOLOGIES

Green technologies reduce environmental impact, conserve resources, and promote sustainability. They curtail greenhouse gas emissions, offer economic benefits through job creation, and foster healthier, resilient communities, ensuring a brighter future. (Kentone, 2022)

3.1. Environmental Benefits

Green technologies herald a revolution in environmental stewardship. A primary advantage is the reduction in greenhouse gas emissions. By replacing or complementing traditional energy sources, these technologies mitigate the

primary drivers of global warming, offering a tangible solution to climate change challenges. Additionally, they emphasize the conservation of natural resources. Whether it's through water-saving measures, efficient manufacturing processes, or sustainable materials, green tech ensures resources are used judiciously, preventing depletion and ensuring availability for future generations. Beyond direct resource use, these technologies play a significant role in biodiversity protection. By reducing pollutants and curtailing habitat destruction, they create an environment where flora and fauna can thrive, preserving the rich tapestry of life on our planet. (K, 2019)

3.2. Economic Benefits of Green Technologies

Green technologies are not just eco-friendly; they're economically transformative. First, the rise of green tech sectors leads to significant job creation, from research and development to manufacturing and installation roles. As traditional industries wane, green tech provides alternative employment avenues. Second, these technologies offer tangible energy savings and cost reductions. Whether it's households cutting down electricity bills through solar installations or industries reducing operational costs with energy-efficient appliances, the economic relief is palpable. Lastly, the push towards sustainability serves as a stimulus for innovation and the birth of new industries. Entrepreneurs and businesses see opportunities in challenges, leading to

groundbreaking solutions and pioneering ventures, further propelling economic growth. (Söderholm, 2020)

3.3. Social Benefits

Green technologies bring forth profound social benefits. Foremost, with the reduction of environmental pollutants, there's a noticeable improvement in public health. Cleaner air translates to fewer respiratory ailments and a decrease in pollution-induced diseases. Furthermore, green tech initiatives often involve community participation, strengthening community resilience. As communities come together for projects like urban gardens or local renewable energy installations, it fosters unity and a shared sense of purpose. Finally, the embrace of these technologies invariably leads to an enhanced quality of life. Beyond health, cleaner surroundings, green spaces, and reduced noise pollution from green transportation means make urban living more serene and enjoyable, further emphasizing the integral social advantages of green tech. (Renewable Energy and Electricity, 2021)

4. CHALLENGES IN IMPLEMENTING GREEN TECHNOLOGIES

Implementing green technologies faces challenges like high initial costs, technological limitations, resistance to change, infrastructure inadequacies, regulatory barriers, and knowledge gaps, hindering widespread adoption and optimization. (What are the challenges hindering adoption of green building practices?, 2023)

4.1. Technological Barriers

One significant hurdle in the realm of green technologies is the current limits of technology. Some green solutions, while promising, may not yet match the efficiency or output of traditional methods. This discrepancy can hinder widespread adoption, especially if the immediate benefits are not evident. Additionally, there's a pressing need for further research and development (R&D). Continuous innovation is essential to refine existing technologies and discover new breakthroughs. The pace of R&D can be constrained by factors like funding, access to expertise, and infrastructure. Overcoming these technological barriers is crucial for green technologies to realize their full potential and deliver on their promise of a sustainable future. (Lange, 2021)

4.2. Economic Challenges

Economic hurdles often impede the broad acceptance of green technologies. Primarily, the high initial costs associated with green tech solutions, such as installing solar panels or wind turbines, can be prohibitive for individuals and businesses, even if they promise long-term savings. Additionally, market barriers and a lack of incentives further discourage adoption. Existing industries, deeply entrenched in conventional technologies, might resist change due to vested interests. Without substantial financial incentives or policy support, businesses and consumers might delay or forgo the transition to greener alternatives. Overcoming these economic challenges necessitates both public and

private sector collaboration, and strategic policymaking to create a conducive economic environment. (Phebe Asantewaa Owusu, 2016)

4.3. Sociopolitical Challenges

The road to green technology adoption isn't just paved with technical or economic hurdles; sociopolitical challenges are significant. Public resistance or lack of awareness can delay the adoption of sustainable practices. Misconceptions or a mere unfamiliarity with green technologies can make people hesitant to embrace change. Additionally, regulatory and policy challenges play a crucial role. Inconsistent policies, lack of foresight in regulations, or bureaucratic red tape can impede the growth and integration of green solutions. Overcoming these challenges requires concerted efforts in public education, community engagement, and a regulatory environment that's adaptive, forward-thinking, and supportive of sustainable technological advancements. (Damini, 2022)

5. CASE STUDIES

5.1 Country or Region Focus

Denmark stands as a beacon in wind energy, meeting a significant portion of its electricity needs through wind turbines. Japan, post-Fukushima, has invested heavily in solar technology, showcasing urban centers adorned with solar panels. Meanwhile, Singapore's water recycling and rainwater harvesting strategies serve as models for urban water sustainability. These nations exemplify the successful integration of green technologies, driven by a blend of necessity, innovation, and policy support. (India, 2019)

5.2. Specific Technologies

Tesla's Electric Vehicle: Tesla, an American automaker, revolutionized transportation with its electric vehicles (EVs). Its Model S broke perceptions by proving that EVs could combine luxury, range, and performance. Tesla's innovations, including its proprietary Supercharger network and software updates, have pushed the entire automotive industry toward electrification. The ripple effects include reduced carbon emissions, decreased fossil fuel dependence, and a challenge to traditional automotive paradigms, paving the way for a sustainable transport future. (The Role of Electric Vehicles in Reducing Carbon Emissions, 2023)

5.3 Failure and Lesson

The Solyndra Scandal: Solyndra, a solar panel company, received significant U.S. government funding but went bankrupt in 2011. Its cylindrical solar panels, although innovative, couldn't compete with cheaper alternatives. The fallout highlighted the risks of governmental financial backing in fast-evolving sectors. The lesson? While supporting green tech is vital, thorough due diligence and market analysis are equally crucial to ensure that investments drive sustainable and competitive solutions. (India G. o., 2022)

6. THE ROAD AHEAD: FUTURE PROSPECTS FOR GREEN TECHNOLOGIES

6.1 Emerging Technologies

Innovative green technologies are continually emerging, like algae biofuel, which turns aquatic plants into energy, and energy-harvesting pavements that generate power from footsteps. These frontier solutions promise to reshape our sustainable efforts, merging scientific advancement with environmental responsibility. (Ezema, 2019)

6.2 Role of Policymakers

Policymakers wield significant influence in green tech's trajectory. By enacting supportive policies, offering tax incentives, and funding research, governments can drive innovation and adoption. International bodies, through guidelines and collaborative initiatives, can standardize practices and encourage cross-border cooperation. Their combined efforts can shape a regulatory landscape conducive to sustainable technological growth, ensuring global strides toward environmental resilience. (Colson, 2022)

6.3 Individual and Community Actions

At the grassroots level, individuals and communities play pivotal roles in green tech adoption. From installing solar panels on homes to initiating community gardens or local recycling programs, individual actions create ripple effects. Communities championing carpooling, rainwater harvesting, or local renewable projects foster a culture of sustainability. These collective efforts, though localized, cumulatively contribute to global environmental betterment and drive larger systemic changes. (Ma, 2022)

(Barriers to Renewable Energy Technologies, 2014)

7. CONCLUSION

The journey toward a sustainable future is a complex interplay of technological innovation, governmental support, and grassroots momentum. Green technologies not only provide solutions but also present opportunities for economic and social growth. Challenges, though present, serve as valuable lessons that refine our approach and enhance the resilience of our endeavors. (How do you overcome the barriers and challenges of green technology adoption?, 2022)

Individuals and communities play a pivotal role, recognizing that every small action contributes to the broader tapestry of global sustainability. Standing at this crucial juncture, the collective efforts of nations, industries, and citizens will shape the environmental legacy we leave for future generations. (Chadha, 2022)

Green technologies emerge as transformative solutions, intertwining environmental stewardship with socio-economic growth. Despite challenges, ranging from technological barriers to socio-political hurdles, their manifold benefits, including emissions reduction and economic opportunities, make them essential for reshaping our world while balancing progress with ecological responsibility. (Kshetrimayum Birla Singh, 2023)

Embracing green technologies is imperative for a future that is both progressive and sustainable. This pivotal moment demands collective action from

policymakers, industries, and individuals to champion and invest in sustainable solutions. The call is to drive innovation, break barriers, and prioritize a green transition, ensuring the thriving of our planet for generations to come. (Dyer, 2020)

8. SUGGESTED MODEL TO THE INDUSTRY

8.1 Awareness & Education:

Objective: Increase knowledge on the importance and benefits of green technologies.

Action: Conduct seminars, workshops, and webinars. Collaborate with educational institutions for curriculum integration.

8.2 Research & Development:

Objective: Foster innovation and overcome technological barriers.

Action: Establish dedicated R&D centers, incentivize innovation through grants and competitions, and partner with academic institutions. (Bergamasco, 2017)

8.3 Economic Incentivization:

Objective: Make green technologies financially appealing.

Action: Provide tax breaks, subsidies, and low-interest loans for green initiatives. Establish public-private partnerships.

8.4 Policy & Regulation:

Objective: Create a conducive regulatory environment.

Action: Develop clear, forward-looking policies, reduce bureaucratic hurdles, and establish standards.

8.5 Community Engagement:

Objective: Harness grassroots energy and local knowledge.

Action: Launch community-driven green projects, solicit feedback, and create platforms for local innovation.

8.6 Infrastructure Development:

Objective: Lay the groundwork for widespread adoption.

Action: Develop renewable energy grids, recycling facilities, and sustainable transport infrastructure.

8.7 Continuous Evaluation:

Objective: Ensure the model's adaptability and relevance.

Action: Regularly assess the impact of interventions, solicit feedback from all stakeholders, and iterate based on findings.

8.8 International Collaboration:

Objective: Learn from global best practices and foster cross-border cooperation.

Action: Engage in international green tech forums, collaborate on joint projects, and share knowledge.

8.9 Call to Industry:

Embracing the SIM-GT model is not just an environmental imperative but a strategic business move. As consumer consciousness grows and global trends shift toward sustainability, industries that

proactively adopt and promote green technologies will position themselves as leaders, benefiting both the planet and their bottom line.

G - Green Awareness & Education

R - Research & Development

I - Incentivization, Economic

D - Development of Infrastructure & Dynamic Policy & Regulation

S - Stakeholder Engagement, Continuous

suggests a systematic approach, and "Sustainable Progress" is the overarching goal.

The added emphasis on "Dynamic Policy & Regulation" and "Stakeholder Engagement" highlights the model's adaptability and the importance of community and stakeholder participation.

Lastly, the "Call to Industry" could serve as a preamble or postscript to the model, emphasizing the benefits of adopting the

Fig.1. Tarun's GRIDS Framework for Sustainable Progress
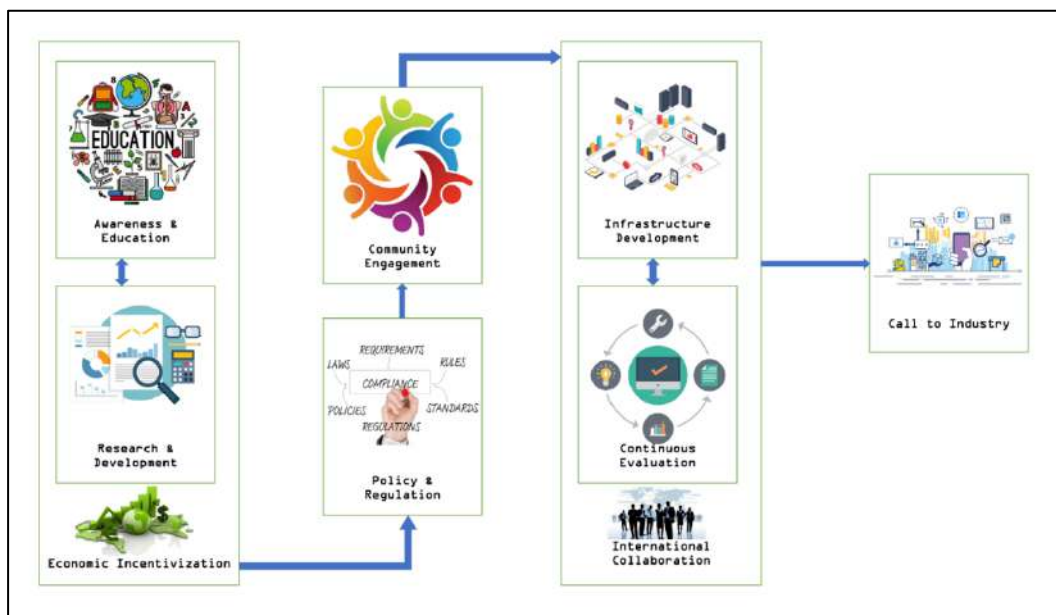
Evaluation, & Strategic International Collaboration

The term "GRIDS" alludes to the interconnected nature of all these initiatives, much like a power grid or network. Each component supports and reinforces the others, creating a cohesive structure. The term "Framework"

GRIDS framework for businesses in the present and future sustainable landscape.The added emphasis on "D

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Modified Vogel's Approximation Method to Solve Both Balanced and Unbalanced Transportation Problems

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ABSTRACT

The Transportation Problem (TP) is a characteristic optimization technique that aims to find the most effective way to deliver items from suppliers to customers while keeping transportation costs to a minimum. By refining Vogel's approximation approach, this work suggests a novel algorithm that covers both balanced and unbalanced transportation problems. This suggested method provides optimal or near-optimal solutions to TPs, increasing overall system performance and reducing transportation costs. The suggested technique is based on a modification of Vogel's approximation method, which is a common method for solving TPs. Vogel's approach has been modified to overcome its limits and increase its accuracy in addressing transportation challenges. Our

solution, in particular, introduces additional restrictions that take into account the least cost per unit of transportation, allowing our algorithm to handle both balanced and unbalanced transportation situations. Using numerical examples, we illustrate the usefulness of the proposed algorithm by comparing its performance to that of other current approaches. Several forms of TPs, such as balanced and unbalanced TPs with various origins and destinations, are numerically shown. According to the findings, the suggested algorithm provides optimal or near-optimal solutions and beats other current approaches in terms of solution quality and computing efficiency. By enhancing the accuracy of transportation cost prediction and optimizing transportation routes, the suggested algorithm has the potential to revolutionize the transportation business. It provides a simple solution that may be

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utilized in a variety of sectors, including production, management of supply chains, and transportation. This algorithm can assist businesses in lowering transportation costs, increasing operational efficiency, and improving customer satisfaction.

Keywords— **Customer satisfaction, Optimization, Supply chains, Transportation problems, Vogel's approximation**

1. INTRODUCTION

The Transportation Problem (TP) is a fundamental optimization technique that is important in ensuring the effective transport of commodities from suppliers to buyers. Several real-wsorld scenarios, such as production processes, logistics and distribution, and supply chain management, include this issue. The goal of the TP is to find the most effective way to distribute items from numerous sources to multiple destinations while keeping transportation costs to a minimum. Many researchers have developed various alternative approaches for solving the TP. There are numerous approaches to solving TPs that are both interesting and distinct from one another. TP-solving approaches, such as the Northwest Corner Method (NWCM), the Least Cost Method (LCM), Vogel's Approximation Method (VAM), etc., may not yield optimal or near-optimal solutions. The modified distribution (MODI) method and the stepping stone method are better for finding the optimal solution for TPs.

Opara Jude (Jude et al., 2017) proposed a method called the Inverse Coefficient of Variation Method in 2017. Lakhveer Kaur

(Rakshit et al., 2019) proposed an approach for obtaining the Initial Basic Feasible Solution (IBFS) of TP in 2019. A modified algorithm for solving unbalanced TP was developed by A. K. M. Selim Reza (M Selim Reza et al., 2019) in 2019. A. E. S. Ramanujan (Edward Samuel, 2012) proposed the Improved Zero Point Method (IZPM) for solving both Crisp and Fuzzy TPs. K. Venkatasubbaiah (Venkatasubbaiah et al., n.d.) proposed a fuzzy goal programming method for Solving Multi-Objective TPs. An Average Opportunity Cost Method to find the IBFS of TPs was proposed by Swati V. Kamble (Kamble & Kore, 2019) in 2019. Reena G. Patel (G. Patel et al., 2017) presented an alternative approach to finding the IBFS of TPs in 2017. The maximum difference method was proposed by Smita Sood and Keerti Jain (Sood & Jain, 2015) in 2015. Serdar Korukoğlu (Korukoğlu & Ballı, 2011) proposed an improved Vogel's approximation method in 2011. The Incessant Allocation Method was developed by Mollah Mesbahuddin Ahmed (Ahmed et al., 2016) in 2016. In 2015, Aminur Rahman Khan (Khan, Aminur & Adrian, Vilcu & Sultana, Nahid & Ahmed, 2015) proposed a method called the TOCM-SUM approach. T. Geetha (Geetha & Anandhi, 2018) used the standard deviation method to solve TPs in 2018. The Implied Cost Method was proposed by Md. Ashraful Babu (Babu et al., 2014) in 2014. The Improved Least Cost Method was used to solve TPs by Md. Sharif Uddin (Uddin & Khan, 2016) in 2016. Dhia Abdul Sattar Kadhem and Mardeen Shawkat Taher (Kadhem et al., 2013) developed a method using the Maximum supplies and demands

and combining both of them with the minimum cost to find an IBFS of TPs in 2013. Z.A.M.S. Juman (Juman et al., 2022) proposed several algorithms to solve TPs. EMUSB. Ekanayake (Ekanayake et al., 2022) and his colleagues proposed several methods to address TPs. K.P.O. Niluminda (Niluminda et al., 2023) published several papers addressing novel algorithms to solve TPs. Moreover, S. Krishna Prabha (Prabha & Scholar, 2016), Abul Kalam Azad (Kalam Azad, 2018), Bimal Sinha (Sinha et al., 2016), P. K. Giri (Giri et al., 2016), S. Krishna Prabha (Krishna Prabha & Vimala, 2016), D. Santhosh Kumar (Kumar & Rabinson, 2018), Sharmistha Jana (Jana et al., 2018), A. Seethalakshmy (Seethalakshmy & Srinivasan, 2019), and Md. Salehin Ferdous Kader (Kader & Alam, 2019) proposed several methods to address TPs.

In this study, we summarise all of the existing research and offer a novel method that can handle both balanced and unbalanced TPs. The proposed algorithm improves Vogel's approximation approach to deliver optimal or near-optimal transportation solutions. We use numerical simulations to demonstrate the efficacy of our proposed algorithm and compare its performance to that of other existing approaches. According to the proposed algorithm, it outperforms other current approaches in terms of solution quality and computing efficiency, which makes it an attractive tool for improving transportation networks in a variety of sectors.

2. METHODOLOGY

This section presents some preliminaries related to TPs and proposed novel modified Vogel's Approximation Method.

2.1 Sources (Origins)

Sources are the starting places of transportation movements or travels. They could be particular places like buildings, factories, or transit hubs like bus stops, train stations, or airports. Sources are the places where people or organizations start their journeys or send items to be transported.

Destination (Locations)

The endpoints or final places of transportation journeys are indicated by destinations. They stand in for the locations that people or organizations want to go or where they want to deliver things. Residential addresses, business locations, distribution hubs, ports, and other defined sites of arrival are all considered destinations.

Penalty Value (Opportunity cost" or the "slack cost")

When available resources are not completely exploited, the cost or loss is represented by the penalty value in transportation problems. By taking into account the opportunity cost of underutilization, it promotes optimal resource allocation and reduces transportation costs.

The Vogel's Approximation Method (VAM)

A heuristic technique used to solve transportation problems is called Vogel's

Approximation Method (VAM). It is intended to swiftly arrive at an initial feasible solution by taking the cost or penalty of each possible transportation route into account. In the transportation matrix, each row and column's two lowest costs are calculated, and VAM chooses the route with the largest difference as the next allocation. This methodology aids in balancing the distribution across several routes and can be used as a springboard for more sophisticated optimization methods.

The Proposed Modified Vogel's Approximation Method

The Proposed Modified Vogel's Approximation algorithm is shown below and we can solve both balanced and unbalanced TPs using this method.

Step 1: Determine whether the transportation problem is balanced.

If the problem is unbalanced, it must be balanced by adding a dummy row or column. A non-existent origin or supplier is represented by a dummy row, while a non-existent location or demand is represented by a dummy column.

Step 2: Determine each row's and column's slack cost (penalty value).

Calculate the slack cost for each row and column in the transportation table by determining the difference between the greatest and second minimum value of the cells in that row or column.

Step 3: Select the highest slack cost and allocate it to the appropriate cell.

Select the row or column with the largest slack cost and find the cell in that row or column with the lowest cost. Assign the cell the minimum supply and demand for that row or column.

Step 4: Resolve any ties in slack costs.

If slack costs are tied, select the cell with the lowest cost. If there are any remaining ties, select the cell with the maximum allocation

Step 5: Cross out any rows or columns where supply or demand has been met.

Remove any rows or columns that have been fully satisfied (i.e., its total supply or demand has been fulfilled).

Step 6: Continue the steps until the transportation issue is resolved.

Stop the procedure when all demand has been fulfilled at each destination and all supply has been met at each origin. Otherwise, repeat steps 2–5 until the transportation issue has been resolved.

3. RESULTS AND DISCUSSION

This section illustrates the numerical examples of balanced and unbalanced TP using the proposed algorithm and compares the results with existing methods.

Example 1: BTP-1 (Ekanayake et al., 2022)

Step 1:

Table 1: Initial Balanced Transportation Table

	L_1	L_2	L_3	L_4	Supply
O_1	4	2	4	1	400
O_2	3	10	5	1	300
O_3	4	8	8	6	250
O_4	4	10	2	7	50
Demand	100	300	250	350	

In this example, total supply is equal to total demand. Therefore, this is balanced TP.

Steps 2 – 6:

Table 2: Iteration_1

	L_1	L_2	L_3	L_4	Supply	SC_1
O_1	4	2	4	1	400	2
O_2	~~3~~	~~10~~	~~5~~	1*(300)	~~300~~, 0	**7**
O_3	4	8	8	6	250	2
O_4	4	10	2	7	50	6
Demand	100	300	250	~~350~~, 50		
SC_1	1	2	4	1		

Table 3: Iteration_2

	L_1	L_2	L_3	L_4	Supply	SC_1	SC_2
O_1	4	2	4	1	400	2	2
O_2	~~3~~	~~10~~	~~5~~	1*(300)	~~300~~, 0	**7**	-
O_3	4	8	8	6	250	2	2
O_4	4	~~10~~	2*(50)	~~7~~	~~50~~, 0	6	**6**

Demand	100	300	250, 200	350, 50
SC₁	1	2	4	1
SC₂	-	2	4	1

Table 4: Iteration_3

	L₁	L₂	L₃	L₄	Supply	SC₁	SC₂	SC₃
O₁	4	2*(300)	4	1	400, 100	2	2	2
O₂	3	10	5	1*(300)	300, 0	7	-	-
O₃	4	8	8	6	250	2	2	2
O₄	4	10	2*(50)	7	50, 0	6	6	-
Demand	100	300, 0	250, 200	350, 50				
SC₁	1	2	4	1				
SC₂	-	2	4	1				
SC₃	-	6	4	5				

Table 5: Iteration_4

	L₁	L₂	L₃	L₄	Supply	SC₁	SC₂	SC₃	SC₄
O₁	4	2*(300)	4	1*(50)	400, 100, 50	2	2	2	3
O₂	3	10	5	1*(300)	300, 0	7	-	-	-
O₃	4	8	8	6	250	2	2	2	2
O₄	4	10	2*(50)	7	50, 0	6	6	-	-
Demand	100	300, 0	250, 200	350, 50, 0					
SC₁	1	2	4	1					
SC₂	-	2	4	1					
SC₃	-	6	4	5					

SC₄	-	**-**	4	**5**

Table 6: Iteration_5

	L₁	L₂	L₃	L₄	Supply	SC₁	SC₂	SC₃	SC₄	SC₅
O₁	4	2*(300)	4	1*(50)	~~400~~, ~~100~~, 50	2	2	2	3	-
O₂	~~3~~	~~10~~	~~5~~	1*(300)	~~300~~, 0	**7**	-	-	-	-
O₃	4*(100)	~~8~~	8	6	~~250~~, 150	2	2	2	2	**4**
O₄	4	~~10~~	2*(50)	~~7~~	~~50~~, 0	6	**6**	-	-	-
Demand	~~100~~, 0	~~300~~, 0	~~250~~, 200	~~350~~, ~~50~~, 0						
SC₁	1	2	4	1						
SC₂	-	2	4	1						
SC₃	-	**6**	4	5						
SC₄	-	-	4	**5**						
SC₅	-	-	4	-						

Table 7: Final Transportation Table with all Allocations

	L₁	L₂	L₃	L₄	Supply	SC₁	SC₂	SC₃	SC₄	SC₅	SC₆
O₁	4	2*(300)	4*(50)	1*(50)	~~400~~, ~~100~~, ~~50~~, 0	2	2	2	3	-	-
O₂	~~3~~	~~10~~	~~5~~	1*(300)	~~300~~, 0	**7**	-	-	-	-	-
O₃	4*(100)	~~8~~	8*(150)	6	~~250~~, ~~150~~, 0	2	2	2	2	**4**	-
O₄	4	~~10~~	2*(50)	~~7~~	~~50~~, 0	6	**6**	-	-	-	-
Demand	~~100~~, 0	~~300~~, 0	~~250~~, ~~200~~, ~~150~~, 0	~~350~~, ~~50~~, 0							
SC₁	1	2	4	1							

SC$_2$	-	2	4	1
SC$_3$	-	**6**	4	5
SC$_4$	-	-	4	**5**

	L$_1$	L$_2$	L$_3$	D/L	Supply
O$_1$	6	10	14	0	50
O$_2$	12	19	21	0	50
O$_3$	15	14	17	0	50
Demand	30	40	55	25	
SC$_5$	-	-	4	-	
SC$_6$	-	-	**4**	-	

Total Transportation Cost = (2*300) + (4*50) + (1*50) + (1*300) + (4*100) + (8*150) + (2*50) = 2850

In this example, the proposed method gives the total transportation cost is 2850. It is also the optimal solution. But the VAM method gives the 2900. It is higher than the proposed method solution. So, the proposed method is better than this balanced TP compared to the VAM method. In this example, total supply is not equal to total demand. Therefore, this unbalanced TP. We should balance this unbalanced TP by adding a dummy location. The balanced transportation problem is shown in Table 9

Table 10: Iteration_1

	L$_1$	L$_2$	L$_3$	D/L	Supply	SC$_1$
O$_1$	6	10	14	~~0~~	50	8
O$_2$	12	19	21	0*(25)	~~50~~, 25	**9**
O$_3$	15	14	17	~~0~~	50	3
Demand	30	40	55	~~25~~, 0		
SC$_1$	3	5	4	0		

Table 11: Iteration_2

	L₁	L₂	L₃	D/L	Supply	SC₁	SC₂
O₁	6	10*(40)	14	0̶	5̶0̶, 10	8	4
O₂	12	1̶9̶	21	0*(25)	5̶0̶, 25	9	2
O₃	15	1̶4̶	17	0̶	50	3	2
Demand	30	4̶0̶, 0	55	2̶5̶, 0			
SC₁	3	5	4	0			
SC₂	3	5	4	-			

Table 12: Iteration_3

	L₁	L₂	L₃	D/L	Supply	SC₁	SC₂	SC₃
O₁	6	10*(40)	14	0̶	5̶0̶, 10	8	4	8
O₂	12*(25)	1̶9̶	2̶1̶	0*(25)	5̶0̶, 2̶5̶, 0	9	2	9
O₃	15	1̶4̶	17	0̶	50	3	2	2
Demand	3̶0̶, 5	4̶0̶, 0	55	2̶5̶, 0				
SC₁	3	5	4	0				
SC₂	3	5	4	-				
SC₃	3	-	4	-				

Table 13: Iteration_4

	L₁	L₂	L₃	D/L	Supply	SC₁	SC₂	SC₃	SC₄
O₁	6*(5)	10*(40)	14	0̶	5̶0̶, 1̶0̶,	8	4	8	8

	L₁	L₂	L₃	D/L	Supply	SC₁	SC₂	SC₃	SC₄
					5				
O₂	12*(25)	~~19~~	~~21~~	0*(25)	~~50, 25,~~ 0	**9**	2	**9**	-
O₃	~~15~~	~~14~~	17	~~0~~	50	3	2	2	2
Demand	~~30, 5,~~ 0	~~40,~~ 0	55	~~25,~~ 0					
SC₁	3	5	4	0					
SC₂	3	**5**	4	-					
SC₃	3	-	4	-					
SC₄	**9**	-	3	-					

Table 14: Final Transportation Table with all Allocations

	L₁	L₂	L₃	D/L	Supply	SC₁	SC₂	SC₃	SC₄	SC₅
O₁	6*(5)	10*(40)	14*(5)	~~0~~	~~50, 10,~~ ~~5,~~ 0	8	4	8	8	-
O₂	12*(25)	~~19~~	~~21~~	0*(25)	~~50, 25,~~ 0	**9**	2	**9**	-	-
O₃	~~15~~	~~14~~	17*(50)	~~0~~	~~50,~~ 0	3	2	2	2	-
Demand	~~30, 5,~~ 0	~~40,~~ 0	~~55, 50,~~ 0	~~25,~~ 0						
SC₁	3	5	4	0						
SC₂	3	**5**	4	-						
SC₃	3	-	4	-						
SC₄	**9**	-	3	-						
SC₅	-	-	**3**	-						

Total Transportation Cost = (6*5) + (10*40) + (14*5) + (12*25) + (0*25) + (17*50) = 1650

In this example, the proposed method gives the total transportation cost is 1650. It is also the optimal solution. But the VAM method gives the 1745. It is higher than the proposed method solution. So, the proposed method is better than this balanced TP compared to the VAM method.

3.1 Comparative Analysis

This section the proposed method (Modified VAM) analysis comparatively with existing methods for both balanced and unbalanced TPs. The comparative analysis of balanced TPs is shown in Table 15. The data set of Table 15 is attached in Appendices 1.

Table 15: Comparative Analysis of Balanced TPs.

Problem	Total Transportation Cost					Percent Error (%)			
	NWCM	LCM	VAM	Proposed (MVAM)	Optimal	NWCM	LCM	VAM	Proposed (MVAM)
BTP -1	4150	3850	2900	2850	2850	45.61	35.09	1.75	0.00
BTP -2	4160	3500	3320	3320	3320	25.30	5.42	0.00	0.00
BTP -3	139	103	103	103	103	34.95	0.00	0.00	0.00
BTP -4	4400	2900	2850	2850	2850	54.39	1.75	0.00	0.00
BTP -5	234	191	187	183	183	27.87	4.37	2.19	0.00
BTP -6	5925	4550	5125	4550	4525	30.94	0.55	12.64	0.55
BTP -7	226	156	156	156	156	44.87	0.00	0.00	0.00
BTP -8	730	555	555	555	555	31.53	0.00	0.00	0.00
BTP -9	1500	1450	1500	1390	1390	7.91	4.32	7.91	0.00
BTP -10	9050	9275	9275	9275	8400	7.74	10.42	10.42	10.42
BTP -11	4125	3500	3500	3500	3500	17.86	0.00	0.00	0.00
BTP -12	3800	3800	3800	3800	3800	0.00	0.00	0.00	0.00

The graphical representation of the comparative analysis is shown in Figures 1 and 2. By looking at Table 15, Figure 1, and Figure 2 proposed method gives optimal or near-optimal solutions. In most of the cases Proposed method solution is

better than the VAM solution and in other cases, it is equal to VAM solutions. The percent error is less than in the proposed method compared to the other existing methods.
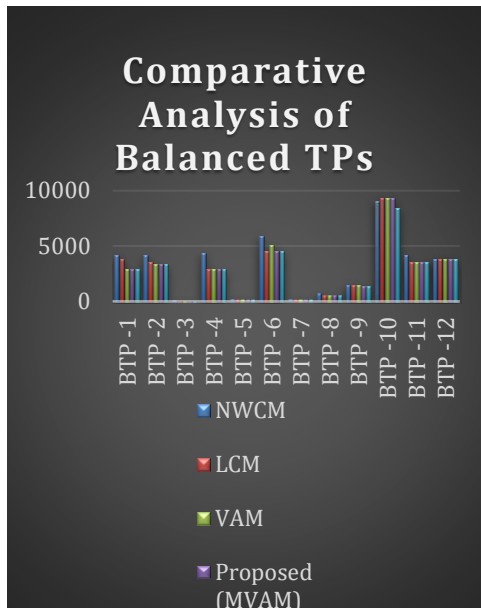
Figure 1: Comparative Analysis of Unbalanced TPs
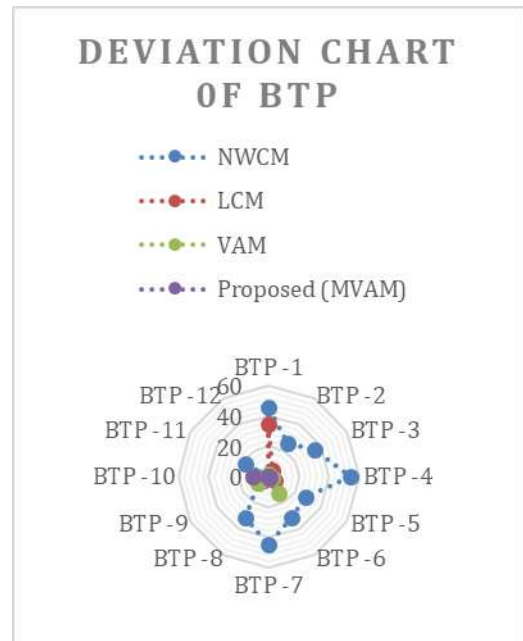
Figure 2: BTP's Percent Error Deviation

The comparative analysis of balanced TPs is shown in Table 15. The data set of Table 16 is attached in Appendix 2.

Table 16: Comparative Analysis of Unbalanced TPs.

Problem	Total Transportation Cost					Percent Error (%)			
	NWCM	LCM	VAM	Proposed (MVAM)	Optimal	NWCM	LCM	VAM	Proposed (MVAM)
UBTP -1	1815	1695	1745	1650	1650	10.00	2.73	5.76	0.00
UBTP -2	175	136	136	136	136	28.68	0.00	0.00	0.00
UBTP -3	5070	4900	5020	4740	4720	7.42	3.81	6.36	0.42
UBTP -4	18800	7750	8350	7750	7750	142.58	0.00	7.74	0.00
UBTP -5	8150	5750	6000	6000	5600	45.54	2.68	7.14	7.14
UBTP -6	1530	1140	1140	1140	1140	34.21	0.00	0.00	0.00
UBTP -7	13100	9200	9200	9200	9200	42.39	0.00	0.00	0.00

UBTP -8	1780	1465	1555	1520	1465	21.50	0.00	6.14	3.75

The graphical representation of the comparative analysis is shown in Figures 3 and 4.
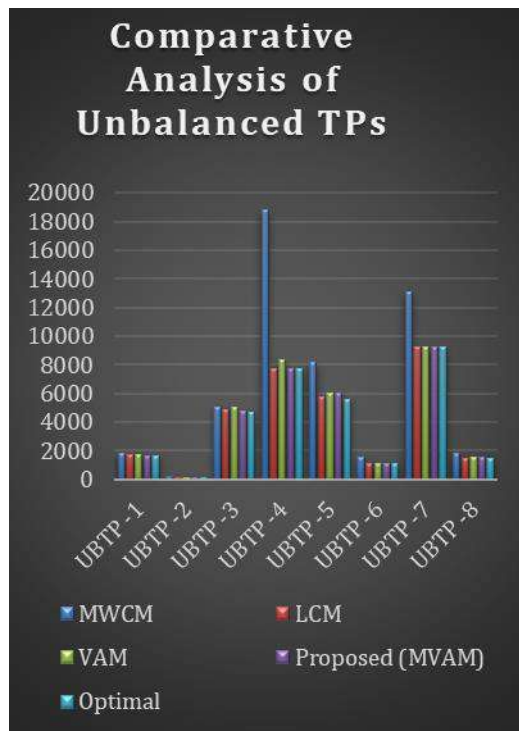
Figure 3: Comparative Analysis of Unbalanced TPs

Figure 4: UBTP's Percent Error Deviation Chart

By looking at Table 16, Figure 3, and Figure 4 proposed method gives optimal or near-optimal solutions. In most of the cases Proposed method solution is better than the VAM solution and in other cases, it is equal to VAM solutions. The percent error is less than in the proposed method compared to the other existing

## 4. CONCLUSION

This examination proposed a new method that solves Transportation Problems (TPs) simply and more effectively. Different techniques have been developed in the literature for solving the transportation problem, but this approach plays an important role. The proposed algorithm was put to the test using several numerical examples, and it outperformed the other approaches by a wide margin. However, this algorithm can be a useful tool for enhancing logistics and transportation, which would be advantageous for both businesses and customers. The workup and proposed algorithm represent a significant advancement in the study of TPs. It has the

ability to alter how companies manage their transportation, save money, and enhance the products and services they provide. Also, this algorithm can assist businesses and transportation providers in various areas, including product development, supply chain management, and consumer delivery.

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Appendices

Appendices 1: Data set of Balanced Transportation Problems

Problem	Data
BTP -1	$c_{ij} = \{4, 2, 4, 1; \ 3, 10, 5, 1; 4, 8, 8, 6; 4, 10, 2, 7\}$
	$O_{ij} = \{400, 300, 250, 50\}, L_{ij} = \{100, 300, 250, 350\}$
BTP -2	$c_{ij} = \{50, 60, 100, 50; \ 80, 40, 70, 50; 90, 70, 30, 50\}$
	$O_{ij} = \{20, 38, 16\}, L_{ij} = \{10, 18, 22, 24\}$
BTP -3	$c_{ij} = \{9, 12, 9, 6, 9, 10; \ 7, 3, 7, 7, 5, 5; 6, 5, 9, 11, 3, 1; 6, 8, 11, 2, 2, 10\}$
	$O_{ij} = \{5, 6, 2, 9\}, L_{ij} = \{4, 4, 6, 2, 4, 2\}$
BTP -4	$c_{ij} = \{3, 1, 7, 4; \ 2, 6, 5, 9; 8, 3, 3, 2\}$
	$O_{ij} = \{300, 400, 500\}, L_{ij} = \{250, 350, 400, 200\}$
BTP -5	$c_{ij} = \{5, 7, 10, 5, 3; \ 8, 6, 9, 12, 14; 10, 9, 8, 10, 15\}$
	$O_{ij} = \{5, 10, 10\}, L_{ij} = \{3, 3, 10, 5, 4\}$
BTP -6	$c_{ij} = \{6, 8, 10; \ 7, 11, 11; 4, 5, 12\}$
	$O_{ij} = \{150, 175, 275\}, L_{ij} = \{200, 100, 300\}$
BTP -7	$c_{ij} = \{4, 6, 9, 5; \ 2, 6, 4, 1; 5, 7, 2, 9\}$
	$O_{ij} = \{16, 12, 15\}, L_{ij} = \{12, 14, 9, 8\}$
BTP -8	$c_{ij} = \{6, 4, 1; \ 3, 8, 7; 4, 4, 2\}$
	$O_{ij} = \{50, 40, 60\}, L_{ij} = \{20, 95, 35\}$
BTP -9	$c_{ij} = \{4, 3, 5; \ 6, 5, 4; 8, 10, 7\}$
	$O_{ij} = \{90, 80, 100\}, L_{ij} = \{70, 120, 80\}$
BTP -10	$c_{ij} = \{13, 15, 11, 17; \ 9, 21, 22, 10; 5, 26, 21, 10\}$
	$O_{ij} = \{50, 300, 250\}, L_{ij} = \{25, 175, 100, 300\}$
BTP -11	$c_{ij} = \{19, 16, 17; \ 13, 13, 9; 7, 17, 19\}$
	$O_{ij} = \{100, 50, 100\}, L_{ij} = \{25, 175, 50\}$
BTP -12	$c_{ij} = \{11, 7, 11, 17; \ 12, 7, 8, 16; 15, 14, 9, 7\}$
	$O_{ij} = \{50, 150, 300\}, L_{ij} = \{25, 175, 100, 200\}$

Appendices 2: Data set of Unbalanced Transportation Problems

Problem	Data
UBTP -1	$c_{ij} = \{6, 10, 14;\ 12, 19, 21; 15, 14, 17\}$
	$O_{ij} = \{50, 50, 50\}, L_{ij} = \{30, 40, 55\}$
UBTP -2	$c_{ij} = \{7, 10, 8, 8, 5;\ 6, 9, 9, 8, 7; 10, 6, 8, 8, 6\}$
	$O_{ij} = \{4, 4, 5, 4, 8\}, L_{ij} = \{8, 5, 9, 3\}$
UBTP -3	$c_{ij} = \{10, 15, 12, 12;\ 8, 10, 11, 9; 11, 12, 13, 10\}$
	$O_{ij} = \{200, 150, 120\}, L_{ij} = \{140, 120, 80, 220\}$
UBTP -4	$c_{ij} = \{10, 8, 4, 3;\ 12, 14, 20, 2; 6, 9, 25, 25\}$
	$O_{ij} = \{500, 400, 300\}, L_{ij} = \{250, 350, 600, 150\}$
UBTP -5	$c_{ij} = \{5, 4, 8, 6, 5;\ 4, 5, 4, 3, 2; 3, 6, 5, 8, 4\}$
	$O_{ij} = \{600, 400, 1000\}, L_{ij} = \{450, 400, 200, 250, 300\}$
UBTP -6	$c_{ij} = \{6, 9, 7, 7, 4;\ 5, 8, 8, 7, 6; 9, 5, 7, 7, 5\}$
	$O_{ij} = \{40, 40, 50, 40, 80\}, L_{ij} = \{80, 50, 90, 30\}$
UBTP -7	$c_{ij} = \{5, 8, 6, 6, 3;\ 4, 7, 7, 6, 5; 8, 4, 6, 6, 4\}$
	$O_{ij} = \{800, 500, 900\}, L_{ij} = \{400, 400, 500, 400, 800\}$
UBTP -8	$c_{ij} = \{5, 6, 9;\ 3, 5, 10; 6, 7, 6; 6, 4, 10\}$
	$O_{ij} = \{100, 75, 50, 75\}, L_{ij} = \{70, 80, 120\}$

Proposing an Information Systems Solution to Improve Collaboration Among the Vegetable Farming Community in Sri Lanka

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ABSTRACT

The vegetable market in Sri Lanka has always been volatile due to the surplus and deficit of produce. Studies have shown that a lack of collaboration within the vegetable cultivation community has resulted in poor diversification of crops. Several ICT interventions were introduced to optimize the vegetable cultivation sector. However, all these focused on the post-harvest stage, resulting in the farmers not using the systems as intended. Therefore, a gap was identified as a requirement for an Information Systems Solution that would improve collaboration among the vegetable farming community and facilitate informed decision-making during the pre-cultivation stage. This study was designed to find requirements, design a suitable information systems solution, and finally, evaluate and check if the system met the needs of the intended stakeholders. The study comprised of three main surveys. A pilot survey, the main data collection survey, and an evaluation of the proposed solution (prototype). The main sample comprised of 19 Agricultural Officials and 50 Farmers. It was found that Farmers and Agri officials collaborated for many reasons while the frequency depended on the reason. However, there was minimum communication during the decision-making stages due to a lack of information sharing. Even though knowledge sharing happened, the modes used did not reach the farmers as intended. There was a need for an efficient and cost-effective method of communication between the parties rather than the most commonly used in-person communication. Almost all respondents had a good level of ICT knowledge while most preferred and had access to a smartphone. Therefore, a mobile application was proposed as a solution. This proposed Information System solution facilitates communication (group

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& personalized), informed decision-making when selecting the vegetable variety, and targeted & monitored knowledge sharing, ultimately improving collaboration among the vegetable farming community as intended.

Keywords **- collaboration, information systems, farming, community**

1. INTRODUCTION

Agriculture is one of the main divisions of the Sri Lankan economy (Ministry of Agriculture, 2020). 33% of Sri Lanka's population engages in agriculture-related activities while their contribution to the country's GDP is 7% (Baddegamage, De Silva, & Goonetillake, 2022). Sri Lanka exports around 90,000 tons of fresh and processed fruits and vegetables worldwide (Export Development Board, Sri Lanka).

With the matters standing as such it is vital to analyze and make the sector much more efficient and effective. Several projects have been conducted in the past for that purpose. As an example, the Govipola app was launched to provide a mobile marketplace for Sri Lankan farmers. Research on improving the quality of seeds used in plantations, increasing produce, battling against climatic changes affecting cultivation, etc. have been conducted by researchers with the same ultimate motive.

This research will focus on how Information Systems can be used to manage vegetable cultivation in Sri Lanka, which is a relatively untouched area of the agriculture sector.

1.1 Importance of the Study

In several media publications, we find various issues faced by vegetable farmers in Sri Lanka. The most common issue is the surplus of vegetable harvest resulting in farmers being unable to sell their produce at a reasonable price (Silva, 2018). Probably this is a result of over plantation than the demand in the market. Also, we find the constant rise in market prices due to the vendors claiming a deficit of produce (Rubatheesan, 2021). This is probably due to the destruction of produce by natural disasters and the ill timing of farming.

The farmers also complain about the lack of government intervention to help them get their needed aid during the cultivation period (Baddegamage, De Silva, & Goonetillake, 2022). This includes the supply of fertilizer and also the technical know-how on the cultivation process. Further, the department of agriculture states that they have found that there is low diversification in cultivation (Chadha, 2019). This will also result in an excess supply of produce. Studies show that a suitable ICT intervention would help solve these issues (Subashini & Fernando, 2017). Even though most of the studies have been conducted on how ICT can intervene to help improve the Sri Lankan agriculture sector, most focused on the post-harvest stage (Baddegamage, De Silva, & Goonetillake, 2022). At that stage, farmers are more concerned about selling the product than using the proposed systems (De Silva, Goonetillake, Wikramanayake, & Ginige, 2012).

Therefore, a research gap was identified to find a suitable ICT intervention to optimize the pre-harvest (cultivation) stage. More specifically a gap was identified in the lack of information communicated among stakeholders (Subashini & Fernando, 2017). Therefore, this study would focus on designing a suitable Information System to improve collaboration among the vegetable farming community in Sri Lanka.

1.2 Research Motivation

This has always been a pressing issue in Sri Lanka. For years and years, we have seen several reports of farmers committing suicide and protests due to them being unable to sell their harvest at a considerable rate due to a surplus of them or consumers protesting about high rates due to a deficit of the harvest. Furthermore, solving this issue would also help achieve the United Nations Sustainable Development Goals of No Poverty and Zero Hunger. Thereby the research team decided to see if the team can provide them with a sustainable solution to the problem using Information Systems

1.3 Research Objective

The research question is formulated as: How to improve collaboration among the vegetable farming community via Information Systems in Sri Lanka?

In this study, the final objective is to provide Sri Lankan farmers with a suitable Information System to effectively manage their cultivation avoiding a surplus and deficit of vegetables in Sri Lanka.

The other key objectives were as follows

- To identify the features of a suitable Information System to be used to improve collaboration among the vegetable farming community.
- To formulate a suitable Information System prototype.
- To evaluate the success of the designed prototype.

2. METHODOLOGY AND EXPERIMENTAL DESIGN

The initiating point for this study was the analysis of previous literature. This showed the current progress in the related field and the research gaps. As a result, the research team identified that the main reason for this issue was the lack of collaboration and informed decision-making during the cultivation stage. Thereby the study was designed to find the related issues and provide solutions going forward on that train of thought.
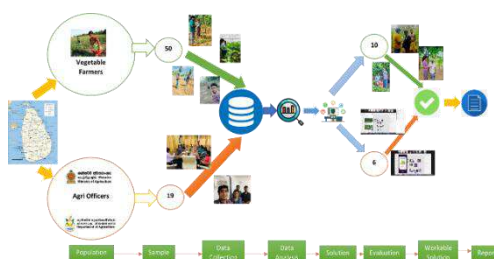
The primary method of data collection was through structured interviews. A pilot survey was conducted with the participation of 4 Agricultural Officials and 6 Farmers to assess the survey questionnaire. The Agricultural Officials included 1 Additional Secretary, 1 Assistant Director (Development) and 2 Agricultural

Instructors. Further, a discussion was held with the participation of 7 Agricultural Officials to access the entire study. The Officials in this discussion included the Additional Secretary (Development), Additional Secretary (Technical), Director (PPE) I, Director (PPE) II, Director (Agri Development), Deputy Director (Development), and Assistant Director (Development). A similar discussion was held to get expert advice from a Senior Professor of the Faculty of Agriculture, University of Ruhuna. Once the standard was set to satisfaction of the researchers, the team moved on to the second type of survey.

The data collected from the second and main survey was used to achieve the 1st objective of the study, i.e. to identify the requirements of a suitable Information System (IS) solution to solve the current issue. This was conducted with the participation of 19 Agricultural Officials and 50 Farmers.

The final survey was used to achieve the 3rd and final objective of the study i.e., to evaluate the proposed solution. The results were used to improve the prototype further until the results are up to the researchers' satisfaction. The evaluation was done through in-person demonstrations to farmers and focus group discussions with the Ministry of Agriculture and the Department of Agriculture. 10 Farmers were selected randomly from the previous sample. Representing the Ministry of Agriculture, the participants were the Additional Secretary of the Ministry of Agriculture, the Director (Policy and

Project Evaluation), and the Director (Development). Representing the Department of Agriculture, the Assistant Provincial Director of Agriculture, and 2 Agriculture Instructors participated in the discussions.

3. RESULTS AND DISCUSSION

3.1 Demographic Data

3.1.1 Farmer demographics

a) Farmer's Age

Table 1. Demographic – Farmer's Age

Range	Frequency	Percentage
18 - 30 Years	5	10%
30 -40 Years	19	38%
40 -50 Years	14	18%
50 - 60 Years	9	28%
More than 60	3	6%

The majority (19) of the respondents were in the age category of 30 – 40 years. The least (3) were above the age of 60.

b) Farming Experience

Table 2. Demographic – Farmer Experience

Range	Frequency	Percentage
Less than 5 Years	17	30%
5 - 9 Years	16	29%
10 - 14 Years	7	13%

15 - 19 Years	12	21%
More than 20 Years	4	7%

The majority (17) of the respondents had less than 5 years of farming experience. There were also 4 farmers (7%) who had more than 20 years of experience. A significant portion (70%) had more than 5 years of farming experience.

c) Nature

Table 3. Demographic – Land Area

Range	Frequency	Percentage
Less than 1 Acre	38	76%
1 - 4 Acres	12	24%
More than 4 Acres	0	0%

Most vegetable farms were less than 1 Acre while all were less than 4 Acres. The farms which were more than 1 Acre were usually targeting the export market as well in addition to the local market.

Table 4. Demographic – Vegetable Varieties

Range	Frequency	Percentage
Only 1	8	16%
2 Varieties	16	32%
3 Varieties	13	26%
More than 3 Varieties	13	26%

On average most cultivators farmed 2 (32%) or 3 (26%) varieties of vegetables and some even cultivated more than 3 (26%) varieties.

d) Language

Table 5. Demographic – Farmer's Language

	Sinhala	Tamil	English
1 (Most Familiar)	43	1	0
2	5	3	38
3	2	1	4
No Knowledge	0	45	8

The language knowledge of the farmers was ranked in order Sinhala, English and Tamil. All farmers knew Sinhala while the majority did not know Tamil.

3.1.2 Agricultural Officer's Demographics

a) Agri Officer's Age

Table 6. Demographic – Agri Officer Age

Range	Frequency	Percentage
18 - 30 Years	2	11%
30 -40 Years	4	21%
40 -50 Years	5	26%
50 - 60 Years	8	42%
More than 60	0	0%

The majority (8) of the Agri Officers were of 50 – 60 Years of age. There was no

officer above the age of 60 while the minority (2) were between 18-30 Years of age.

Agriculture		
Deputy Director of Agriculture	3	16%
Director Agri Development	1	5%
Additional Secretary	1	5%

b) Working Experience

Table 7. Demographic – Agri Officer Experience

Range	Frequency	Percentage
Less than 5 Years	3	16%
5 - 9 Years	2	10%
10 - 14 Years	4	21%
15 - 19 Years	3	16%
More than 20 Years	7	37%

The majority (7) of the officers had more than 20 Years of age. The minority (2) were of 5 -9 Years of experience while 3 (16%) had less than 5 Years of Experience

c) Nature

Table 8. Demographic–Agri Officer Designation

Designation	Frequency	Percentage
Technical Assistant	2	11%
Agriculture Instructor	8	42%
Assistant Director of	4	21%

The team reached out to all levels of Agri Staff and the number was decided based on their relevancy (direct interaction with the farmers), and the proportional division of designations within the survey. Thereby, the views of 8 Agriculture Instructors were taken into consideration (majority), while only 1 Additional Secretary and 1 Director was included in the respondents' list.

d) Language

Table 9. Demographic–Agri Officer's Language

	Sinhala	Tamil	English
1 (Most Familiar)	10	2	3
2	6	1	10
3	3	6	6
No Knowledge	0	10	0

Considering the familiarity of the languages of the Agri Officials, it was ranked as Sinhala, English and Tamil. There were no respondents who did not know English or Sinhala, while some (10) did not know Tamil.

3.2 Collaboration Among Vegetable Farmers

63% of the agricultural officers stated that they are not satisfied with the popularity of the currently available collaborative systems. On average Agri Staff and Krushi Advisor were the popular apps while Govipola was also popular among farmers. The main reason (as per the farmers' responses and Agri officers' opinions) for its unpopularity was that these systems didn't fulfil their needs (Farmers – 42.90%, Agri Officers – 46.70%). The other main reasons were, unawareness about current collaborative systems (Farmers – 46.40%, Agri Officers – 6.70%), and insufficient knowledge to use them (Farmers – 14.29%, Agri Officers – 53.30%).

The Farmers collaborate mostly with Farmers, Agri Officers and Vendors, while the Agri Officers collaborate with other Government Officers as well in addition to the prior three.

The Agri Officers use multiple means to share knowledge among farmers. The most frequent method is by meeting the farmers physically or through other Agri Officers who do so (89.47%). The other main means were through related books, leaflets etc (68.42%), and by means of demonstrations/ model farms by the Agri department (57.89%). In terms of farmers, they mainly use fellow farmers (80%) as a source of gathering knowledge followed by Agri Officers (70%). 82% stated that they use websites as their least preferred method of knowledge gathering. In addition to the above, they use other main sources of information like WhatsApp Groups and observations of other cultivations.

3.3 ICT Literacy

The farmers rated their level of confidence to be confident (46%) and highly confident (16%). However, there were farmers who had no confidence (4%) as well. In terms of Agri Officers, they said that they are confident (31.60%) and highly confident (26.30%), while there were no responses for no confidence (0%). This was further established by their active presence on social media (Farmers – 86%, Agri Officers – 100%). The majority of the Agri Officers preferred WhatsApp (57.89%) over the other three main social media platforms followed by Facebook (31.57 %) in second place. The same trend was seen with Farmers preferring WhatsApp (88%) over the other three social media platforms followed by Facebook (28%) in second place.

3.4 Availability of ICT Infrastructure

The ranking on available digital devices for farmers was smartphones (90%), Tablet Computers (32%), and PC/Laptop Computers (28%). For Agri Officers, it was smartphones (94.70%), PC/Laptop Computers (52.60%), and Tablet Computers (31.60%). Only 1 (2%) farmer did not have any device while all Agri Officers has at least one device. For both parties, the most preferred device was a smartphone (Farmers – 74%, Agri Officers – 63%).

3.5 Communication between Farmers

92% of farmers communicate with their fellow farmers in person while 94% do via phone call. 88% do so in a common meeting while 76% use social media. The least (24%) use SMS as their means of communication.

Some Farmers speak to their peers about their plantations daily (38%) while 34% discuss it once a week. They collaborate about plantation-related diseases mostly about twice a week on average (42%). Farmers collaborate to decide what (44%), and when to start farming (54%) once a month on average. The responding farmers collaborated to address complaints/ unfairness (46%), discuss economic matters (44%) and had personal discussions (46%) when they needed to (they did not have a specific average time and it varied each time). The responding farmers on average never collaborated to clear their lands (46%). In addition, they spoke about pest damages, market prices, buyers, fertilizer availability, fuel issues, transportation methods for produce etc.

68% of the farmers preferred to increase their communication group and 46% found it to be very useful to know what their peers are cultivating. They preferred to get information on the availability of resources, guidance on selecting the right crop, market information, experiences and knowledge of peers, pest mitigation, plant diseases mitigation etc.

3.6 Communication between Agri Officers

The frequency of communication among the Agri Officers depended on their hierarchy. The responses depended on the designation of the responding officer, and the designation of the collaborating officer. It was found that they mostly collaborated with designations similar to theirs or below while getting lesser and lesser when going up the hierarchy. All officers (100%) used phone calls as their most common way of communicating with fellow officers. The second most common method was using social media (73.70%) and at common meetings (73.70%). 57.90% communicated in person while 36.8% communicated via SMS.

The officers normally or frequently collaborated on crop-related diseases (42.11%). They also normally communicated on which variety to farm (52.63%), when to start farming (52.6%), to address complaints/unfairness (47.37%) and to gather day-to-day information regarding /her farmer's crop (36.84%). They frequently collaborated to get advice on his/her farmer's crops (47.39%).

74% of the Agri Officers preferred to increase their communication group while 47.40% responded that it would be very useful for them to know what their peers are cultivating. They further preferred to get to know about updates on the harvest, new Agri technologies found by the farmers, new varieties found by the farmers, a forecast of the expected harvest, the progress of cultivation, and market opportunities.

3.7 Communication between Farmer and the Department of Agriculture

53% of the Agri Officers communicated with their farmers daily while 21% did so only when needed. The communication between farmers and the Agri Officers depended on the hierarchy of the officer. Their most common means of communication with the Agriculture Instructors were in person (84%), via phone call (88%) and in a common meeting (80%). Most farmers did not connect with any other ranks above the Agriculture Instructor and when they did so, the most common was when in a common meeting. On average most Agri Officers (89.47%) communicated with farmers via phone call while 78.9% did so during a common meeting. 63.2% of Agri Officers communicated in person while 57.9% did so using social media.

The responding farmers spoke about plant-related diseases (30%), addressed complaints/unfairness (52%), discussed economic matters (64%), and for personal discussions (54%) when they needed to with their relevant Agri Officer, and they did not have an exact average time for those. They communicated about different varieties they could farm next time (46%) and when to start farming (56%) monthly on average. Further, the farmers spoke twice a week (42%) to get advice on their plantations and weekly (28%) to gather new information relating to their plantations. Most farmers never (42%) spoke to the Agri Officers for land clearance purposes. They also spoke about the success and failure of cultivation, resource-related

issues, effective application of organic fertilizer etc.

The responding Agri Officers frequently communicated with their farmers regarding Crop related diseases (68.42%), to help decide on a variety to farm (47.39%), and to help decide when to start cultivating (47.39%). They normally communicate to address complaints/unfairness (52.63%). They would either frequently or normally (36.84%) gather information regarding their farmers' crops. The Agri Officers either normally or very rarely communicated with their farmers regarding land clearance purposes alike (42.10%). This was the same regarding personal discussions (31.58%).

The responding Agri Officers normally discussed economic matters and potential market patterns alike (42.11%). They also spoke about new technologies and innovation, cost reductions and collaborative projects.

All Agri Officers (100%) responded that they communicate the latest research to their farmers. However, the farmers were divided into Yes (28%), Sometimes (30%), and No (42%).

This discrepancy was well explained when considering the modes of communication. The most common method of communication used by Agri Officers (89.70%) was common meetings and this was reflected by the responses of the farmers (94.70%) as well. There was poor participation of farmers (24.10%) in the demonstration done by the Agri Officers (73.70%). Farmers had received research data via phone call (17%). The communication of Agri Officers via related

books/leaflets (78.90%), Radio (42.10%) and TV programs (36.80%) had not reached the farmers (0%). Both parties do not communicate research data via SMS (0%).

Most farmers (80%) selected the variety based on their experience growing it. 76% decided based on the market. 66% decided based on the availability of resources and knowledge. 54% of the farmers took into account what their peers are growing while 46% decided based on the instructions of the Agri Officer. 63% of the Agri Officers assigned the vegetable variety to the farmers based on the recommendations by the Department of Agriculture (DOA) while 37% did so based on the request of the farmers. The factors considered in making decisions were DOA recommendations, market suitability, expected harvest, land & area suitability, and farmer's choice.

The most used method for communication of the vegetable variety was in person both by farmers (62%) and Agri Officers (73.68%). The next was via phone call for farmers (44%) and in a common meeting as per Agri Officers (36.84%), closely followed by in a common meeting for farmers (20%) and via phone call for Agri Officers (31.58%). Social media (Farmers– 2%, Agri Officers–4%) was also used as means of communication.

When providing progress updates, the most common method used by both farmers (64%) and Agri Officers (63.16%) was in person. The next was via phone call for Farmers (46%) and Agri Officers (50%). In Third place was at Common Meeting for Agri Officers (39%) and Farmers (15%). 5% of the farmers gave updates via SMS while 4% of Farmers and 28% of Agri Officers communicated via social media. 17% of the Agri Officers communicated using other means. On average, updates were provided monthly by farmers to Agri Officers.

4. CONCLUSION

4.1 Discussion & Recommendations

The Sri Lankan vegetable market needs optimization. At times there is a huge surplus of vegetable harvest resulting in farmers being unable to sell their produce at a reasonable price (Silva, 2018). At times there is a constant rise in market prices with vendors claiming a deficit in produce (Rubatheesan, 2021). On the other hand, the Department of Agriculture states that there is a low diversification in cultivation (Chadha, 2019). Therefore, researchers had concluded that informed decision-making is a must and that a suitable ICT intervention would solve this problem (Subashini & Fernando, 2017). As a solution, many system solutions were proposed.

However, all these system solutions mostly focused on the post-harvest stage (Baddegamage, De Silva, & Goonetillake, 2022). This has made the systems unpopular among farmers since they would not address their needs (Baddegamage, De Silva, & Goonetillake, 2022). Further, studies have shown that there is a shortage of information communicated among the community for informed decision-making (Subashini & Fernando, 2017). Hence, a need was identified to develop a suitable Information Systems Solution to improve collaboration among the vegetable farming

community and promote informed decision-making.

To find requirements for a suitable information system solution for the problem, the team surveyed the participation of 50 Farmers and 19 Agri Officers. The data collected was analysed and presented in Chapter 3 of this report. The demographic data showed that the survey was well planned out and the respondents were proportionate to the real-life population. It further showed that both categories recommend having both Sinhala and Tamil as their first language while the general ranking for both types was Sinhala, English and Tamil in order.

The current system solutions for collaboration are not popular among farmers and on average Agri Staff and Krushi Advisor were the popular apps while Govipola was also popular among farmers. The main reasons for the unpopularity of the current systems were the farmer's unawareness of current systems and the systems not fulfilling their needs. The Farmers collaborate mostly with Farmers, Agri Officers and Vendors, while the Agri Officers collaborate with other Government Officers as well in addition to the prior three. Agri Officers use multiple methods to share knowledge with farmers with Fellow Agri Officers used the most. The farmer too highly uses Agri Officer and Fellow Farmers to gather knowledge.

Both parties had good confidence in using systems without guidance while the presence of a social media account showed that they can do so. Almost all respondents had access to a smartphone, and it was the most preferred device on the most. The respondents ranked WhatsApp, Facebook, and Instagram in order of preference. The farmers collaborated with fellow farmers for a variety of reasons during different times and did so mostly via phone calls. This was also the case with Agri Officers while the frequency changed with the hierarchy. Both parties highly preferred to increase their communication group and know what's being cultivated by others.

The farmers mostly communicated with the Agri Instructors and did so mostly via phone call. They discussed a variety of topics and the frequency of communication changed accordingly. Almost all farmers were willing to get new knowledge while the Agri Officer gave them to the best of their abilities. However, a discrepancy in the communication means was found. When selecting the crop, the parties were not much collaborative, and the communication of selection occurred occasionally. This was also the same case in the communication of updates by the farmer to the Agri Officers. Farmers preferred to get more data on the availability of resources before starting to farm while the Agri Officers preferred to get more experiences shared by farmers with them. Both parties experienced transportation issues when collaborating and preferred a more cost-effective and efficient way.

The research team used the above findings to derive the requirements needed for a suitable information system solution to solve the identified problem. These will be discussed in detail within section 4.1.1

below of this report, thereby successfully achieving the 1st Objective. Using the requirements, the team developed the system solution (protype) and hence successfully achieved the 2nd Objective. The proposed system solution was evaluated with user testing done with 10 farmers and focus group discussions held with the represented of both the Ministry of Agriculture and the Department of Agriculture. The results obtained will be presented to the reader within section 4.1.2 of this report and thereby achieving the 3rd and final objective of the project. Therefore, it can be concluded with confidence that the research team has successfully achieved all objectives and this research was a great success.

4.1.1 Proposed Solution

A. Mobile Application

Since most of the target audience are frequent mobile users and prefer smartphones over others, the most suitable approach would be to introduce a mobile app. This app should be available in all three languages. Since some respondents said that they are not much confident in using systems independently, introducing a help option would be a good feature. Their familiarity with social media shows that a UI similar to social media would improve the learnability of this app. Discussions revealed that the relevancy of information depends on the location for farmers and the hierarchy for Agri officers. Thereby a personalized login would help manage this need. This app should facilitate informed decision-making at cultivation stages, knowledge sharing, communication among

stakeholders, and event scheduling. The proposed features are as follows.

B. Collaborative Crop Selection

When selecting the desired crop, the user would first see a publicly visible database of different vegetable varieties (cultivatable in his/her area). This would show the estimated market requirement, the estimated harvest provided by other similar vegetable farmers, and the remaining unallocated quantity. If the unallocated quantity is zero, this tab would be disabled. If not, the farmer may click on the tab and navigate further in.

The next screen would give him a detailed view of the information needed for him/her to arrive at a decision. This includes but is not limited to, the suitability of the farmer's land, the estimated harvest based on land area, market suitability, DOA recommendations, availability of resources etc. If the farmer is satisfied, he/she may enter the desired land area he/she wishes to cultivate in this variety and place a request.

Once he/she does so, a tentative allocation will be placed in the database and the relevant Agricultural Instructor (AI) will be notified. The farmer may place as many requests as he/she wishes for different vegetable varieties. The AI would visit the farmer and discuss the cultivation plan. If the AI is satisfied, he/she may approve the request. This would update the crop selection database and the farmer would be assigned to the vegetable variety (for that quantity). If the AI is not satisfied, he/she may reject it and assign the farmer to another vegetable variety.

Once the farmer is assigned, he/she may follow the same steps as selecting the vegetable variety to provide updates on the progress while the AI will be able to view them. A summarized version of the crop selection database is to be available based on the need of level of detail for all relevant stakeholders. This would manage the market demand and supply of vegetables.

C. Knowledge Sharing

A community blog with a UI similar to Facebook would be introduced to facilitate knowledge sharing. The users (both farmers and Agri Officers) may upload content while Agri Officers may moderate it to ensure only real facts are shared. Similar to Facebook, they may react, comment, and share to keep the conversation moving forward. Views would be recorded which would help Agri Officers to monitor the reach.

D. Efficient Communication

For collaboration, both parties mostly used mobile phones and the most preferred social media was WhatsApp. A functionality similar to WhatsApp could be introduced within this app. The app would consist of all the contact information of all relevant stakeholders. Similar to WhatsApp, them to be able to call, chat, and share media either personally, or by creating groups. A live common public forum to be available to discuss with anyone online on urgent common issues.

A challenge faced during collaboration was the unawareness of most meetings. This can be minimized with the users' getting reminders of meeting ahead of time.

Further, this could also be used to communicate important and latest information to the users. A calendar function can be introduced to schedule events.

E. All in One Application

Both Farmers and Agri Officers were in need of a more efficient, all-in-one system for collaboration, at a minimum expense. Thereby the objective of this app is to be a comprehensive one-stop shop app providing just that.

4.1.2 Evaluation of the Prototype

The system was evaluated using in-person demonstrations with a random sample of 10 Farmers, and focus group discussions with the Ministry of Agriculture, and the Department of Agriculture. The evaluation was done based on Human Centred Design principles and more focused on usability factors.

The evaluation was done with the participation of 10 (62%) Farmers, and 6 (38%) Agri Officers. This was selected to be proportionate with the real-life scenario.

11 (68.8%) respondents found the systems' ease of adaptability to be above average while 5 (31.3%) found it to be at an average level. There were no responses to say it was below average. 12 (75.1%) respondents found the systems' ease of use of interfaces to be above average while 4 (25%) found it to be at an average level. There were no responses to say it was below average. 10 (62.5%) respondents found the understandability of the information provided by the system to be above average

while 6 (37.5%) found it to be at an average level. There were no responses to say it was below average. 14 (87.5%) respondents found the availability of the information provided by the system to complete the task to be above average while 2 (12.5%) found it to be at an average level. There were no responses to say it was below average.

11 (68.75%) respondents found the system's ability to meet expectations to be above average while 5 (31.25%) found it to be at an average level. There were no responses to say it was below average. In addition to the above, the respondents agreed that this is a much-needed project for Sri Lanka and would be good to be implemented in a departmental level.

They also preferred if they can have access to market-related data as well (Eg: Market trends and statistics, different marketing channels, price trends etc).

4.2 Future Research

A. Market Insights

When conducting the research, the team found a lack of market data being shared among the vegetable farming community. Though there are many Information System solutions, these have not addressed the needs properly. The team could not follow up on this sector due to the limited availability of time and resources. It is recommended for any researcher following up on this lead to collect data from economic centres, vendors, consumers and the Export Development board in addition to the Farmers and Agri Officials. Afterwards, a comprehensive plan should be presented to the farmer with available

market opportunities to them (export and local markets).

Further, a price trend would be useful to decide on market conditions. For this historic prices and factors which affected the price fluctuations should be considered to find a relationship between which factors would affect the vegetable market. This would help to predict the future price and would be of much help for the farmer to decide on which variety to cultivate.

B. Prerequisite Study

This application could further be expanded to include the data on resources needed for vegetable cultivation (fertilizer, fuel, water). The availability of these resources could be predicted by identifying the factors affecting the availability of each. Further, the same extension could contain a feature that would locate the nearest supply to the farmer and arrange a method of communication for the farmer to obtain it with ease.

C. Enhanced Solution

With all these features combined with the proposed system, this would potentially help solve the surplus and deficit of the vegetable supply in Sri Lanka. Further, this model could be extended to include other types of agricultural products such as Yams, Rice etc and would potentially be a good solution for the food crisis by avoiding a deficit of supply.

4.3 CONCLUSION

Optimizing the vegetable cultivation sector has always been an interest of many researchers worldwide. Many countries around the globe have come up with

multiple innovative solutions to help manage the supply of vegetables to their markets. Sri Lankan too has many Information System Interventions to do the same. However, research has shown a lack of popularity of the systems among farmers. The main reason for this may be that most if not all of these systems are focused on the post-harvest stage of cultivation. Therefore, there is a gap in informed decision-making pre-cultivation among the vegetable farming community.

To solve the issue the research team surveyed the participation of 50 farmers and 19 Agri Officials to identify requirements for such a system. Based on the requirements a mobile application with multiple useful features was proposed. During the evaluation stage of this prototype, the proposed system was highly appreciated by farmers and Agri Officials alike.

The research team suggest the use of this system to help manage informed decision-making through improving collaboration among the vegetable farming community. Further, it is suggested to extend the system to have market-related data and a communication method for resources needed for vegetable farming. This concept is recommended to be extended to incorporate all Agri products and help optimize the entire Agri Sector and thereby achieving a stable supply of Agri Products to the Sri Lankan market and beyond.

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ACKOWLEDGEMENT

Enhance the Customer Experience Gathering Process by Understanding Facial Emotions for Sri Lankan Banking Sector

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ABSTRACT

Customer feedback and experience inform management decisions. Companies may not actively participate in customer feedback and analysis. Companies prioritize client satisfaction. A company should often ask customers for their experience. Most of the time customer feedback is collected manually. Despite being inefficient and time-consuming. Facial expressions are one of the most significant parts of human communication. This computer vision and pattern recognition sector is quite active. Communication was 93% nonverbal. The 7-38-55 rule claims that 7% of communication is verbal, 38% vocal, and 55% facial. Face expressions convey ideas.

As a result of the findings, gathering customer experience is crucial from both the customer and staff perspectives. Even though it is crucial, the majority of the consumers weren't involved.

Additionally, most of the customers and employees approved of using facial expression recognition to regulate CX.

Therefore, proposed an automated CX gathering system that identifies and categorizes facial expressions.

The two primary views of the proposed system are manager/administrative user and employee/staff member.

Consequently, managers may assess staff performance and evaluate them. If an employee receives a large number of unfavorable CX ratings, he will get a notification and suggestions on how to improve his/her performance.

Keywords - **Computer vision, Customer Experience Gathering, CX, Facial Expression Recognition, Automated Customer Experience gathering system.**

1. INTRODUCTION

1.1 Background of the Study

It's crucial to comprehend the customer experience. Decisions on management can be made by the organization, based on customer feedback. Through that company can maximize the profit. In order to acquire

consumer input and analyze customer experience, CEOs or top management of the organization may not actively engage. But getting client input without being inconvenient or taking too much time is essential. The consumer is essential to the continued existence of any organization. One of the primary focuses of a company is to ensure that the needs of its customers are met (Wantara & Tambrin, 2019). It is important for a corporation or firm to solicit the opinions of their clientele as part of their daily operations. At this time, collecting feedback from customers is done manually. It serves its purpose, despite the fact that it is not particularly efficient and also requires a lot of time. Additionally, the majority of the time, consumers either decline to provide feedback or provide feedback that is not genuine. According to the results of Meyer and Schwanger, consumers have a tendency to submit fraudulent feedback due to their anxiety around what the data may show (Wantara & Tambrin, 2019).

Automating the process of obtaining feedback is an excellent option that may help you prevent situations like the one described above, as well as boost the efficacy and efficiency of the procedure you use to receive input.

The ability to transmit a wide range of data about human emotion via one's facial expressions is one of the most important aspects of human communication. Around the last decade, researchers from all over the globe have been focusing their attention on the problem of automated facial expression identification. This subfield of computer vision and pattern recognition has become a particularly active area of study. 93% of all communication was done via nonverbal means (Lapakko, 2007). In addition, the 7-38-55 rule states that only 7% of communication is done verbally, 38% of communication is done vocally, and the remaining 55% of communication is done facially (Lapakko, 2007). Expressions on one's face are quite important when it comes to communicating thoughts (Anupreet Kaur & Pushpender, 2022). As a result of this, we decided to collect information on the client experience based on facial expressions. The ability of the business to make judgments based on the facial expressions of the consumer is a significant competitive advantage. According to the research conducted by Taeshik, it was discovered that the overall quality of the service has a beneficial impact on the customer experience (Gong and Yi, 2018).

Customer Experience has emerged as one of the top priorities for organizations around the world, with business leaders devoting more resources and placing a greater strategic emphasis on providing the right Customer Experience to their customers in order to gain an advantage in a highly competitive landscape (Anupreet Kaur & Pushpender, 2022).

1.2.1 Motivation

Most of the banks gather customer experience or customer feedback to improve their service quality. Even though the banks provide customer experience gathering forms or many manual techniques to gather customer experience, customers tend to avoid this type of event.

The motivation of this research is to enhance both the quality of the services

offered by the organization as well as the quality of life for all people.

1.3 Problem Identification

Customer satisfaction is really important for the banking sector (Butor-Keler., 2019). The banking industry in Sri Lanka has been characterized of many problems that have badly affected the loyalty of customers. A country's economic financial system must be stable and forward-thinking if it is to sustain national economic development. The foundation of Sri Lanka's financial system is the banking industry (Saeed, et al., 2020). Institutions of public trust include banks. This has to do with the enormous responsibility that banks have. Additionally, it is a result of the specialized nature of the items in the financial services market. Customers entrust banks with their life savings and take on lengthy credit obligations. The connection between the consumer and the bank should be based on trust. The bank functions as a professional body, and the customer believes that the plans that the bank would push are in his best interests. As a result, banks should be concerned with the well- being of their customers, because it is their quality that will persuade people to pick this bank. Banks should deliver the greatest level of service to their customers in an era of intense competition in the financial services industry and the emergence of a new Financial Technology sector. Customers are content or dissatisfied based on the totality of their interactions with a certain organization (Butor, 2019).

Sri Lanka's banking sector is fiercely competitive. Domestic commercial banks in

Sri Lanka currently try to improve the customer satisfaction with the advent of new technologies in the banking industry, the largest issue for this in Sri Lanka is measuring whether the customer satisfaction is increasing or not in a highly competitive market.

Even though several manual customer experience and feedback gathering methods had been built, their efficacy and efficiency were quite low. For this problem automated customer experience gathering systems can be proposed. Several studies have been undertaken to prove the relationship between service quality, customer satisfaction, and customer loyalty. Only a few researchers in Sri Lanka have looked at these linkages in Sri Lankan banking sector. The goal of this research is to close that gap by proposing a system that gathers customer experience via understanding human facial expressions.

1.4 Aims and Objectives of the Research Project

The proposed automated CX gathering system is built for the purpose of getting management decisions. This system is basically for two parties. They are bank managers and front officers who interact with the customers.

The primary aim of this research is to build a customer base that is happy, loyal, and satisfied with their experience with domestic commercial banks in Sri Lankan by utilizing facial expression recognition with the assistance of image processing in order to better understand the customer experience. In response to the statement that

was made about the situation, the following study goals have been devised.

Research Objectives:

I.   To determine how the use of facial expression recognition may be used to control the overall consumer experience. ii.

II. To investigate the currently available computational methods for controlling the user experience.

III. To provide an appropriate method for identifying face expressions and arriving at managerial judgments.

IV. To determine whether or not the method being suggested is effective.

1.5 Research Question

The following research question is articulated to under the current study:

How facial expression recognition and customer experience combined to improve the service quality.

1.6 Significance of the Research

It has been determined that the quality of the service that a company provides is one of the most important factors in determining whether or not it will be successful in the long run. According to Pratminingsih, Astuty, and Widyatami (Pratminingsih, Astuty & Widyatami,2018), if a company fails to provide good service to its customers, it will have a negative impact on the company. This is because it will result in unhappy customers, which will lead to negative word of mouth, and it will also

cause customers to seek services from competitors. As a consequence of this, it is essential for every company to work toward the provision of the highest possible level of service to its clientele.

Customer loyalty is related to what customers believe, do, or attempt to do. Furthermore, they stated that most customer loyalty specialists would agree that loyalty is best characterized as a state of mind, a collection of attitudes, beliefs, and wants, among other things. Methods that reinforce and encourage a pleasant state of mind as well as the actions that are associated to this mood cultivate loyalty. The sharing of knowledge is one of the fundamental components that underpins loyalty. This practice creates an important connection between an individual's mental state and their actions. Customers that have a long history of patronage with a certain service provider are more likely to provide information (Pratminingsih, Astuty, & Widyatami, 2018).

Furthermore, rather than optimizing corporate performance, this study focuses on the impact of customer experience gathering on a personal basis according to the hierarchy of influence of service quality. In addition, the research will include recommendations on how to enhance business performance based on customer input.

1.7 Research Philosophy

The positivism research philosophy is appropriate for the suggested study. The goal of this study is to provide quantifiable value by addressing the issue of how many customers were happy for a specific amount

of time by assessing customer experience through facial expressions.

1.8 Research Strategy

The deductive research strategy is appropriate for the suggested investigation. This study makes the case for using facial expression recognition theories to identify consumer experiences and combining them to help management to make decisions.

1.9 Limitations of the Research

Researchers had hoped to conduct their study on solely bank personnel, but along the investigation, they came into a few limitations. The chosen mixedmethods approach was the most significant challenge since it produced contradictory findings on the quality of the customer experience, which were difficult to verify. Because the findings in the banking services sector can be interpreted in either direction, the quantitative examination approach has one fundamental limitation: the sample size was kept small in order to simplify the conclusions. This was done because the findings could be interpreted in either direction. It's possible that the quality of the research, its validity, and its trustworthiness were all affected by the study's small sample size.

2. LITERATURE REVIEW

2.2 Face recognition

The term "face recognition technology" refers to a kind of biometric technology that identifies individuals based on the physical features of their faces (Li, et al., 2020). One of the most active research areas in computer vision and pattern recognition is that of face recognition. This area of study has several real-world and commercial applications, including identification, access control, forensics, and human-computer interactions (Li, et al.,2020). However, recognizing a face in a crowd involves ethical problems and raises fundamental concerns about personal freedom. Face detection is necessary for various applications since it is a significant component of the human body. Faces are primarily threedimensional (2D and 3D), with a variety of textures and expressions.

2.2.1 2D face recognition

A certain level of maturity and extremely high rates of recognition were recorded for 2D face recognition techniques. This performance is achieved in controlled situations with preset acquisition parameters such as light, angle of view, color, and camerasubject separation (Li, et al.,2020). There were certain downsides to the 2D facial recognition technique. The identification rate and performance of a 2D face recognition system are both impacted by the properties of the images that are captured, such as the location of the face, the image quality, the lighting, the degree of partial occlusion, and the facial expressions.

2.2.2 3D face recognition

An expression-invariant 3D face recognition system's main purpose is to detect 3D human faces even while they are expressing varied expressions (Leo & Suchitra, 2018). A novel approach to face recognition that might get beyond the basic drawbacks of 2D technology has been revealed by the fast development of 3D technology. The

geometric details in 3D facial data might significantly increase the recognition accuracy in challenging situations for 2D technology (Zhou & Xiao, 2018). During this step of the process, the user will be questioned, and their face will be captured using a depth camera. The gathered data will then be classified using a vector machine, and customer needs will be assigned weights depending on the facial expressions that are recognized. In addition to this, it seems to be valid and is able to capture the interviewee's unconscious reaction (Violante, et al., 2019). On the other hand, this technique only permits a limited range of facial expressions, and its implementation is not very straightforward.

2.3 Facial expression recognition

One of the most effective ways that people communicate their feelings and intentions, facial expressions are also one of the most natural and common forms of human communication. Automated facial expression analysis has been the subject of a number of studies due to the practical significance it possesses in a variety of applications, including social robotics, medical treatment, the detection of driver fatigue, the collection of customer experience data, and many other human-computer interface systems (Li & Deng, 2020). In order to accurately categorize facial expressions, it is of the utmost importance to provide the classifier with the data that is the most relevant and to do it in the best possible conditions. The entering picture archive is often subjected to a standard pre-processing step in the conventional face expression detection system (Li & Deng, 2020).

2.3.1. Convolution Neural Network (CNN) model

CNN has been widely used in the image recognition field. This model is very complicated, and several researchers have put up various strategies to raise the accuracy of various CNN models. The activation function is a critical component of the convolutional neural network that can map out the non-linear feature (Wang, et al., 2020). To begin, the raw picture is convoluted by numerous filters on the convolution layer, which can provide several feature maps. The down-sampling layer then blurs the feature. Finally, a collection of eigenvectors is obtained by means of a complete connection layer.
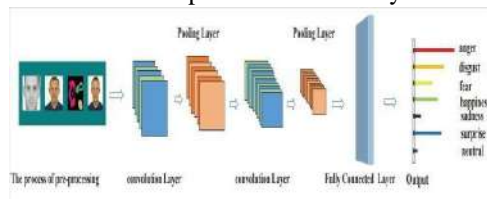
Figure 2.3.1.1(Wang, et al., 2020)

Figure 2.31.1 depicts the architecture of a convolutional neural network. Li et al. suggested a representative facial expression approach based on deep learning and CNN. The data argumentation approach is utilized to overcome the FER dataset's scarcity and generate strong face reactions to adjustments such as rotation and transportation (Li, et al., 2020; Kim, et al., 2019).

2.3.2 3D Facial Expression Recognition

This profitable strategy is based on the feelings of the client, which are conveyed

via the client's facial expressions, and Quality Function Development (QFD). This process entails questioning the user and obtaining the user's face with a depth camera, grouping the information into emotion with the use of vector machine classification, and giving customer requirements weights based on the identified facial expressions. Lastly, the information is given to the customer. In addition to this, it seems to be valid and is able to capture the interviewee's unconscious reaction (Violante, et al., 2019). On the other hand, this technique only permits a limited range of facial expressions, and its implementation is not very straightforward.

2.3.3 CLARANS algorithm (Clustering Large Algorithm Based on Randomized Search)

This algorithm utilizes a partitioning method as opposed to the hierarchical approach (Schubert & Rousseeuw, 2019; Ou, 2012). This method begins by selecting a point at random to serve as the current point. It then investigates a random number of points located in close proximity to the parameter Max neighbor, keeping in mind that it should not exceed the value of the parameter Max neighbor. If you find a better neighbor than the points, you should use that neighbor as the local minimum instead of the point. The next step is to choose a new place at random in order to find yet another local minimum and continue doing so until the number of local minimums satisfies the user requirement (Ou, 2012). It was decided to implement the R tree structure in order to increase efficiency while working with huge disk-based

databases (Ou, 2012). This does not apply to databases that are very complicated or extensive. Additionally, CLARANS searches for neighbors using randomized samples, and it does not ensure that it will seek localized regions.

2.3.4 LBP (Local Binary Pattern)

When extracting face expression texture characteristics, the LBP operator is commonly used since it can measure and extract local texture information from grayscale pictures (He & Che, 2020). LBP, in particular, can accomplish rotation invariance and grayscale invariance, making it excellent for extracting texture characteristics at different scales as well as resolving displacement imbalance, rotation angles, and lighting conditions in facial pictures (He & Che, 2020). However, the original LBP only covers a limited region within a set radius (Sun et al., 2018), which is insufficient when the size and frequency of textures vary.

2.3.5 Image Processing

Many techniques have been used to study computer vision. It progresses from the capturing of raw data to methods and notions of digital image processing. One of the low-level components of a more comprehensive image analysis or computer vision system is image processing. The outcomes of image processing have a major bearing on the high-level component identification and interpretation of the picture data that comes after it (Chen, et al., 2021).

2.4 Why facial expression recognition is used over other mechanisms.

2.4.1 Customer experience and service quality

In today's day, a company's offerings may be summed up by the term "customer experience". Customers have agencies over the intellectual and emotional clues that contribute to their experience, and the situational symptoms that shape those cues into lasting positive or negative associations (Sommakettarin & Khamwon, 2020). As a result of the good effects of experiential marketing on the lives of their customers, those customers will be more likely to share their praise (Pratminingsih, et al., 2018). If customers are pleased with the service provided, this is shown in high levels of customer satisfaction or customer experience, and consumers are satisfied with their first-choice status of a firm or corporation (Sommakettarin & Khamwon, 2020). Alabboodi found that four aspects of service quality— assurance, reliability, tangibility, and empathy—had a substantial and beneficial effect on customers' overall satisfaction (Alabboodi, 2019). Upperlevel management may learn how to raise the bar on service quality by studying customer feedback, according to the correlation between the two.

2.4.2 7-38-55 Communication rule

Albert Mehrabian proposed the 7-38-55 rule of communication, which states that words convey 7% of one's feelings and attitudes, tones and voices convey 38%, and body language, particularly facial expressions, convey the remaining 55%. (Mehrabian, 1971). The results indicate that words are only one part of communication. Sometimes, nonverbal cues have a greater impact than words themselves (Amsel, 2019). According to this principle of effective communication, facial expressions play a crucial part in conveying thoughts and feelings. That's why it's preferable to gauge client satisfaction via the analysis of emotional expressions and facial expressions.

2.4.3 The EASI model (Emotions as Social Information Model)

Emotional expressions, according to the EASI paradigm, serve as a kind of data source (Kaewfoongrungsi & Hormdee, 2018). One may draw a number of conclusions about a person's intentions and emotional state from the information provided by their facial expressions and other body language (Pierce, 2012). This theoretical framework acknowledges that inferential and emotional responses to facial expressions play a role in shaping behavior. The EASI model proposes that people have different capacities for recognizing and making sense of facial signs of emotion.

2.7 Reflection

According to the findings of the Literature Review, there are a great many gaps in the currently implemented systems. The primary objective of this research, as stated in the literature review, is to provide a system to recognize and categorize facial expressions to interior feelings based on the customer experience to inform management choices. The existing solutions mentioned earlier were not directly used to identify and analyze inner emotions like

poor worst, good, awesome, average. The inner feelings of the consumers must be understood in order to make successful judgments and to improve the quality of the services provided. The theories discuses could be used as the backbone for this research project.

3. METHODOLOGY

In order to solve this problem needed a scientific approach. So, decided to use design science research methodology. DSR aims to advance technology and science knowledge by developing new artifacts that solve issues and improve the environment in which they are implemented.

The different sorts of information that qualitative and quantitative research collect results in dramatically different data collection techniques. The foundation of quantitative research is numerical or measurable data. Contrarily, qualitative studies emphasize personal accounts or documents that illustrate how people behave in social contexts.

This study used quantitative data analysis to address the questions at various levels and increase knowledge into various parts of the marvel, specifically the officers' point of view of web-based customer experience gathering system, and thus to investigate and better see how administration or higher management situated organizations and their employees use web-based au. The outcome of this study will be quantitative value, and this will measure or test a hypothesis.

In order to complete this study and meet both the purpose and the objectives, a questionnaire was developed to gather data.

Because of the epidemic and in an effort to cut down on paperwork, we decided to utilize a program called Google Forms to create an online questionnaire. The questionnaire was broken up into two sections, the first section of the survey deals with some information about the respondents, and the second portion of the survey is focused on the impact of the use of facial expressions in the automated system for gathering customer experience. A numeric value is assigned to each anticipated conclusion on the Likert scale, which typically offers five possible responses (strongly agree, moderately agree, neither agree nor disagree, somewhat disagree, strongly disagree). To gather data, the generated questionnaire was distributed to bank clients and other bank personnel. Due to the prevalence of online methods nowadays, these strategies are appropriate for populations that have not yet been studied.

An essential part of the data analysis process is choosing the best statistical methodology. A bad statistical technique not only makes it difficult to comprehend the data, but it also affects how the study comes to its conclusion. For any specific situation, there are statistical methods for data analysis and interpretation available in statistics. To choose the best statistical methodology for data analysis, one must first grasp the underlying premises and constraints of the various statistical techniques. There are primarily two quantitative data analysis techniques.

Descriptive statistics provide an overview of a data collection's characteristics. Inferential statistics can be used by researchers to test a

hypothesis or establish whether their data can be applied to a bigger population. Descriptive statistics, on the other hand, present facts and results that have been verified from a population, whereas inferential statistics examine samples to make inferences about larger populations. Because of that decided to use the Descriptive analysis method for the proposed study.

3.1 Dataset

To train the model MMA FACIAL EXPRESSION data set is used. Three directories for training, validation, and testing may be found in MMAFEDB. Each directory has seven subdirectories that correspond to seven kinds of face expressions. The size of this dataset is 174MB and it contains 6566 angry, 3231 disgust, 4859 fear, 28.6k happy, 29.4k natural, 12.2k sad and 8113 surprise files.

And the key justification for using this dataset is because it includes images of Asian faces, making it appropriate for Sri Lankan faces.

4. DATA PRESENTATION, FINDINGS AND RESULTS

Here is where we'll display our findings and discuss findings as a group. This chapter presents data in a descriptive format, including tables. The usefulness of the information gathered was a part of this, too. Descriptive statistics were used to examine the data.

The information used in this study was gathered via a random-sample survey of bank employees and customers in Sri Lanka. Employees and customers from both the public and private sectors were included in the survey's response poll.

Respondents were given the assurance that their specific responses would be kept private and that only overall results would be released. Over two weeks, responses were obtained. 100 of the customers and employees who were contacted gave complete information.

All of the multi-item measures utilized in this study were created and modified from scales that had previously been used in survey research investigations.

4.1 Univariate Analysis

The univariate analysis would be used to explain the frequency distribution analysis of the respondents by their personal characteristics. Additionally, it would clarify how the independent and dependent variables of this research study were described in the descriptive analysis. Also, it i The structure of the model is followed by the chapter that s helpful for identifying patterns in the data. Respondents were categorized in to two as employees and customers then presented with questions according to the perspective. In the study's analysis, the resultant score was categorized as an observable variable.

4.2. Reliability and Validity

Internal consistency may be quantified by using a statistic called Cronbach's alpha, which quantifies the degree to which a set of items is related to one another. Cronbach's Alpha was calculated to assess the internal consistency of the Likert scales used in the quantitative investigation for

reliability purposes. Every one of them is quite dependable, which is ¬what makes them so appealing.

In this investigation, triangulation was used to confirm the authenticity of data obtained from an internet server by comparing it to other sources of data. By using many sources of data, the reliability of the findings was bolstered.

In addition, a comprehensive questionnaire selection was made according to the respondents' everyday life, knowledge, and experience. To assure the validity of the quantitative data, the provided data's minimal Internal consistency should be greater than 0.7 including a high level of reliability.

Description	Values	Internal Consistency
Sum of the item variance	3.55	
Variance of total score	10.77	Good
Cronbach's alpha	0.89	

Table 1. Summary of Reliability Analysis

Cronbach's alpha of importance in gathering CX, customer engagement with the CX gathering form, CX via facial expression recognition and helpfulness about an automated customer experience gathering system are reliable and internal consistency is good.

The structure of the model is followed by the chapter that discusses and analyzes the model. Each criterion is represented where the quantitative research methodology is concerned.

Customers and staff of the banking firms indicate, from their points of view, that the institutions put a great importance on maintaining client relationships. Because of this, it can be deduced that the customers have the impression that the bank is focused on the customer relationship. As a result, it can be concluded that the needs of the customers were satisfied while working together, and that a relationship of continuous exchange that is beneficial to both parties was established.

4.3. Regulate CX via facial expression recognition.

From the customer's and employee's point of view, gathering customer experience is important. Even though it is important most of the customers were not engaged in it. Also, most of the customers and employees agreed to regulate CX via facial expressions recognition.

Regarding the inquiry of determining CX by observing the facial expressions of bank clients, the overarching findings suggest that there is a statistically significant moderate association between the variables in issue. However, the sample size is not sufficient to make any broad conclusions about the relationship's evolution, given that the direction in which the association develops might change depending on the size of the sample.

The results might be interpreted differently for different institutions depending on the circumstances, amount of time involved, and performance of both employees and customers.

Consideration of service quality, which has a positive influence on customer experience,

should be given by banks in order to improve customer experience (CX), particularly the idea that customers are valued assets.

As a result of the analyzed data, many relationships were identified. One of the most essential relationships identified is the relationship between CX and facial expressions. That relationship has good reliability and validity.

4.4. Special Features for the proposed system

By analyzing data many relationships were identified. According to the relationships unique features were proposed. From the analyzed data identified that has a relationship between CX and facial expressions also identified that most of the customers do not engage with the CX gathering process. So, proposed an automated CX gathering system by understanding facial expressions.

The proposed system has two main perspectives : manager/admin user and employee/staff member. So, managers can evaluate employee performance. If a particular employee gets CX as negative rapidly he will get a notification and recommendations to improve his/her performance. Also, if a particular employee gets CX as positive rapidly he will be noticed by the management and added to a leadership board.

Furthermore, from the analytics page admin users can view overall CX of the customers and other details like number of satisfied customers etc. Also, both parties can generate reports accordingly.

5. CONCLUSION

In the context of the banking business, there are a number of findings pertaining to the influence that facial expressions have on how well client relationships are performed. The factors that determine the CX shift throughout time in response to shifting worldwide trends, changes in the types of customers served, and shifts in how technology is used. In a nutshell, the customer-centric management system, the application of face expressions, and the service quality skills all comprehensively capture attention. This chapter will attempt to summarize the results and suggestions made by the research study that was mostly completed.

It is essential to take into consideration the study questions in order to answer the research aims, which are to determine how CX may be managed by facial expressions in a certain environment. Regarding the first study question, how the combination of facial expression recognition and customer experience might result in an improvement in the quality of the service being provided. As for the second study topic, it concerns the influence of an automated customer experience collecting system on the level of service provided by the banking industry in Sri Lanka. In conclusion, the final research question will focus on the significance of enhancing CX in the Sri Lankan banking industry.

From the customer's and employee's point of view, gathering customer experience is important. Even though it is important most of the customers were not engaged in it. Also, most of the customers and employees

agreed to regulate CX via facial expressions recognition.

The manager/admin user and the employee/staff member viewpoints are the two basic perspectives of the proposed system. Managers may assess employee performance as a result. Employees that experience CX that is quickly unfavorable will be notified and given suggestions on how to improve their performance. Additionally, if a certain employee quickly experiences excellent CX, management will take note and promote him to a leadership board. Additionally, admin users may check the overall CX of the consumers as well as other information like the number of pleased clients, etc., via the analytics page. Additionally, both parties may provide reports appropriately. In conclusion, the final research question will focus on the significance of enhancing CX in the Sri Lankan banking industry.

One of a company's most significant assets is its customer base. Because the effectiveness of a company relies on the skills of its customers and workers, each business has to understand what makes its customers satisfied.

The proposed system will identify CX by identifying facial expressions. Recommend that to add a wide range of security features and client identification features to handle customer relationships. Also, recommend improving the employee evaluation system and system recommendation feature. To get an efficient and effective enhancement using this system recommend training employees.

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The Influence of Social -Media on Depression, Anxiety, and Psychological Difficulty in Youths: A Systematic Review

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ABSTRACT

Most of the time, difficult in our everyday lives, online social media is blamed for developing mental fitness troubles in younger people. This systematic assessment synthesized evidence on the impact of social media use on depression, anxiety, and intellectual distress in youngsters. A search of Medline, PsycINFO, Embase, CINAHL, and SSCI databases reaped 15 eligible studies, of which 1 had been cross-sectional. Findings have been labeled into 4 area names of social media: time spent, activity, investment, and dependency. All domains correlated with depression, anxiety, and psychological misery. However, there are full-size caveats due to methodological limitations to pass-sectional layout, sampling, and measures. Mechanisms of the alleged consequences of social media on intellectual health need to be explored in addition to qualitative inquiry and longitudinal cohort studies.

Keywords - **Youths, depression, social media**

1. INTRODUCTION

1.1 Children and Adolescent Mental Health

According to the World Health Organization (WHO, 2017), 10–20% of kids and teens throughout the world struggle with mental health issues. According to estimates from the research of Kessler et al. (2007) and Kim-Cohen et al. (2003), 50% of all mental illnesses begin to manifest by the age of 14 and 75% by the age of 18. Generalized anxiety disorder and depression are the most prevalent disorders in kids and teenagers (Mental Health Foundation, 2018; Stansfield et al., 2016). The Royal Society for Public Health and the Young Health Movement (2017) found that in the last 25 years, there has been a 70% increase in the incidence of anxiety and depression in young people. According to studies by Copeland, Angold, Shanahan, and Costello (2014), Gore et al. (2011), and Hetrick, Cox, Witt, Bir, and Merry (2016), depression and anxiety have negative effects on adolescent development, including lower educational attainment, school dropout, harmed social relationships, and an increased risk of substance abuse, mental health issues, and suicide.

According to Morgan et al. (2017), during the past ten years, the rate of self-harm among females aged 13 to 16 in the UK has increased by 68%.

Between the ages of 10 and 19, about 15% of young people globally suffer from a mental health issue, and they are also the age group with the highest illness burden at 13%. Report on healthcare inequalities and quality in the US, 2022. Research conducted by the Health Resources and Services Administration (HRSA) predicts that between 2016 and 2020, 27% more children between the ages of 3 and 17 would receive a depression diagnosis.

The percentage of adolescents aged 12 to 17 who received inpatient, or outpatient mental health treatment increased from 11.8% in 2002 to 16.7% in 2019. Over the course of the previous year, the proportion of patients who got mental health care in a general medical setting increased from 2.7% to 3.7%. In the last year, the percentage of students who received mental health treatment increased from 12.1% in 2009 to 15.4% in 2019.

Boys were more likely than girls to have a mental, behavioral, or developmental issue when they were 2 to 8 years old. But since 2009, there has been a significant and sustained rise in the number of depression cases among teenage girls aged 12 to 17. Additionally, 22% of kids who lived below the poverty line had a mental, behavioral, or developmental disorder. Children's likelihood of obtaining therapy for anxiety, depression, or behavioral issues varied by age and poverty level.

There is no solid information regarding the causes of young people's reportedly rising psychological morbidity. Keles et al. (2020) contend that efforts to increase mental health awareness through education have had an impact on diagnostic activity. Many young people are unafraid of stigma and feel free to talk about their psychiatric issues and get expert care. In the digital information age, it is also simple to share personal stories (Kostyrka-Allchorne et al.,2023). Unlike in the past when people with mental health issues suffered in solitude, today's young people can easily find others who are going through the same issues through social engagement or support groups. Doctors may be more likely to diagnose and treat mental health issues in conjunction with rising knowledge and help-seeking behaviour, thereby reducing the diagnostic threshold.

1.2 Social Media

According to Bardus et al. (2020), "Social media" refers to the many internet-based networks that allow users to connect orally and visually. The Pew Research Center (Terrell et al.,2022) estimates that at least 92% of teenagers use social media. The 13–17 age group was highlighted by Keles et al. (2020) as being particularly active users of social media, with 87% of users having access to a computer and 58% to a tablet device. According to the Pew Research Centre (Lowenstein-Barkai & Lev-on, 2022), 68% of teens in the 13–14 age group and nearly three-quarters of those in the 15–17 age group use smartphones.

1.3 Mental health effects

Due to a concurrent rise in mental health issues, it is now crucial to comprehend how social media affects adolescents' well-being

(Keles et al., 2020). Psychiatric terms like "addiction" are frequently used to explain problematic internet user behavior. Some youthful activities, though, might be mistaken for abnormal. For instance, young people who take a lot of selfies may come across as narcissistic, but this type of behavior has become commonplace among younger social networks (Richa et al.,2021). Nevertheless, psychologists and other professionals have issued cautionary statements regarding the negative effects of young people's use of social media on their personal and social development (Garcia, 2022).

It's possible to see social media as a "double-edged sword." Studies (Ta et al.,2020) demonstrate the advantages of allowing people to communicate their thoughts and feelings and get social support. Additionally, studies have shown a connection between social media use and psychological issues. A minor but statistically significant correlation between social media use and depressive symptoms in children and adolescents was found in a comprehensive review of many studies (Cunningham, et al.,2021). There is a link between problematic Facebook use and psychological distress in adolescents and young adults, according to a meta-analysis of more than 20 studies (Marino, Gini, Vieno, & Spada, 2018). The usage of social media and depression have been linked in several comprehensive studies (Keles et al., 2020).

Social media and mental health issues are not directly linked, as there are many contributing factors. Impaired sleep was proposed as a mechanism in a 2017 paper by the Young Health Movement and the Royal Society for Public Health (Tandon et al.,2020). Internet use is an excessively sedentary activity that increases the risk of health issues (Kelly & Leung,2021). According to a meta-analysis by Asare (Zou et al.,2022), young people's mental health is negatively impacted by sedentary behavior. The direction of this association is unknown; however, it may be that those who struggle with mental health issues are more likely to be less physically active. Social media users frequently multitask since they have accounts on various platforms. According to a 2013 study by Rosen, Whaling, Rab, Carrier, and Cheever, online multitasking predicts mental health symptoms (Oraison et al.,2020).

Social support is a major component that affects how social media use and mental health are related. The American Academy of Paediatrics reported that using social media allows adolescent users to deepen their friendships with current friends and make new ones online, reducing social isolation and loneliness and indirectly enhancing mental health (Stănculescu & Griffiths,2021). According to some studies, people with low social support are more likely to experience mental health issues (such as depression, anxiety, and psychological discomfort) than people with significant social support from family, friends, and neighbours (Pop et al.,2022). Seabrook, Kern, and Rickard (2016) reviewed 70 papers and discovered an inverse relationship between positive social media interactions and sadness and anxiety (Odgers & Jensen, 2020).

According to the social comparison hypothesis, people frequently evaluate their opinions and skills by comparing them to those of others (Festinger, 1954). It's interesting to note that adolescents are more likely to engage in such conduct than younger kids or adults (Keles et al., 2020). Teenagers who participate in downward social comparison (comparing themselves to lesser performance) and those who utilize better performers as a benchmark may experience different effects of social media on their mental health. According to Keles et al. (2020) systematic study, there is a connection between depressing online interactions and both anxiety and depression. Similar findings were made by Rozgonjuk et al (2019) who mentioned that passive Facebook use is a predictor of social comparison and jealousy, both of which result in depression.

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which result in depression. According to Erikson (1950), adolescence is a time when people create their social and personal identities (Meca et al.,2019). A large portion of this development currently depends on social media. Adolescents may not be able to avoid the potentially negative impacts of social media use because of their poor ability to self-regulate and their susceptibility to peer pressure, and as a result, they are more likely to experience mental problems. However, research on how social media affects adolescents' psychosocial development is still in its infancy. Many studies conducted to date have focused on adolescents in their later adolescence and college or university students. More studies were included in earlier systematic reviews because they focused on a diverse group of kids, teens, and adults (Baker & Algorta, 2016; Marino et al., 2018; Seabrook et al.,2018).

2. METHODOLOGY AND DESIGN

2.1 Current research

This comprehensive study reviewed the evidence concerning the relationship between juvenile social media use and depression, anxiety, and psychological discomfort. The intention was to encourage further research into this area and impact practice and policy.

2.2 Methodology

Communications protocol and record-keeping

The protocol for this evaluation was submitted to the National Institute for Health Research for registration in the interest of transparency (2020). The

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement is adhered to in this study (Moher, Liberati, Tetzlaff, & Altman, 2009a).

2.3 Eligibility requirements

Studies were eligible for this review if they met the following requirements:

Participants were between the ages of 16 and 25; exposure involved measuring social media use; and the outcome was determined using validated tools such as depression, anxiety, or psychological distress. Research articles that have been published in peer-reviewed journals and are available in English.

Studies that crossed either age range border were disregarded. Studies that only measured social media use were excluded. Studies evaluating exposure to other online activities, such as video gaming, were also excluded. Except when the outcomes of interest were also measured by the researchers, outcomes of substance abuse, eating disorders, happiness, life satisfaction, self-esteem, body image issues, behavior disorders, loneliness, or stress were excluded.

2.4 Search procedure

Psych INFO, Cumulative Index to Nursing and Allied Health (CINAHL), Medline, Embase, and the Social Sciences Citation Index (SSCI) were all thoroughly searched in May 2018. A list of search words was created utilizing truncations, Medical Subject Headings (MESH), and Boolean operators.

3. RESULTS

3.1 PRISMA Flow Chart

The literature search turned up 1002 items in the five databases. After screening the title, 321 of the 624 unique articles were removed, along with 303 duplicates. 244 of the 303 remaining papers were dropped after being scrutinized based on their abstracts, leaving 59. After reviewing the entire text, 45 papers were determined to be ineligible, with the age range being the most common reason. The PRISMA flowchart in Figure 1 (Moher, Liberati, Tetzlaff, & Altman; The PRISMA Group, 2009b) provides further details on the exclusionary factors. Finally, 14 papers were accepted for review analysis.
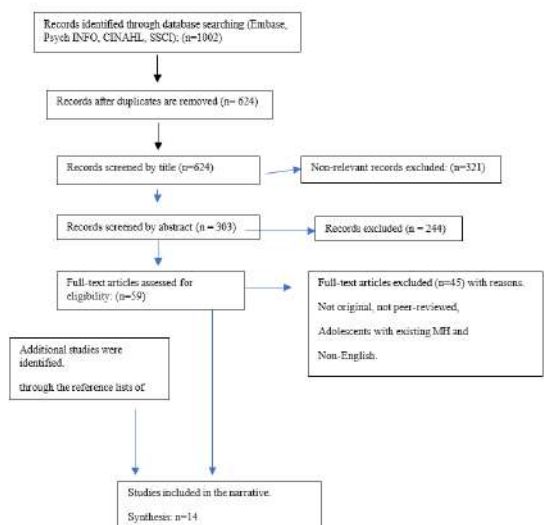

Figure 1

3.2 Description of studies

Table 1 provides a summary of the reviewed publications. Some of the

research included in this review and analysis was cross-sectional, while others were longitudinal. Over a thousand people made up the overall sample for all the research. One research was carried out in six European nations, including Greece, Spain, Poland, the Netherlands, Romania, and Iceland. Other studies were carried out in Australia, China, the UK, the USA, Malaysia, Thailand, and Canada. The participants were 16 to 26 years old. A few research looked at social media exposure in general, while others (Keles et al., 2020; Twenge et al., 2018, Guraya et al., 2019, Ye et al., 2021) concentrated on Facebook use specifically. Some research examined confounding variables (such as age and gender) as well as mediating and moderating factors (such as sleeplessness, rumination, and self-esteem) in addition to assessing depression, anxiety, or psychological distress.

3.3 Analysis of the Findings

Four types of social media exposure were used to group the study's primary findings: time spent, activity, investment, and addiction. The term "time spent" refers to how much time users spend on social media. The amount of engagement and communication a person has with social media platforms, other users, and other users is referred to as activity. Investment, as opposed to addiction, refers to the act of devoting time and energy to social media. Addiction refers to the state of being dependent on social media. For each region, we explore the relationship between depression, anxiety, and psychological distress in relation to confounding, mediating, or moderating factors assessed.

3.4 Time spent

The research produced inconsistent findings about the relationship between social media use and mental health problems. Piteo, E. M., & Ward (2020) in another Australian study, Keles, B., McCrae, & Grealish (2020) with an Australian sample, and Benjamin et al. (2015) in Serbia did not discover a relationship between the frequency of social media use and depressed mood. However, Sampasa-Kanyinga et al. (2019) found a connection between psychological distress and daily social media use of more than two hours. An association between heavy social media use and both sorrow and anxiety was discovered in a 2014 study by Tsitsika et al. involving 10,930 teenagers from six European countries. Keles et al. (2020) mentioned a connection between social media use and anxiety among Chinese youths.

3.5 Activity

In a sample of Belgian high school students, Piteo, E. M., and Ward, K. (2020) found a correlation between active and passive Facebook use and a greater frequency of melancholy moods. Barry et al. (2017) found that data from parents revealed a link between teenagers' social media activities (i.e., number of accounts, frequency of checking for messages), and both anxiety and depression. This was based on a study of 113 adolescent-parent dyads. Benjamin et al. (2015) could not discover a link between the number of "selfies" posted on social media and students' levels of sorrow in Serbian high schools.

3.6 Investment

Keles et al. (2020) found a strong correlation between teenage depressive tendencies and the amount of identity-related information on Facebook profiles. Geagea investigated the link between social media use and depression in 2019. Neira and Barber (2014) found a link between increased depression symptoms and social media use. Vernon et al. (2017) found a relationship between problematic social media usage and depression in longitudinal research, with sleep disturbance acting as a mediation factor.

3.7 Addiction

The three studies all focused on addiction. Gordon (2021) discovered that there was a strong association between Facebook addiction and hopelessness among 972 high school students in Thailand's affluent areas. Sleep deprivation mediates the statistically significant link between social media addiction and depression, according to a study by Li et al. (2017) involving Chinese secondary school students and Honglv (2023). Wang et al's (2018) study found that self-esteem lessened the mediating effect of rumination, which mediates the relationship between depression and social networking site addiction. They also found

a link between addiction to social networking sites and depression.

3.8 Confounding factors

The impact of gender on the association between social media-related factors and outcomes linked to mental health was examined in four studies. According to Kong et al. (2022), while social media may be a pleasant pastime for young males, it may have drawbacks for young women. According to Vidal et al. (2020), boys and girls who actively use Facebook in public settings are more likely to experience Facebook's negative effects. According to Liu et al. (2022), there is no evidence that gender has a substantial impact on the association between social media use and depression.

The impact of age was examined in two investigations. According to Vidal et al. (2020), there is a significant age effect on the relationship between heavy social media use and negative internalizing symptoms (anxious/depressed, withdrawn/depressed), with younger heavy social media users having a higher likelihood of experiencing internalizing symptoms than older heavy users.

Table 1

Study	Aim	Author /s	Findings/Results
1) Systematic review: The influence of social media on depression, anxiety, and	Finding the relevance of the wonder of youth social media use's effects on mental health.	Keles, B., McCrae, N., & Grealish, A. (2020). A	Time passed, movement, venture, and compulsion. The intricacy of these connections was confirmed by the discovery that all these categories were

psychological distress in adolescents			connected to unhappiness, discomfort, and mental pain.
2) Digital experiences and their impact on the lives of adolescents with pre-existing anxiety, depression, eating, and no suicidal self-injury conditions – a systematic review.	Searching for evidence that many online experiences (both positive and negative) are shared by adolescents with different mental health difficulties.	Katarzyna et al. (2023)	Overall, the literature suggests that digital media may provide adolescents with mental health difficulties with positive social experiences, instant peer support, and acceptance. However, the male sex and greater severity of depression symptoms may reduce opportunities for benefiting from these positive digital practices.
3) The relationship between addictive use of social media, narcissism, and self-esteem: Findings from a large national survey.	Studying basic demographic variables (primarily age and sex), narcissism, and self-esteem are all associated with the addictive use of social media.	Andreassen, C. S., Pallesen, S., & Griffiths, M. D. (2017)	Addictive social media use was related to lower age, being a woman, not being in a relationship, lower education, being a student, lower income, having narcissistic traits, and negative self-esteem.
4) Smartphone distraction-addiction: Examining the relationship between	Finding participants' views of the factors that influence their smartphone use aligns with	Oraison, H., Nash-Dolby, O., Wilson, B., & Malhotra, R. (2020).	This research further illustrates the interaction of smartphone addiction and distraction resulting in increased smartphone use and psychological distress.

psychosocial variables and patterns of use	previous literature.		
5) The Longitudinal Association Between Social-Media Use and Depressive Symptoms Among Adolescents and Young Adults:	examined the associations between social media use and depressive symptoms over time using two samples.	Twenge et al. (2018) Taylor Heffer1, Marie Good2, Owen Daly1, Elliott MacDonell1, and Teena Willoughby1	Social media use did not predict depressive symptoms over time for males or females. However, greater depressive symptoms predicted more frequent social media use only among adolescent girls.
6) Body-esteem, Self-Esteem, and Loneliness among social media in Young Users Lavinia.	Verifying addiction to SNSs may improve the psychological interventions among young SNSs users.	Pop, L. M., Iorga, M., & Iurcov, R. (2022)	The results of the present research proved the relationship between the use of SNSs and the presence of loneliness, self-esteem, and body esteem, with gender differences. (**SNS**: social networking service)
7) Social media and loneliness.	conduct on the correlations between loneliness and social networking sites (SNS).	Halston, A., Iwamoto, D., Junker, M., & Chun, H. (2019).	. The research found a minimal correlation between SNS, and the UCLA (University of California Los Angeles) revised loneliness scale score.
8) The effects of social media usage on loneliness and well-being: analyzing friendship connections of Facebook, Twitter, and Instagram.	study aims to clarify the effects of different patterns of Facebook, Twitter, and Instagram usage on user loneliness and well-being	Ye, S., Ho, K. K., & Zerbe, A. (2021).	Investigated social media-related factors that affect the loneliness and well-being of college students in Japan. It is analyzed to determine how these usage patterns might affect their loneliness and well-being, as the respondents used different social media for different social connections.

9) Comparison of student health and wellbeing profiles and social media use.	Finding the complicated relationship between technology use and health.	Wright, R. R., Schaeffer, C., Mullins, R., Evans, A., & Cast, L. (2020).	Increased daily use of social media has a negative impact on the user's well-being, image-based social media (i.e., Snapchat) use is associated with more negative health-related outcomes, and video-based (i.e., Marco Polo) and professional social media (i.e., LinkedIn) use are related to more positive outcomes.
10) Academic performance, social adjustment, and emotional intelligence of students involved in social networking sites.	To identify Social networking in students' academic achievement, social adjustment, and emotional intelligence.	Beri, N. (2018).	Revealed a positive relationship between involvement in social networking sites and Academic performance, social adjustment, and emotional intelligence.
11) Comparing the extent and pattern of use of social networking sites by medical and non-medical university students: a multi-center study.	Explore the educational reforms that can uniformly embed the use of social media in teaching and learning pedagogies across disciplines.	Guraya, S. Y., Al-Qahtani, M. F., Bilal, B., Guraya, S. S., & Almaramhy, H. (2019).	This research demands educational reforms that can uniformly embed the use of social media in teaching and learning pedagogies across disciplines. Keywords: social networking sites, Facebook, Twitter, Flickr, WeChat, education
12) Time Spent on Social Media and Risk of Depression in Adolescents: A Dose–Response Meta-Analysis.	To find an association between TSSM and depression in Adolescents by pooling the risk of depression with TSSM for adolescents, quantifying a dose-response association, and exploring the	Liu, M., Kamper-DeMarco, K. E., Zhang, J., Xiao, J., Dong, D., & Xue, P. (2022)	The findings provided evidence that more time spent on social media (TSSM) is associated with a higher risk of depression in adolescence in a linear dose-response manner, especially for teenage girls.

	heterogeneity of the included studies		
13) Social networking sites and associations with depressive and anxiety symptoms in children and adolescents–a systematic review.	examine the relationships between SNS and depressive and anxiety symptoms in the child and adolescent population (5–18 years).	Piteo, E. M., & Ward, K. (2020).	There is a relationship between SNS and anxiety and depressive symptoms, the effect size tends to be small and informed by studies of inadequate quality.
14) An increase in time spent on social media is associated with a modest increase in depression, conduct problems and episodic heavy drinking.	examine if a within-individual change in time spent on social media was associated with within-individual changes (FD-models).	Brunborg, G. S., & Andreas, J. B. (2019)	Increased time spent on social media was modestly related to increases in depression, conduct problems, and the frequency of episodic heavy drinking among adolescents.

4. DISCUSSION

The data supporting a potential link between teenage usage of social media and mental health issues were explored in this systematic review. The outcome that was most assessed throughout the 11 research was depression. This review identified time spent on social media, repetitive message checking, personal investment, and addictive or problematic use as the main risk factors for depression, anxiety, and psychological discomfort.

This evaluation discovered a broad association between social media use and mental health issues, even though the research findings were not always consistent. However, most authors pointed out that the observed association is too nuanced for generalizations. Although several studies examined the impact of mediating and moderating variables, few were created to study this complexity. The most common mediators of the impact of social media on teenage depression, anxiety, and psychological distress were revealed to be insomnia and other sleep-related issues (Keles et al., 2020).

Other mediating characteristics identified in the research were narcissistic features (Andreassen et al., 2017) and perceived quick peer support (Katarzyna et al., 2022). Researchers recommended further research into these factors as well as others, including the interaction of smartphone addiction and distraction (Oraison et al., 2020), sociocultural factors that affect the expectations of adolescents in family and

society (Vidal et al., 2020), the development of adolescents' social skills, the presence of loneliness, self-esteem, and body esteem, greater depressive symptoms (Twenge et al., 2018), lonelily, and others.

This review study revealed that attitudes or behaviors, such as social comparison, active or passive use of social media, and reasons for using it, may have a bigger impact on the signs of depression, anxiety, and psychological distress than how frequently someone uses social media or how many friends they have there. Although there is proof that using social media for extended periods of time and engaging in associated activities might lead to depression, other research has found the opposite to be true. For instance, Liu et al. (2022) discovered that, particularly for adolescent girls, spending more time on social media (TSSM) is related to a greater risk of depression in adolescence in a linear dose-response fashion. Like this, Piteo et al. (2020) demonstrated a link between SNS and anxiety and depressive symptoms, however, the impact size is often modest and supported by low-quality research. The impacts of age and gender require more research to be determined.

Limitations

Although the results of this systematic review added to the body of literature in a way that focused on not only the symptoms of depression but also other related outcomes like anxiety and psychological distress among adolescents who are more likely to experience anxiety and depression, they also provided substantial evidence for the mental health impact of social media use. There are several gaps in the evidence

that have been found in the included research and review procedures. Since they were cross-sectional and failed to establish a causal link between the relevant variables, some studies were unable to respond to the review question. Only a few (Brunborg et al., 2019) examined the relationship between rising levels of depression, behavior issues, and episodic heavy drinking among teenagers and the increased time spent on social media.

Another discovered drawback was that several research focused on Facebook use exclusively rather than other social media platforms, which also results in a considerable bias and restricts the applicability of findings to other social media platforms. Despite the complexity of the putative association between social media-related variables, depression, anxiety, and psychological distress, little research has investigated potential mediating factors that can strengthen or aggravate this relationship. To fully understand the fundamental causes of why social media affects some teens' mental health negatively while having no favorable effect on others, more research is required.

5. CONCLUSION

According to this review, social media use has a multifaceted effect on the prevalence of depression, anxiety, and psychological discomfort among adolescents. Differentiating between the phrases used to describe the relationship is crucial. Given that this term refers to a socially created reality, it is reasonable to state that there is an "association" between social media usage and mental health issues. But this is not always supported by science. Instead of

accepting widely held beliefs as true, objective researchers look at correlations. Not phenomenal, correlation is a statistical concept. Third is causality, which calls for directional proof. As the latter has not been sufficiently explored in this area, we must state that there is a connection but not proof of causation.

Four types of social media exposure were categorized by the study's key findings: time spent, activity, investment, and addiction. Recognizing the complexity of these relationships, it was discovered that each category related to psychological distress, anxiety, and depression. Even though some research has investigated mediating and moderating factors that might worsen or contribute to the relationship that has been proposed, there are still several understudied mediators and moderators that might explain how this link developed. We also found gaps in the literature in terms of methodology, study design, and sample. Due to the cross-sectional study design that was utilized in all investigations and the absence of a reference group in the cohort study, causation was unclear. We anticipate that by filling in the gaps and highlighting the significance of the phenomena of the mental health impact of social media use on adolescents, this systematic review will make a positive contribution to the body of literature already in existence.

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Understanding the influence of social media on consumer satisfaction among bank customers in Sri Lanka

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ABSTRACT

Technology and internet usage has changed the way people interact with their friends' families. This impacted the consumers on the mode of purchasing and the way they gather information and support. This paper analyzes about the influence of social media on banking consumer satisfaction in Sri Lankan financial sector. The deductive approach is carried out, and the study is carried out with a sample of 185 young people responses this quantitative study has been carried out. The quantitative study has been carried out with the help of SPSS. The findings show that customer satisfaction is strongly influenced by social media usage. Approximately 70% of respondents mention that their satisfaction level is influenced by social media usage. While the moderating variable the Gender is not moderating the result of this study. 27% of respondents mention that social media is not influencing their satisfaction and it cannot be accepted

as a proper communication tool for the consumers.

***Keywords* - Social media, Customer satisfaction, banking**

1. INTRODUCTION

With the development of the internet, shopping, communication, and consumer interaction totally changed. The efficiency of this was not limited to the country or the region in the world. While Facebook is leading in usage, Instagram is used as an influencer platform to attract consumers (Dwivedi et al., 2018). Within a few years the new social media entrants and the efficiency improved massively because of the number of users (Kengatharan, 2017). Social media enabled the organizations to have two-way communications with their consumers to have better relationships (Dootson, et al., 2015). The social media became as a main marketing medium for many organizations and the brands in Sri Lanka and other countries. Starting from service sector to

major brands using social media for the marketing as well as for the consumer relationship.

There were number of research and scholarly articles are available around social media, as the social media impacted in all the industries (Kumar et al., 2020). There were a number of different social media platforms that are used for different purposes by people (Facebook, Twitter, LinkedIn, Instagram, TikTok etc.). The study around the world shows that the people are using social media for entertainment and relationship building and some are addicted for different reasons, especially the young generation is addicted because of different reasons like games, and other benefits they get (Chikandiwa, er al., 2014). According to the report provided by the Digital Sri Lanka 2023 it revealed that the 14.58 million people are connect with internet in Sri Lanka. Out of the total internet users 49.4 % people are using at least a social media there were 37.3% people are female and 62.7% are male users relate to social media (Digital Sri Lanka, 2023).

Social media has changed the way people think, enquire, and communicate with each other. This is not only in Sri Lanka, but entire world trend is also going same with the latest trends. For the Brands and organizations social media is an effective medium to connect people and they can make the branding with low budget comparatively (Rishi and Sharma, 2017). With the usage numbers and cost effectiveness most of the organizations adopt several digital media including social media for their marketing activities.

With the impact of COVID-19 and the financial difficulties all the industries are in trouble getting into the business back.

The financial industry is severely affected by the situation. All the Financial institutions are focusing on their core values by improving Privacy, transparency, and customer care. As the other industries involve Banking industries also getting into the social media to make their business easier by making the brand, product awareness to the consumers. As they get into social media it is important to connect with the consumers to build their trust through social media.

This paper mainly focuses on the importance of customer care in the Banking sector through social media platforms. As social media is used for marketing, making loyal customers will be an important factor for the organizations. The objective is to analyze the consumer aspect of social media consumer relations. In some sectors consumer satisfaction measurement will be a deciding factor for their business, this includes the banking sector. The objective of this study is to understand the impact of social media on consumer satisfaction in the banking industry. The outcome of the study will support the financial institutions to understand the social media platform directions for the future developments.

2. LITERATURE REVIEW

Social Media

The social media considered as the most convenient model to communicate and to connect with others (Senthilkumar, 2011). Companies and the brands are looking for a better communication medium to keep their

consumers and to evaluate their satisfaction level, the consumers also prefer to have the two-way communications as they can get some advantages including the information and other benefits(Chodak et al., 2019).

Marketers get advantages such as loyal customers, easier brand collaboration and low-cost marketing. This also enables them to transfer rich information to the consumers (Hudson et al, 2016). The experience sharing made simpler by the social media to their friends and families, where the organizations also used this to inform their peers(Liu et al., 2018).

Social media and Organizations

Social media given more opportunities for organizations like cost advantages, branding, consumer interaction, wide range of customers and easy platform for information interchange (Hudson et al,2016).

Social media provides lot of opportunities for the organizations as well as the consumers because of communication and information sharing. The reason behind this was the usage pattern and the capacity to attract people with more information compared to traditional marketing mediums. This platform ensured the customer relationship and supported on consumer affairs (Chawla Ph.D. & Chodak, 2021).

Organizations preferred a method to maintain their own loyal customers, and social media supported it as it expanded its development on a massive scale. The social media is earlier considered as an entertainment medium and later this was a part of internet users, the brands started

thinking about building their brand image with social media and they also considered about people perception (Ismail, 2017). As social media is adopted by large populations, the organizations are trying to be competitive with others, and creativity is one important aspect to attract people.

Consumers and social media

Social media converted the consumers into active participants rather than a normal consumer. The consumers were able to keep the bond with the organization to get the information and the brands created loyal customers (Zeitzoff,2017). The organizations started achieving different advantages such as influencing the consumers, making awareness, and making the consumers to buy the products (Shareef et. Al,2017).

Social media is used as an instrument to buy the products and to promote the products by the organizations, the marketeers influence the social media users to purchase their products (Pütter, 2017). With the social media entry, the organizations are thinking about the consumer engagement of their content to attract the consumers and new customers, for this the organizations are working on creativity and viral contents to attract the consumers (Toor et al., 2017).

Figure 1. 4C Framework of social media
(source- Cook 2008)

Globalization created several consumer-based problems, and with the expansion of organization it went to a higher level.

Organizations had the responsibility to manage the consumer issues, to make this easier organizations started searching for other options than the traditional methods(Duffett, 2017; Yang, 2019).

The Governments improved their legal systems to support the consumers as the government had the responsibility to protect the consumers (Waller, 2011). The consumer related laws not famous in most of the developing countries as they are not that serious on this aspect, this is regardless of their education levels, still this was essential for the brands and the organizations to manage their customers. Many studies reveal that social media marketing, and the loyalty has massive impact on purchase intentions (Ismail, 2017).

Smart mobile usage also seems to be a reason for this social media fever around the world, billions of people are using social media, and this has been captured by many organizations as their marketing tool. The current Era is with social media and the credibility of social media content plays an important role on consumer purchase intention, because of this reason companies are focusing on social media to handle their consumers rather than the traditional mediums (Islam et al, 2021).

Awareness creation with social media

With the latest improvements social media is used for awareness creation for products and brands. The degree to which customers believe a firm has a strong reputation is referred to as brand awareness. According to Lavidge and Steiner's (1961) hierarchy of effects (HOE) model, consumer decision-making is a sequential process with six discrete stages. The steps stated above comprise the mental and emotional processes people go through while deciding which item or service to buy. The terms awareness, knowledge, like, preference, conviction, and purchase are frequently used to describe these stages. The awareness stage is the first one in the consumer's cognitive process that affects the purchase of goods or services. Influencing cognitive awareness, emotional liking, selecting and belief, and conative real purchase are the desired results of advertising.

Consumer Support

Previous research has also recognized the significance of social media programs for consumers. For instance, Chen (2014) looked at the impact of social media on consumers in his study. The study's conclusions indicate that social media-related elements like community, dialogue, and involvement have a big impact on consumers' intentions to make purchases. Ozer (2012) looked at how social media affects consumer purchases in his study. The study's conclusions indicated that social media had a favorable impact on consumers' decisions to buy. Additional research, such that done by Kamtarin (2012) and Valenzuela, Park, and Kee (2009), discovered that consumer behavior toward a company is significantly impacted by social media related connections. All these studies are focused that the consumer

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support using different digital platforms provided value for consumer support.

Consumer Satisfaction

Consumer satisfaction is important to create loyal consumers for any product or services. Social media can play a vital role in consumer satisfaction as brands are connecting the consumers through social media. The high degree of emotions that one has after obtaining a good or service and evaluating a certain performance is known as customer satisfaction. The demands and aspirations of these customers will differ according to how they perceive their level of fulfillment. As stated by Lovelock and Wirtz, cited by Fandy Tjiptono & Chandra (2016), one's level of satisfaction is determined by the experiences one has had.

To demonstrate if a past anticipation has a significant role in satisfaction, more research is required. Considering this, Kotler & Keller (2016) define satisfaction as an individual's emotions of delight or disillusionment brought on by contrasting the perceived performance (or result) of a good or service with their expectations.

Customer satisfaction derived from social media is also considered. One way to do this is by offering services through WhatsApp business, which makes it simpler for customers to express complaints or requests for advice. It is believed that by doing this, issues from customers may be addressed. However, this results in fewer satisfied customers since the only thing that keeps them from being extremely satisfied is the automatically determined response to a message. As a result, a company's ability to provide high-quality service is crucial to its customers' happiness and the development of long-lasting relationships.

3. METHODOLOGY

The intention of this study is to check the impact of social media operations on consumer satisfaction among banking customers of Sri Lanka. The study is carried out with the deductive approach, and it is done in a particular time frame in the method of cross-sectional manner. The research was carried out in the quantitative method, in the natural environment. Data gathered from the banking customers who use social media.

Online Questionnaires are distributed to the youngsters who are using social media using convenience sampling.

The data is gathered from the youngsters who are the customers of Sri Lankan banks and the users of different social media users. For this study 200 youngsters' data has been collected and only 185 valid responses were received from the respondents. The sampling technique is a convenient sampling technique and SPSS is used to analyze the gathered data.

Frequencies

Table 1. Frequencies

Variable		Frequency	Impact Percentage
Gender	Male	116	62.7%
	Female	69	37.3%
	Other	0	0%

Age	13-20	57	30.8%
	21-28	58	31.4%
	29-36	70	37.8%

The above table shows the respondent's demographic information. According to the table Male respondents are 62.7% and the Female respondents are 37.3%. The age group distributions are with 13-20 age group 30.8%, 21-28 age group with 31.4% and 29-36 age group with 37.8%

Hypothesis of the study and Conceptual framework

By considering past studies and the literatures the hypothesis social media aspects are influencing user satisfaction. The specific hypotheses are included as follows:

H1: Social Media created awareness has a significant impact on User satisfaction.

H2: Consumer support has an impact on user satisfaction.

From the above hypotheses the following theoretical framework is drafted.

Figure -1 Conceptual Framework

Data Analysis

Reliability analysis

The study's reliability was checked with the Cronbach's alpha value, and it will determine the consistency of a study. The following table (Table-2) shows the Cronbach's value of each construct that is derived for the study. According to the

study of Bujang (2018) the Cronbach's minimum accepted value should be 0.7. All the constructs here are above 0.7 and this can be accepted.

Table 2. Reliability Analysis

Construct	Item	Response	Alpha (Cronbach's)
Social Media Awareness	4	185	0.861
Social Media Consumer support	4	185	0.872
Satisfaction	4	185	0.815

Good ness of Fit

The model summary is checked with the Regression analysis, the following table (Table-3) shows the summary. The R^2 value is Greater than the accepted level by 0.5. It can be considered that the data is placed around the mean value and the model is fit.

Table 3. Goodness of Fit

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.714ª	.510	.504	.5447

a. Predictors: (Constant), B, A

Hypothesis Test

The hypothesis test result shows that (Table-4) that both hypotheses are significant with less than 0.05 value for both the hypothesis considerations. Both the variables are significant, and their t-value is less than -2 or greater than +2, the accepted range.

Table 4. Hypothesis

Coefficients

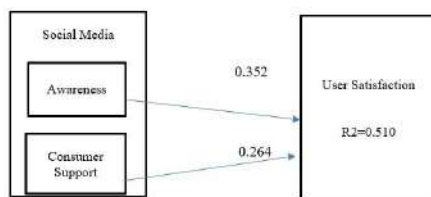| Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	.941	.110		8.576	.000
A	.352	.074	.420	4.756	.000
B	.264	.071	.330	3.738	.000

a. Dependent Variable: C

Figure -2 Hypothesis Results

As shown in the above figure (Figure-2) both the hypothesis is accepted and the R2 value is above the accepted level 0.5. This implies that the hypothesis consideration, awareness, and consumer support from social media is influencing user satisfaction.

4. DISCUSSION

The results of the hypothesis testing show that social media awareness creation and consumer support positively influences consumer satisfaction.

All the factors considered having the positive impact on consumer satisfaction where the awareness creation having the impact 0.352.

The results show that awareness creation is important to make the consumer satisfied and this is well supported by the studies done earlier on Consumer satisfaction and brand awareness (Das and Mukherjee, 2016). This Study also says that two more tangible supporting factors customer perceptions and brand awareness can enhance the relationship between service excellence and customer pleasure. Customer happiness and service quality are positively correlated, and this link may be further strengthened by the consumers' opinions about the best possible service procedures.

The data analysis also says that the consumer supports positively impacting the satisfaction. The studies made by Ozer (2012) and Chen (2014) highlighted the fact that consumer support is an important factor for consumer satisfaction.

Several other studies also mentioned that social media related consumer support is easier and essential to make the consumer connected with the brands. The result of the study also suggested the same.

5. CONCLUSION AND IMPLICATIONS

The result of the research shows there is a strong relationship between the social media handling and the banking customer satisfaction in Sri Lanka. Out of the 185 respondent's 71 percent of the respondents mentioned that social media is one of the communication tools they use to

communicate with the bank, to know about their operations and the services in general. At the same time 25 percent of respondents mentioned that they are having difficulties accessing the social media platform and they are also not ready to use the social media as communication tool.

The outcome of this study will help the banks to understand the importance of social media platforms. The banking sector should focus more on social media to create awareness on their new products and their operational changes for the consumers through the social media.

From this study, it can be recommended to the banks to concentrate more on social media operations to make awareness to the consumers. And the social media platforms can be used to provide customer service for the customers.

The banks can use platforms with the latest AI technologies to connect to the consumers all the time. As some studies show consumer engagement in content is important for social media campaigns. The social media campaigns are going towards potential organic engagements than the campaign-based concepts.

The study is done in the quantitative manner, and it's important to go further with qualitative manner to get more insights of this consumer satisfaction. The respondents connected through the online platforms and in total of 185 respondents only responded for the questionnaire and it's better to have more sample to get more accurate results of the study. The external factors are not considered in this study, that can be included to get more insights of this topic.

The organizations should use some techniques to promote their social media platforms in different ways to attract people and to connect the consumers to provide customer support and awareness. These platform people will support the consumers to help each other in the network, and that will help the banks to manage their consumer queries.

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Human-Computer Interaction in Smart Living Environments: Challenges and Opportunities

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ABSTRACT

The proliferation of smart technologies in living environments has ushered in an era where humans and computers interact more intimately than ever before. This research paper delves into the complex landscape of Human-Computer Interaction (HCI) within the context of smart living environments, shedding light on the multifaceted challenges and exciting opportunities that lie ahead.

In this exploration, we first review the fundamental concepts and technologies that underpin smart living environments, emphasizing the centrality of HCI in bridging the gap between humans and the myriad of interconnected devices and systems that constitute these environments. We then identify and analyze key challenges such as user privacy, security, usability, and adaptability, which continue to shape the HCI landscape in smart living.

The paper also highlights the emerging opportunities for HCI research, including the integration of augmented reality (AR), virtual reality (VR), and natural language processing (NLP) into smart living systems, fostering more intuitive and seamless interactions. Additionally, it discusses the potential for personalized and context-aware HCI solutions that enhance user experiences and promote inclusivity.

By addressing these challenges and harnessing these opportunities, this research seeks to provide valuable insights for HCI researchers, designers, and policymakers, ultimately contributing to the development of smarter and more user-friendly living environments that enhance our quality of life while respecting our fundamental rights and values.

Keywords - Human-Computer Interaction (HCI), Smart Living Environments, Smart Home Technology

1. INTRODUCTION

In an era characterized by the relentless march of technology, the concept of "smart living environments" has emerged as a transformative force, reshaping the way we interact with the spaces we inhabit. These environments, often referred to as smart homes or connected living spaces, are imbued with an intricate web of sensors, devices, and systems that collectively seek to enhance our daily lives. At the heart of

this transformation lies the field of Human-Computer Interaction (HCI), a discipline focused on understanding and improving the ways in which humans and computers communicate and cooperate.

While the promise of smart living environments is tantalizing—offering increased convenience, energy efficiency, and security—it also presents a host of intricate challenges. These challenges span a broad spectrum, ranging from the critical issues of user privacy and security to the subtler nuances of usability and adaptability. As our homes become increasingly saturated with interconnected devices and systems, the importance of effective HCI within these environments cannot be overstated.

1.2 RESEARCH GAP

Despite the growing significance of HCI in smart living environments, there exists a noticeable research gap. While there is a wealth of literature addressing HCI principles in traditional computing contexts, there is a paucity of comprehensive studies that specifically focus on the unique challenges and opportunities presented by smart living environments. This gap hinders our understanding of how best to design, implement, and optimize HCI within these intricate ecosystems.

To address this gap, this research paper embarks on a journey to explore the intricate interplay between humans and computers in smart living environments. It aims to provide a holistic overview of the challenges encountered, the opportunities waiting to be harnessed, and the directions in which future research in this domain can flourish.

1.3 AIM OF THE STUDY

The primary aim of this study is to elucidate the multifaceted landscape of HCI in smart living environments. Specifically, this research seeks to:

1. Identify Challenges: Analyze and categorize the challenges that arise in the context of HCI within smart living environments, with a focus on issues such as user privacy, security, usability, and adaptability.
2. Explore Opportunities: Examine the emerging opportunities for HCI research in smart living, including the integration of augmented reality (AR), virtual reality (VR), and natural language processing (NLP), as well as the development of personalized and context-aware HCI solutions.
3. Provide Insights: Offer valuable insights for HCI researchers, designers, and policymakers to inform the design and implementation of more user-friendly, inclusive, and secure smart living environments.

Through this research, we aim to contribute to the ongoing dialogue surrounding the evolution of smart living environments and pave the way for a more harmonious and enriching interaction between humans and the technology that surrounds us in our daily lives.

1.4 OBJECTIVES

1. To Assess Current Human-Computer Interaction Practices

2. To Identify, categorize, and prioritize the challenges faced in the field of HCI within smart living environments

3. To Explore and assess the impact of emerging technologies, such as augmented reality (AR), virtual reality (VR), and natural language processing (NLP), on HCI within smart living environments.

4. To Develop recommendations and strategies for the integration of context-aware computing to enhance user experiences in smart living environments.

2. REVIEWS OF LITERATURE

1. Gianluca Paravati and Valentina Gatteschi, in their article, "Human-Computer Interaction in Smart Environments" highlighted technologies and solutions encompassing the use of mass-market sensors in current and emerging applications for interacting with Smart Environments. Also discussed the working of various smart equipments.

2. Avantika Tiwari, her article, "Human Computer Interaction: Trends and Challenges"gave an overview of the topic of HCI. Also given Definitions of various organizations and terms, an overview of existing technologies and recent advances in this field, how the sphere interacts with various other areas of the sphere such as engineering, cognitive and behavioral psychology, and anthropology Humancomputer interaction, including what to do. , sociology, ergonomics, industrial

design and more. Provided an overview of HCI and applications or devices, trends and challenges in the HCI space

3. Yu Zhao, Xihui Zhang, John Crabtree, in their article, "Human-Computer Interaction And User Experience In Smart Home Research: A Critical Analysis" they proposed four innovative approaches including efficient general control panels, effective user interfaces, variable accessibility, and secure privacy Based on diverse fundamental theories and various practical implementations. They said these proposed approaches can help designers and developers optimize the user experience in smart homes and satisfy the users' non-functional requirements by improving the efficiency and effectiveness of the user experience. They discussed the importance of each of these approaches and provide detailed instructions on how to implement each of them.

4. Wei Xu, Marvin J. Dainoff, Liezhong Ge, Zaifeng Gao, in their article, "From Human-Computer Interaction to Human-AI Interaction: New Challenges and Opportunities for Enabling Human-Centered AI" they focused on the unique characteristics of AI technology and the differences between non-AI computing systems and AI systems. Their review and analysis highlighted unique issues in developing AI systems which HCI professionals have not encountered in non-AI computing systems. To support future HCI practice in the HAII area, they also offered enhanced HCI

methods and strategic recommendations

3. CURRENT HUMAN COMPUTER INTERACTION

Human-Computer Interaction (HCI) plays a pivotal role in shaping the user experience within smart living environments. As technology continues to evolve, the way humans interact with computers in these settings has profound implications for usability, comfort, and efficiency. This paper delves into the first objective of our research, which is to assess current HCI practices within smart living environments. To achieve this, we conducted a comprehensive review of existing literature, observed real-world interactions, and gathered user feedback through surveys and questionnaires. This assessment serves as the foundational step in understanding the state of HCI in smart living environments and identifying areas for improvement.

Our assessment began with an extensive literature review, examining academic papers, reports, and industry publications related to HCI practices in smart living environments. The literature review spanned a wide range of topics, including smart home systems, voice assistants, wearable devices, and other IoT (Internet of Things) technologies. The review revealed several key insights into current HCI practices:

1. Device Proliferation: Smart living environments are characterized by a proliferation of devices, each with its own interface and interaction modalities. This can lead to user confusion and interface fragmentation.

2. Voice and Natural Language Interfaces: Voice commands and natural language processing have gained prominence as intuitive HCI methods. Virtual assistants like Amazon Alexa and Google Assistant have become central to smart homes.

3. Mobile Applications: Many smart home systems rely on mobile apps for control and monitoring, introducing touch-based interactions on smartphones and tablets.

4. Gesture Control and Sensors: Emerging technologies, such as gesture control and sensors, are being explored to enable more immersive and touchless interactions in smart living environments.

5. Challenges with Interoperability: The lack of interoperability standards among devices and platforms can hinder a seamless user experience.

In addition to the literature review, we conducted on-site observations of users interacting with smart living systems in their homes. These observations provided valuable insights into real-world HCI practices. We noted how users interacted with smart devices, voice assistants, and mobile applications to control lighting, temperature, security, and entertainment systems. These observations highlighted both the successes and challenges users faced in their day-to-day interactions.

To further understand user perspectives, we administered surveys and questionnaires to HCI professionals and smart home users. Participants were asked about their experiences, preferences, and pain points

when interacting with smart living technologies. The survey results corroborated several findings from the literature review:

1. User Satisfaction: Many users expressed satisfaction with the convenience and automation offered by smart living technologies, particularly voice assistants.
2. Interface Complexity: Users cited the complexity of managing multiple devices and apps as a common challenge.
3. Privacy Concerns: Privacy and data security emerged as significant concerns, with users worried about the collection and use of personal data by smart devices.
4. Desire for Standardization: Participants expressed a strong desire for standardized interfaces and improved interoperability among devices.

4. CHALLENGES FACED IN THE FIELD OF HCI WITHIN SMART LIVING ENVIRONMENTS

As smart living environments continue to expand and integrate technology into daily life, the field of Human-Computer Interaction (HCI) faces a myriad of challenges. Understanding and addressing these challenges are essential to enhancing the user experience, ensuring usability, and promoting the widespread adoption of smart living technologies. In this section, we delve into the second objective of our research, which is to identify, categorize, and prioritize the challenges faced in the field of HCI within smart living environments.

Identifying Challenges

Identifying challenges in HCI within smart living environments requires a comprehensive and multifaceted approach. To accomplish this, we employed a combination of research methods, including semi-structured interviews, focus groups, and online surveys.

Semi-Structured Interviews: HCI experts, smart home users, and industry professionals were engaged in semi-structured interviews. These interviews allowed us to explore their experiences and insights regarding HCI challenges in smart living environments. Key challenges that emerged from the interviews included:

1. Device Fragmentation: Users often encounter difficulties in managing multiple devices from different manufacturers, each with its own interface and compatibility issues.
2. Complexity of Interactions: Smart living environments involve intricate interactions that may require multiple steps or device configurations, leading to user frustration and errors.
3. Privacy Concerns: Users expressed concerns about the collection and handling of personal data by smart devices, highlighting the need for enhanced data protection measures.
4. Lack of Interoperability: The lack of standardized communication protocols and interoperability among devices can hinder seamless interactions.

Focus Groups: Focus groups were conducted to categorize and prioritize the identified challenges. Participants were asked to group challenges into categories

and rank them by importance. The resulting categories included:

1. Usability and Accessibility: Challenges related to the ease of use and accessibility of smart devices and interfaces.
2. Privacy and Security: Concerns regarding data privacy, security vulnerabilities, and unauthorized access.
3. Interoperability and Integration: Issues surrounding the compatibility and integration of various devices and platforms.
4. Complexity of Control: Challenges associated with the complexity of controlling multiple devices and managing automation routines.

Prioritizing Challenges

To prioritize the challenges identified, we utilized quantitative data collected through online surveys administered to a broader audience. Participants were asked to rate the importance of each challenge on a scale, allowing us to assign numerical values to their significance. The survey results enabled us to establish a priority ranking of HCI challenges within smart living environments.

5. THE IMPACT OF EMERGING TECHNOLOGIES, SUCH AS AUGMENTED REALITY (AR), VIRTUAL REALITY (VR), AND NATURAL LANGUAGE PROCESSING (NLP), ON HCI WITHIN SMART LIVING ENVIRONMENTS

Smart living environments are rapidly evolving, driven by advances in technology, and the integration of emerging technologies has the potential to revolutionize Human-Computer Interaction (HCI) within these environments. In this section, we delve into the third objective of our research, which is to explore and assess the impact of emerging technologies, including augmented reality (AR), virtual reality (VR), and natural language processing (NLP), on HCI within smart living environments.

Impact of Augmented Reality (AR)

Augmented Reality (AR) is a technology that overlays digital information, such as images or data, onto the physical world. In the context of smart living environments, AR has several potential impacts on HCI:

1. Enhanced Visualization: AR can provide users with real-time information about their environment, such as energy consumption, temperature, or security status, by overlaying digital data on physical objects.
2. Interactive Interfaces: AR can transform everyday objects into interactive interfaces, allowing users to control smart devices through gestures or touch interactions with augmented elements.
3. Remote Assistance: AR can facilitate remote technical support by enabling experts to visually guide users in troubleshooting and maintenance tasks.
4. Spatial Awareness: AR can improve spatial awareness within smart environments, helping users navigate and interact more intuitively with their surroundings.

Impact of Virtual Reality (VR)

Virtual Reality (VR) immerses users in a computer-generated environment, offering unique possibilities for HCI in smart living environments:

1. Virtual Home Tours: VR can provide users with immersive virtual tours of their smart homes, allowing them to explore and interact with different configurations and settings.
2. Training and Simulation: VR can be used for training purposes, enabling users to practice emergency response procedures or interact with virtual replicas of their smart home systems.
3. Data Visualization: VR can present complex data, such as energy consumption patterns, in a three-dimensional and interactive format, enhancing understanding and decision-making.
4. Emotional Engagement: VR can create emotionally engaging experiences within smart living environments, enhancing user satisfaction and attachment to their home automation systems.

Impact of Natural Language Processing (NLP)

Natural Language Processing (NLP) enables computers to understand and interact with human language. In smart living environments, NLP has the following impacts:

1. Voice Control: NLP powers voice assistants like Amazon Alexa and Google Assistant, providing users with a natural and convenient means of controlling smart devices.

2. Conversational Interfaces: NLP-driven chatbots and virtual assistants can engage in conversations with users, helping them troubleshoot issues or set up automation routines.
3. Personalization: NLP can be used to understand user preferences and adapt smart home systems to individual needs, improving the overall user experience.

Assessment of Impact

To assess the impact of these emerging technologies on HCI within smart living environments, we conducted controlled experiments, gathered user feedback, and evaluated the technical capabilities of these technologies.

Controlled Experiments: We designed experiments to measure user interactions, user satisfaction, and task performance when using AR, VR, and NLP-based interfaces. These experiments provided quantitative data on the impact of these technologies on HCI.

User Feedback: Surveys, interviews, and observations were used to collect qualitative data on user experiences and perceptions of AR, VR, and NLP. This feedback highlighted both the advantages and limitations of these technologies.

Technical Evaluation: We conducted technical assessments to evaluate the feasibility and reliability of integrating AR, VR, and NLP into smart living environments. This included assessing hardware requirements, software capabilities, and potential technical challenges.

6. RECOMMENDATIONS AND STRATEGIES FOR THE INTEGRATION OF CONTEXT-AWARE COMPUTING TO ENHANCE USER EXPERIENCES IN SMART LIVING ENVIRONMENTS

The integration of context-aware computing is poised to play a pivotal role in shaping the future of smart living environments. Context-aware systems have the ability to adapt and respond to user needs based on real-time environmental information, significantly enhancing the user experience. This section focuses on the fourth objective of our research, which is to develop recommendations and strategies for the integration of context-aware computing to enhance user experiences in smart living environments.

Understanding Context-Aware Computing

Context-aware computing relies on sensors, data analysis, and machine learning algorithms to understand and respond to a user's context, including their location, preferences, activities, and surroundings. In smart living environments, context-aware systems can use this information to automate tasks, optimize energy usage, and provide personalized services.

Recommendations and Strategies

To effectively integrate context-aware computing into smart living environments and enhance user experiences, we have developed a set of recommendations and strategies:

1.   Multi-Modal Sensing Infrastructure

o   Develop a robust multi-modal sensing infrastructure that includes sensors for environmental factors (e.g., temperature, light), user behavior (e.g., motion, voice), and device status.

o   Ensure data accuracy and reliability to provide a rich context for decision-making.

2.   Data Fusion and Analysis

o   Implement advanced data fusion techniques to combine data from various sensors and sources, enabling a comprehensive understanding of user context.

o   Employ machine learning and AI algorithms to analyze context data in real-time and make informed decisions.

3.   Personalized User Profiles

o   Create user profiles that capture individual preferences, habits, and routines.

o   Use these profiles to tailor smart home automation and services to each user's specific needs and preferences.

4.   Dynamic Automation Rules

o   Develop dynamic automation rules that adapt to changing user context.

o   For example, adjust lighting and temperature settings based on occupancy and time of day.

5.   Context-Aware Alerts and Notifications

o   Implement context-aware alerting and notification systems that deliver timely and relevant information to users.

o   For instance, notify users of a security breach when they are away from home.

6.   Energy Optimization

o   Utilize context-aware computing to optimize energy usage by automatically

adjusting heating, cooling, and lighting based on occupancy and outdoor weather conditions.

o Implement load-shedding strategies during peak energy demand times.

7. Privacy and Security Measures

o Prioritize user data privacy by providing transparency about data collection and usage.

o Implement robust security measures to protect context data from unauthorized access or cyber threats.

8. User Education and Control

o Educate users about the benefits and capabilities of context-aware systems.

o Empower users with control over system settings and privacy preferences.

Testing and Validation

To ensure the effectiveness of these recommendations and strategies, rigorous testing and validation are essential. This involves:

1. Prototype Development: Create context-aware prototypes within a controlled environment to test the functionality and user-friendliness of the proposed features.

2. User Testing: Conduct user testing to gather feedback on the context-aware system's performance, usability, and overall user experience.

3. Iterative Design: Continuously refine and iterate the design based on user feedback and testing results.

4. Real-world Deployment: Pilot the context-aware system in real smart living environments to assess its performance and user acceptance in real-world conditions.

Findings

Throughout our research on Human-Computer Interaction (HCI) within smart living environments, we have uncovered several significant findings that provide valuable insights into the state of the field and its potential for improvement. These findings can be summarized as follows:

1. Current HCI Practices

o Smart living technologies offer substantial benefits in terms of convenience and automation.

o Challenges such as interface complexity and privacy concerns are prevalent in the current HCI landscape.

o The proliferation of devices and the absence of interoperability standards pose ongoing issues.

2. Challenges in HCI

o Users express concerns about device fragmentation, interaction complexity, privacy, and interoperability.

o These challenges are reflective of the pressing issues that need to be addressed to enhance the user experience in smart living environments.

3. Emerging Technologies

o Emerging technologies like Augmented Reality (AR), Virtual Reality (VR), and Natural Language Processing (NLP) hold significant potential to transform HCI in smart homes.

o These technologies offer novel ways for users to interact with their environments, emphasizing visualization, interactivity, and personalization.

4. User-Centric Considerations

o It is essential to consider the user experience comprehensively when integrating emerging technologies,

including usability, privacy, and accessibility.

o User satisfaction and well-being should be central to the design and implementation of smart living systems.

5. Context-Aware Computing

o Context-aware computing has the potential to revolutionize smart living environments, making them more intuitive, efficient, and personalized.

o Recommendations and strategies have been developed to guide the integration of context-aware systems while ensuring privacy and security.

These findings collectively contribute to a deeper understanding of the challenges and opportunities in the field of HCI within smart living environments. They serve as a basis for future research, innovation, and the development of user-centric technologies that enhance the quality of life in the ever-evolving landscape of smart technology integration.

7. CONCLUSION

In conclusion, our research journey has taken us through a comprehensive exploration of Human-Computer Interaction (HCI) practices within smart living environments. We've gained valuable insights into the current state of the field, identified and prioritized key challenges, assessed the transformative potential of emerging technologies like AR, VR, and NLP, and developed recommendations for the integration of context-aware computing.

It is evident that while smart living technologies offer immense convenience and automation benefits, they also present challenges such as interface complexity, privacy concerns, and interoperability issues. These findings serve as a solid foundation for future HCI improvements within smart living environments.

The incorporation of emerging technologies has shown great promise, offering enhanced visualization, interactivity, and personalization. However, our research underscores the importance of considering usability, privacy, and accessibility when integrating these technologies to ensure a holistic and user-centric experience.

Finally, our exploration and recommendations for context-aware computing integration have highlighted the potential for smart living environments to become more intuitive, efficient, and personalized. This research provides a roadmap for stakeholders, including designers, policymakers, and providers, to create smart homes that truly enhance the quality of life while prioritizing user needs and data security.

In the ever-evolving landscape of smart technology integration, our research strives to contribute to the ongoing transformation of smart living environments, paving the way for a future where technology seamlessly integrates with our daily lives to improve our overall well-being and comfort.

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A Methodology for The Use of Long-Range Dependency and Machine Learning Algorithms for Rainfall Forecasting

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ABSTRACT

Forecasting rainfall is found to be an important indicator to the undisturbed continuation of social and economic activities. This derives the significance of predicting rainfall, providing better decision making in sectors such as agriculture, power, and tourism. This paper discusses the methodology behind applying long range dependency and machine learning in rainfall forecasting. It was determined that a time series should be established with data from past rainfall figures. This data will be analyzed through the Auto Correlation Factor (ACF) and the Partial Auto Correlation Factor (PACF) to check for seasonality and to identify the lag after which the other lags are insignificant. A time series process is categorized as long memory if the serial dependence or the ACF decays slower than an exponential decay. An exponentially decaying ACF can be categorized as having short memory. The spectral density of the time series will also be measured to gauge how far the peaks are from zero. The times series with peaks closer to zero will be considered as standard long memory, while the further peaks will be categorized as generalized long memory. The Ljung-Box Test and the Brusch-Godfrey Test will be used to assess whether any group of autocorrelations are different from zero. Based on the outputs from this analysis, it is possible to apply the time series into models such as ETS and ARIMA for prediction. The residual values from the models can determine the best fit model. Which can be further verified through machine learning.

***Keywords*- Rainfall, Forecast, Time Series, Long Range Dependency**

1. INTRODUCTION

Many countries have identified a linkage between the rainfall amount and the country's economic growth (Ojo & Ogunjo, 2022). Since excessive rainfall causes floods and insufficient rainfall causes drought, rainfall is a crucial consideration when planning and managing agriculture, and related industries globally. Surface runoff, which is a significant factor in the

transport of sediment, nitrate, phosphorus, and other chemical compounds in the watershed, as well as flood-related economic losses are indicators of how rainfall affects the economy of a country. Therefore, it is essential to develop suitable mechanisms to track and forecast rainfall for effective management, planning, and mitigation.

Forecasting future rainfall is crucial for decision makers working in irrigation, urban and rural water management, tourism, ecology, and agriculture as well as society. Despite the significance placed on the forecasting of rainfall, it has proven to be a complex process due to the inconsistent nature of rainfall. Adding to this, Scher & Messori (2019) have concluded that predictability of rainfall (specially in summertime) will decrease over time with global warming.

Despite the huge amount of research being conducted to forecast rainfall using various factors, Hudson et al. (2010) found that forecasting models created with climate drivers as potential predictors are unable to predict rainfall for more than a week. Therefore, more attention needs to be given to studies which take time series analysis into consideration. Due to the chaotic nature of rainfall, researchers have tried out various linear and nonlinear approaches to model the rainfall in different geographies and time scales.

Linear and non-linear modeling techniques are used widely for hydrological forecasting. Multiple Linear Regression (MLR) is widely used by researchers for variable forecasting; Rasel et al. (2015)

applied MLR to investigate the influence of ENSO and SAM on the South Australian rainfall, and Mekanik et al. (2013) investigated the influence of IOD and ENSO on the Victorian rainfall. On the other hand, non-linear modelling is also used for rainfall forecasting through applications such as Artificial Neural Networks (ANN). According to Maier and Dandy (2001), ANN can handle incomplete, noisy, and ambiguous data, which is consistent with the characteristics of the rainfall data.

Simple models such as linear regression models have been in use to model the monthly rainfall amounts (Westra & Sharma, 2009; Lloyd-Hughes & Saunders, 2002; Oettli & Camberlin, 2005). Bhakar et al. (2006) has used an additive time series decomposition model to predict the rainfall in the Kota region in India. A limitation of such simple models is the defectivity of the model where monthly rainfall does not follow a normal distribution. This is the case for Australian rain stations (Ghamariadyan & Imteaz, 2021).

In many cases, it is essential to have access to the monthly rainfall distribution rather than the mean seasonal value (Mehrotra et al., 2013). It is also very advantageous to predict the upcoming monthly rainfall some months in advance. A variety of computer models and observational data are used in rainfall prediction simulations by taking into account factors such as atmospheric conditions and historical weather patterns. These methods analyze historical data to identify trends, seasonality, cycles, and correlations, allowing researchers to develop models to predict future rainfall

based on observed patterns. Using regression techniques, researchers can derive mathematical equations that determine the relationship between meteorological variables and rainfall. This equation can be used to predict future rainfall events more quantifiably and accurately (Zanial et al., 2023). But the residual errors will not be independent. It is addressed through time series forecasting.

Going beyond using computational models to forecast rainfall, it is crucial to utilize much more innovative solutions such as artificial intelligence (AI). AI is a method for manipulating and using implicit, unused, and potentially valuable information from data. It is a broad and profound field that keeps growing and being applied in different fields. By utilizing the strength of sophisticated algorithms and machine learning techniques, AI offers promising solutions in the context of rainfall prediction and its impact on the economy. AI algorithms can find complex relationships and patterns that humans might miss by processing and learning from this data.

1.2 Problem Statement

It has been established that rainfall is one of the toughest hydrological variables to predict due to its volatility in time and space (French et al., 1992). Yet, due to the importance of rainfall forecasts to the economy and society, different researchers have tried various approaches to predict the rainfall in their respective study locations. Literature identifies several forecasting models such as the Box-Jenkins autoregressive integrated moving average

model and Artificial Neural Networks (ANN) being used for countries such as India, Jordan, Thailand, Iraq and Nigeria (Dubey, 2015; Eni & Adyeye, 2015; Hung et al., 2009; Momani, 2009; Wang et al., 2013; Zakaria et al., 2012).

Feng et al. (2020) developed probabilistic seasonal rainfall forecasting model for Australia using machine learning. This model managed to generate seasonal predictions for Queensland with higher accuracy than the governments Southern Oscillation Index (SOI) Phase model (Ghamariadyan & Imteaz, 2021). Ghamariadyan & Imteaz (2021) have used a hybrid wavelet ANN model using temperature and climate indices to predict the rainfall in Queensland with promising insights. Bagirov & Mahmood (2018) in their study mentioned that there is a research gap in Queesnland for alternative models to forecast rainfall.

Despite the extensive research being done on rainfall forecasting using various models, little can be found in the context of time series memory. Gil-Alana et al., (2022) found out through their study that there is indeed a long memory dependency in rainfall data for the United States of America (USA). This is proven true for Malaysia as well through the research done by (Yusof & Kane, 2012). However, there is a significant research opprtunity to set a guidng framework for future researchers to utilize when applying time series forecasting techniques to predict the future rainfalls. This study aims to provide a general methodolgy for researchers to follow were they to apply time series

forecasting methods to their selected research geography.

2. LITERATURE REVIEW

2.1 Time Series Analysis

The importance of time series data and the analysis of such data is growing by the day due to the higher leniency towards data-based decision making. It can be observed that time series models are being developed with increasing levels of accuracy over time. Most effective new models combine the two approaches of statistical and machine Learning techniques (Bagirov & Mahmood, 2018).

2.1.1 Long Memory Models

Since the introduction of the short memory autoregressive moving average (ARMA) model by Box and Jenkins (1970) the integer differenced time series model Autoregressive Integrated Moving Average (ARIMA) was introduced to the world of statistics by Granger and Joyeux (1980) along with Hosking (1984) (Mills, 2018). Many recent studies have shown that time series showcase Long Range Dependency (LRD) (Aks & Sprott, 2003; Delignieres, et al., 2006; Eke et al., 2002; Madison, 2004).

LRD is how fast the statistical dependence between two points degrades with the increase of time or spatial separation. A time series is LRD if the dependence has a slower decay than an exponential decay. On the contrary, if the time series shows short memory, the autocorrelation will decay faster at an exponential rate as the number of observations increases in time and space (Stroe-Kunold et al., 2009).

Unbounded spectral density closer to the origin in terms of the frequency along the x-axis, and hyperbolic decay of the Autocorrelation Function (ACF) can be established as key features of the ARIFMA model. It is identified as a standard long memory model.

Ideally any time series is required to be of a stationary nature for modelling. Yet, this is hardly the case in real life time series. The time series will have to be adjusted to make it fit the features of the model. Yet another unique feature of long memory models would be the hyperbolic decay of the Partial Autocorrelation Function (PACF) as opposed to an exponential decay of it in short memory models.

The time series will have to be adjusted to make it fit the features of the model. Apart from the hyperbolically decaying ACF, and a spectral density increasing limitlessly as the frequency gets closer to zero, the Hurst phenomenon is also a basic property of an LRD (Stroe-Kunold et al., 2009). The Hurst exponent (H) shows that the parameter showing the probability of an event occurring in a time series is continued with a similar event derived from 0.5. When H=0.5, the observations are independent (Hurst et al., 1965).

LRD can be captured in three major methods: (1) by means of H lying within the parameters of fractal analysis; (2) through power exponent or power spectrum function; (3) through the Autoregressive Fractionally Integrated Moving Average (ARFIMA) framework. Fractal processes are long-memory, self-similar processes. Mandelbrot & Wallis, (1969) implies that a

process will look the same or with comparable statistical features at different levels through the concept of self-similarity in statistics. These processes have self-similar autocorrelations and power spectra. The power-spectral density of a process with serial dependence is inversely proportional to the frequency for long-range serial dependence.

The power spectral density (PSD) analysis, also known as the periodogram method, is a technique for estimating in spectral analysis by determining the negative slope of the line connecting log S(f) and log f (Eke et al., 2002).

Granger, Joyeux, and Hosking (1980,1984) showed that by allowing the differencing parameter d of the Box-Jenkins ARIMA methodology to take on continuous values, self-similar hyperbolical decaying autocorrelations of fractional series could be parsimoniously modeled. In the context of the [ARFIMA (p, d, q)] framework, d is the parameter for simulating long-range dependence. The parameters p and q are used to capture the process's short-range dependencies. When $-0.5<d<0.5$, the process is both stationary and invertible. The range $[-0.5, 0]$ for the value of d suggests antipersistence. Long-term persistent processes have $d>0$. As a result, $0<d<0.5$ can be used to model finite long memory. The process is nonstationary with noninvertible ARMA representations for $0.5=<d=<1$. The memoryless ARFIMA (0, 0, 0) process is Gaussian white noise.

2.1.2 ARFIMA Framework

In many time series, having a long memory or strong persistency is seen as stylized facts. Modeling and subsequent estimation for these series are challenging due to the strong persistence that is on the one hand characterized by slowly decaying autocorrelations. The most common model for capturing strong persistence and long memory is Fractional Integration (FI) of order d. Estimated values of d range from 0 to 1, with $d = 1/2$ denoting the transition from stationarity to nonstationarity. Thus, modeling persistence can be done with a great deal of flexibility using FI.

In comparison to ARMA (1,1) models, (Brodsky & Hurvich, 1999) show that FI models are more effective at forecasting long memory time series. In comparison to several short memory rivals for medium sample sizes, (Bhardwaj & Swanson, 2006) report improvements in predictive performance when using FI models.

There is evidence that these gains increase noticeably for larger sample sizes. In terms of empirical evidence, Bhardwaj and Swanson (2006) again report that FI models are superior predictors of financial data, but that the evidence is less conclusive for macroeconomic data. They primarily attribute the much larger sample sizes in finance for this result, which resulted in a more accurate estimation of the long memory parameter. Dissanayake (2016a) provides an insight into a robust ARFIMA configuration for estimation and prediction. A stationary fractional ARIMA model was used successfully for rainfall prediction in Sri Lanka according to Silva, Peiris and Dissanayake (2018a) utilizing an ARFIMA series. An extension to it capturing the seasonality feature in addition to long memory is presented in Silva, Peiris and

Dissanayake (2018b) using a seasonal autoregressive fractionally integrated moving average (SARFIMA) model. The evidence is conflicting because some authors assert that short-memory substitutes, such as the Heterogeneous Autoregressive model (HAR) by (Corsi, 2009), have comparable predictive power. Yet it is found that FI models outperform a wide range of competing methods, including autoregressive (AR) models, exponential smoothing (ES) methods, and for the realized volatility series, also the HAR model, in systematic forecasting experiments using classical examples of strongly persistent time series from macroeconomics and finance, namely inflation and realized volatility, as well as simulated series. According to published research, adding a long memory component to the model used when forecasting a strongly persistent time series is advantageous in all tested scenarios, e. g. over all forecasting horizons and sample sizes. Extending the ARFIMA model to a much more generalized long memory time series version results in a Gegenbauer Autoregressive Moving Average (GARMA) model. It depicts long memory with unbounded spectral peaks away from the frequency origin and hyperbolically decaying ACF and PACF.

2.1.3 GARMA Framework

In certain texts GARMA is defined as Generalised Autoregressive Moving Average model. Extensive work with rich expositions related to fractional differencing and prediction using the GARMA model could be found in discussions presented in Dissanayake and Peiris (2012), Dissanayake (2016b), Dissanayake, Peiris, and Proietti (2014), Dissanayake, Peiris, and Proietti (2016), Dissanayake, Peiris, and Proietti (2018), and Dissanayake (2023). The theoretical developments and empirical evidence found in such work would be utilized for the models to forecast rainfall if generalized persistence is found in the data under observation.

2.2 Machine Learning

Throughout the history researchers have been using data mining techniques (Kusaik et al., 2013; Chowdari et al., 2015; Tharun et al., 2018; Zainudin et al., 2016), big data analysis methods (Namitha et al., 2015; Manandhar et al., 2019), and machine learning algorithms to increase the accuracy of rainfall predictions (Arnav, 2019; Aswin et al., 2018; Zeelan et al., 2020; Vijayan et al., 2020). The current trends of rainfall forecasting are more lenient towards the machine learning (ML) techniques due to their higher accuracy and reliability (Namitha et al., 2015). The following section discusses a few machine learning algorithms this research could apply to the rainfall data of Queensland.

According to (Arnav, 2019), there are three algorithms which can be used to predict the rainfall patterns: Support Vector Machine (SVM), Support Vector Regression (SVR), and K-nearest Neighbor (KNN). Liyew & Melese (2021), chose algorithms Multivariate Linear Regression (MLR), Random Forest (RF) and XGBoost gradient descent to experiment for the most suitable algorithm to forecast rainfall.

2.2.1 Multivariate linear regression (MLR)

There are two types of linear regression: MLR, in which several independent variables are used as input features, and simple linear regression, in which there is just one independent or input feature. One dependent variable in each linear regression can be forecasted or predicted using the input features. In order to predict the dependent variable, daily rainfall amount, multiple environmental variables or features can be used, which will result in MLR. The MLR algorithm shows the intensity of the relationship between the used environmental variables and the rainfall.

2.2.2 Random Forest (RF)

As a supervised machine learning algorithm, RF regression performs regression using the ensemble learning approach and using input variable and features to predict outputs. The way RF operates is to construct a number of decision trees during the training phase, with each tree's prediction being the mean of the classes. This algorithm has been identified to be generating accurate and powerful outputs (Ojo & Ogunjo, 2022). The RF algorithm has proven to be useful for large datasets with large proportions of missing data (Kusaik et al., 2013).

2.2.3 XGBoost Gradient Descent

The XGBoost Gradient Descent method seeks out the best tree model by using precise approximations. The supervised machine learning problem, which uses data from multiple features is applied to forecast a target variable using XGBoost. Due to the algorithm's speed and precision in predicting outcomes, most authors use XGBoost for various regression and classification issues (Ojo & Ogunjo, 2022). XGBoost is a potent algorithm that generates a solid solution quickly, efficiently using memory, parallel learning and distributed computing to produce robust solutions (Arnav, 2019).

Through their study, (Liyew & Melese, 2021), established that the XGBoost Gradient Descent method yielded the best performance.

2.2.4 Time series projections using ML paradigms.

In addition to using traditional time series methods the inclusion of the "Classification and REgression Training (CARET)" and "Time Series forecasting using general regression neural network (tsfGRNN)" library packages within the R programming environment enables much more robust time series forecasts in which unsupervised learning is utilized for time series model fit and selection. It will be an approach that will be adopted during the research endeavor. Additionally, the ML paradigm of "remote sensing" presented in Dissanayake and Ruymgaart (2000) will be utilized for rainfall analysis if required.

3. METHODOLOGY

The primary objective of the study is to establish and check whether there is a LRD between time series and the rainfall data. For this purpose, the data needs to be analysed through the ACF and the PACF. The ACF will check the data set for seasonality. PACF will create a regression of the time series onto itself. The PACF

will be used to identify the lag after which the other lags are insignificant (Crato & Ray, 1996).

A time series process is categorized as long memory if the serial dependence or the ACF decays slower than an exponential decay implying a higher level of persistence over time. An exponentially decaying ACF can be categorized as having short memory. This shows that in LRD time series, the ACF will decay hyperbolically and that there is an evident correlation between two points regardless of their distance. If the time series is indeed LRD, the autocorrelations will remain high for a greater number of lags, which is referred to as a "fat tail". On the other hand, if the time series has short memory, the decay will be much quicker with most of the autocorrelations being closer to zero following a few lags (Kirchgassner, Wolters, & Hassler, 2013). A slowly decaying PACF will further solidify the claim of an LRD in the time series. This would indicate that there is an influence on the value even at longer lags. The PACF concentrates on the immediate impact of each lag, and for time series with short memory, this impact rapidly decreases the further you are from the current time point.

It is important to keep in mind that identifying long memory in a time series is not always simple, and that findings may vary depending on the lag order chosen, the amount of data available, and other time series-specific properties. To validate the presence of long memory the time series, the researcher has applied more tests to examine and validate the results from the

ACF and PACF. The Ljung-Box test is one such test used by the researcher to confirm the type of memory of the time series.

The Ljung-Box test will assess whether the time series has a long memory or a short memory. In summary it will check whether the autocorrelations of the time series are significantly differs from zero at multiple lags. The Ljung-Box test checks whether there is serial correlation amongst the data points (Granger & Joyeux, 1980).

The Ljung-Box test's null hypothesis is that there is no serial correlation since all of the time series' autocorrelations are equal to zero. The alternative hypothesis is that there is serial correlation because at least one of the autocorrelations does not equal zero. If the test rejects the null hypothesis, then it has long memory, and if does not reject the null hypothesis of no autocorrelation, the time series is considered as a short memory.

H0: The autocorrelations at all lags up to a certain lag are equal to zero, implying no serial correlation.

Ha: At least one of the autocorrelations at those lags is not equal to zero, suggesting the presence of serial correlation.

The test statistic (Q) will be computed through the squared value of autocorrelations. The test statistics for each lag will be calculated. The degree of freedom associated with the test statistics (Q) chi-squared distribution is equal to the number of lags being considered. The researcher will have to compare the test statistic to the critical value from the chi-squared distribution at a significance level (alpha) of 0.05 to see whether it differs substantially from zero. If Q is higher than

the critical value, the null hypothesis will be rejected.

After determining whether the time series has long memory or short memory, the researcher can fit the appropriate models from the models discussed above in the literature review to the time series to check for the best fit model for the time series. The residuals of each model after applying the time series needs to be analysed to select the best fit model. This method is taken forth to assure that the selected model will capture all the underlying patterns of the time series. Models which align with the memory type of the time series will be considered for the fitting. Models such as ARFIMA and GARMA will be looked at for long memory models while ETS, ARIMA and SARIMA are common models applied for time series lacking long memory.

The historical data will be used to estimate the model parameters. The historical data for the selected time series will be fitted into the different models. The residuals are plotted against time to identify whether there are any trends or patterns. In an ideal conventional time series, residuals will appear as white noise. This can be interpreted as the residuals being uncorrelated, with a constant mean and variance. The Ljung-Box test was also applied to check for the autocorrelation between the residuals.

The residual results from the model fits will be analysed to then determine the best fit model. The objective of the test to select the best fit model is to have residuals with no identifiable patterns or autocorrelation,

which are as close to white noise as is practical. The researcher has selected the resulting model as the one that fits the time series predictions the best. Moreover, the researcher has applied cross-validation to further validate the selected model. This helped in providing more confidence in the model's applicability and robustness.

Machine learning algorithms has been utilized to validate the model selection. The input data is transformed into a higher-dimensional feature space through a set of radial basis functions (RBFs). The network determines the Euclidean distance between each input pattern in the training dataset and the center of each RBF. The activations of the RBFs are then calculated using these distances. The outputs of the hidden layer, which are typically Gaussian functions, are the activations of the RBFs in the pattern layer. The activation of the appropriate RBF increases with the proximity of the input pattern to a center. The input pattern's proximity to the RBF centers determines the weights of the weighted outputs of the RBFs from the pattern layer, which are then added together in the summation layer. It might simply be the sum of the outputs from the summation layer weighted.

The researcher simply feeds the input data into the network while utilizing a trained ML model to produce a prediction. The network computes the RBFs' activations in the pattern layer, adds them in the summation layer, and outputs the prediction. These predictions will be matched with the forecasts from the traditional time series models to further validate the selection of the best fit model.

4. CONCLUSION

This paper has explored and summarised the methodology to be followed when applying LRD to a time series to forecast the rainfall in any given geographic area. The need for rainfall prediction and the applicability of time series forecasting for rainfall predictions were established through the introduction of the paper. The literature review summarises the various models available to predict rainfall through time series. The methodology section brings together the findings of the literature review culminating in the framework a researcher can adopt to forecast rainfall using time series data. The methodology section provides a step-by-step guide which is backed by the literature findings of this study.

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Rationalized Security Frameworks For Web Applications

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ABSTRACT

Evolution of cyber-attacks has imposed serious threats, challenging the confidentiality integrity and availability of critical IT services and infrastructure. Security being the main concern of any web application or website, require the most sophisticated and robust security features as they create a digital identity and a unique representation of the organization in cyberspace. This criticality results in making web applications one of the main focal points for cyber-attacks leading to excessive use of organizational financial and human resources to implement security controls. It was identified that Operational Criticality (OC), which is a measure of availability along with the Data Criticality (DC) that signify the data confidentiality and integrity are important factors for continuous functionality of a web application. The OC was defined based on 4 questions (section 3.1) that identify the standard measures used in evaluating the high availability factors of a system such as Mean Time to Detect (MTTD), Mean Time to Repair (MTTR) and Mean time between failure (MTBF) along with the business continuity measure Maximum Tolerable Downtime (MTD). Data was classified into 4 levels as public, sensitive, confidential, and critical based on NIST 800-53, GDPR, and ISO 27001: 2022. DC was identified based on 4 questions (section 3.2) while defining the security and access restrictions that needs to be implemented in align with the proposed classification. Relying on the OC and DC evaluation, 5 zones were defined as A, B, C, D, and E. By applying the concept on few of the commonly used web applications in the university environment, the results depicted the fact that, the proposed concept of zones are align with the security service levels used in the IT security evaluations. Overall, this research intends to discuss and provide an insight to the issues in selecting security frameworks for web applications in an ad hoc manner and proposes critical parameters and evaluation process in defining a suitable security framework.

Keywords - **web application security, security frameworks**

1. INTRODUCTION

The terms "website" and "web application" are often used interchangeably, but they have distinct meanings and implications, especially in terms of functionality and user interaction. Even though both are accessed via a URL (Uniform Resource locater), a website provides static information or present contents and facilitate communication between the web browser and the server, while a web application is a more interactive and dynamic type of software hosted in a web server that is accessed via a web browser. Websites are designed to publish information in open platform, web applications are designed to perform specific tasks, often involving complex functionality and user interactions. Web applications can provide a wide range of features such as data input, data processing, user authentication, real-time updates, and more. Web applications can be regarded as an extension to the traditional information systems, complemented with navigation and complex information structures (Baresi L., Garzotto F., Paolini P, 14 December 2001). Considering the similarities and the differences between the two, it can be considered a website is also a type of web application hence the term web application to define both website and web application in the paper.

The web applications are hosted in different hosting infrastructure where cloud can be considered as one of the prominent hosting platforms. Apart from the cloud, web applications are hosted in many different platforms as of the application requirements and the affordability of the hosting provider.

Security takes a prominent place in web applications regardless of the service model or the hosting environment. Web applications are built to store, process, and transmit sensitive data, which makes them a prime target for hackers or other malicious actors to exploit. An unsecured web application could result in losing or stealing sensitive data, downtime, or "broken" apps (What is Web Application Security, 2023). Cyber-attacks on web applications affects the data and the reputation of the web application owing organization. Web applications are vulnerable to attacks from a variety of geographic locations, scales, and degrees of sophistication due to the nature of the web application landscape. Main reasons for the importance of the security of web application are preventing data loss, protecting business reputation and protecting the revenue (Why is Web Application Security Important | ProtectOnce, 2023)

The most obvious consequence of poor web application security is the exposure of sensitive data. Sensitive data can include anything from passwords and usernames to bank card details, medical records, and financial records. An attacker who gains access to this data can use the information to commit fraud,

including identity theft. If you can't protect your web application, you run the risk of suffering financial loss, and losing the confidence of the users who trust you with keeping their data safe (Importance of Web Application Security: Three Benefits, 2022).

By staying informed and proactive, the organizations can protect their web applications and data from potential attackers and prevent several consequences to their infrastructure, culture, and, ultimately, customer trust. As of Fastly Inc website "An ounce of prevention is worth a pound of cure, and it's always better to take preventative measures than to clean up the aftermath of a security breach (What is Web Application Security, 2023). Vulnerability Assessment and Penetration Testing (VAPT) helps to assess the effectiveness and ineffectiveness of the security arrangements of web application to stay protected against the rising cyber threats. The projected work helps to develop a versatile mechanism which is able to find vulnerabilities from internet applications.(Shinde & Ardhapurkar, 2016).

Securing web applications needs more resources and deep learning curve as the attack surface in very dynamic and rapidly changing. Following a globally accepted security framework is one of the mostly utilized approach in securing web application. The frameworks defined by National Institute of Standards and Technology, USA (NIST framework), the Center for Information Security (CSI

framework) and framework defined by Information Systems Audit and Control Association (ISACA), the COBIT (Control Objectives for Information and Related Technology) can be considered as highly accepted security frameworks. The question arises why one cannot use NIST, CSI, or COBIT straight away to implement a secure and compliant cloud deployment. While the possibility of following such frameworks remains, the likelihood depends on the amount of workload associated with converting these frameworks' rigor to the technology and the platform of the web applications. An organization has a considerable 'homework' to translate the framework to its expected implementation. On the other hand, it is observed that some of the advanced configurations or recommendations in security frameworks are applicable to a smaller number of web applications which process classified/financial data or mission critical applications. The web application security needs to be implemented not based on the available framework or the competencies of the security team but on the criticality of the web application and the data.

1.1 Research Objectives

The main objective of this research paper is to propose a conceptual framework for the categorization of security requirement for web application based on the criticality of the operations and on the criticality of the data. In other words, the proposed framework should focus on the confidentiality and the availability of the

web application. The requirements and proposed methodology for such framework will be discussed in this concept paper.

1.2 Research Questions

In achieving the main objective of implementing a conceptual framework, following research questions need to be addressed.

RQ1: What parameters should be considered in defining the criticality of web applications.

RQ2: How to define the availability factor of a web application referring to the criticality of the web application for the organization?

RQ3: How the security level of the web applications is defined in align to the data associated with web applications.

RQ4: How to define a suitable metrics to determine the required security level of the web application referring the data and availability factors.

2. LITERATURE REVIEW

Cybersecurity refers to protecting the confidentiality, integrity, and availability of computing devices and networks, hardware and software, and most importantly, data and information (Nweke, 2017). With the magnified use of web applications in last twenty-five years, the threat to integrity and confidentiality to information and resources has together been exaggerated. Each day cases of Hacking and Exploitation are being discovered. Therefore, finding Vulnerabilities and

install security patches has been major considerations of each internet facing organization. (Bau, Bursztein, Gupta, & Mitchell, 2010). It has created a huge workload on the system and security teams as they need to aware of the vulnerabilities and apply patches while minimizing the MTTR (Mean Time to Remediate). This is quite challenging as the number of zero-day attacks are increasing with the time. According to a Mandiant Threat Intelligence report, the number of zero-day exploits in 2021 grew more than 100% compared to the previous record set in 2019. This means that during the last decade about 40% of all zero-day attacks occurred in 2021 alone. (Reed, 2022)

From the technical perspective, achieving 100% cybersecurity is essentially impossible. Furthermore, from an economics perspective, an organization should stop investing in cybersecurity activities once the incremental costs from an incremental investment exceed the expected incremental benefits from such an investment (A. Gordon, January 2021). On the other hand, as per the WEBIT Services, the main reasons that any organization cannot achieve 100% security is given as rapidly changing risk factors, high tech and the resources used by the cybercriminals and human errors (Bocchino, 2022).

Even though the security landscape and the security risks are dynamic and unpredictable, the most common application security weaknesses are well-known. Various organizations track them over time. The Open Web Application

Security Project (OWASP) Top Ten list and the Common Weakness Enumeration (CWE) compiled by the information security community are two of the best-known lists of application weaknesses. The OWASP list focuses on web application software. The remediations for the vulnerabilities and weaknesses are also informed by the security experts and security service providers. The security level of the web applications can be increased by following internationally recognized security frameworks and provide high resistance for the attacks.

2.1 Security Frameworks

An IT security framework is a series of documented processes that define policies and procedures around the implementation and ongoing management of information security controls. These frameworks are a blueprint for managing risk and reducing vulnerabilities.

As of the NIST cybersecurity framework consists of three main components: the Core, Implementation Tiers, and Profiles. The Framework Core provides a set of desired cybersecurity activities and outcomes using common language that is easy to understand. It guides organizations in managing and reducing their cybersecurity risks in a way that complements an organization's existing cybersecurity and risk management processes. The Framework Implementation Tiers assist organizations by providing context on how an organization views cybersecurity risk management while the framework

profiles are an organization's unique alignment of their organizational requirements and objectives, risk appetite, and resources against the desired outcomes of the Framework Core. Profiles are primarily used to identify and prioritize opportunities for improving cybersecurity at an organization (NIST, 2023).

Appropriate security frameworks and solutions will vary significantly across organizations depending on the industry, scale, and scope of the organization's operations. Selecting a proper standard framework is challenging for any IT security professional as the selected framework should support the organizational security requirements and priorities while complying with the security audit and regulatory requirements. Most importantly, the framework should not overload the resources. The research objectives are aligned with the practical requirements stated above.

As of TechTarget Security, the most widely used cybersecurity frameworks in 2023 is as listed below.

Table 1. Popular Security Frameworks

Framework	Provider
ISO 27000 Series	International Organization for Standardization
NIST framework	National Institute of Standards and Technology, USA
COBIT	Information Systems Audit and Control

	Association
CIS Controls	The Center for Internet Security
PCIDSS	PCI Qualified Security Assessor

Most of the frameworks are focused on the complete security landscape in defining the security controls and procedures hence needs expertise knowledge and time to comply with them. Also, they define standards for different requirements. For example, by implementing the security based on the ISO 27000 series framework, the organization will be certified with ISO certification and provides a credibility on the organizational information security. NIST is the standard required by U.S. federal agencies and focusing on Comprehensive and personalized security weakness identification.

The security framework is also selected based on the security maturity of the organization. For example, COBIT5 framework is suitable for an organization having high security maturity, and it needs to pursue a more comprehensive and rigorous security framework. Some of the frameworks focus on specific areas; for example, the security controls defined by CIS as CIS controls solely focused on reducing risk against cyber-attacks and increasing resilience for technical infrastructures. PCIDSS (Payment Card Industry Data Security Standard) is focusing on the payment card industry while GDPR is a requirement if the organization is

handling the personal data of European Union citizens.

2.2 Limitations of the Existing Frameworks

Even though the security experts strongly advocate for adoption of leading cybersecurity frameworks, the organizations facing several practical issues in implementing the security controls defined these frameworks. According to the survey conducted by the Dimensional Research on behalf of CIS and Tenable Network Security, participating 319 IT security decision makers at companies with more than 100 employees, 95% of the participants has stated that they faced significant challenges in trying implementing security frameworks. Respondents identified several obstacles to the implementation including lack of trained staff (57%), inadequate budget (39%), lack of prioritization (24%) and insufficient management support (Companies Face Numerous Obstacles in Deploying Cybersecurity Frameworks, 2023).

Other than the organizational obstacles above, technical limitations were also reported in the survey. These limitations can be listed as follows:

Lack of appropriate tools to automate controls.

Lack of integration among tools

Lack of reporting

Other than the organizational and technical limitations, it has been noted

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that for some organizations, application of one standard or a framework may not fulfill all the demands of an organization, and it may be necessary to employ a combination of standards in order to ensure security against cyber threats and data loss. For example, COBIT can be considered as one of the best choices to be implemented as an integrated solution because of its broadness. However, COBIT is not the best solution in cases where the appropriate implementation of security controls is the priority, since it does not provide guidelines to achieve predefined control objectives (Taherdoost, 2022 July). This may worsen the limitation of trained staff as the organization may be required to expand their security team, which affects the organization financial aspects.

3 METHODOLOGY

As discussed in the introduction section, the requirement for rigid security controls for web applications to protect them from cyber-attacks is increasing with the trend of digitalization. With the limitation of skilled IT security experts and the budget constraint, the organizations are facing difficulties in implementing required security controls by following standard reputed security frameworks. In defining a rationalized security framework for web applications, this research propose following steps:

- Identifying the criticality of the web application for the operations of the organization – This refers to the level of the criticality of the availability and

functionality of the web application for the organization. – This measure will be defined as *Operational Criticality (OC)* in the paper.

- Identifying the criticality of the data used in the web application – This refers to the confidentiality and the integrity of the data/information used in the web application – This measure will be defined as *Data Criticality (DC)* in the paper.

As defined by NIST (National Institute of Standards and Technology), information assurance is "Implementation of required measures to protect the information and information systems by ensuring their Confidentiality, Integrity and Availability (CIA). (Excellance, 2020). The two measures proposed above align with the security objectives defined in the CIA triad. The operational criticality defines the availability measure of the web application while the second measure complies with the confidentiality and integrity.

One of the main objectives of the research is to formulate a process to identify the criticality of each measure, that is operational criticality and data criticality. The study proposed the following metrics to identify the criticality level as a qualitative measure.

3.1 Operational Criticality (OC)

The measure is directly associated with the Availability of the web application. The maximum tolerable downtime (MTD) was taken as the main measure to identify the qualitative value of OC. The

following questions were used to derive the measure for OC.

1. What is the level of accepted downtime for your organizational web application?
2. How frequently do you test the availability of the web application?
3. How would you rate the response time of your web application?
4. How confident are you in system failover mechanisms?

The above complied questions identify the standard measures used in evaluating the high availability factors of a system such as Mean Time to Detect (MTTD), Mean Time to Repair (MTTR) and Mean time between failure (MTBF) along with the business continuity measure MTD.

3.2 Data Criticality (DC)

Data is the lifeblood of any organisation and has enormous value. Such data includes intellectual property and trade secrets, financial and customer records, and information related to employees (Tankard, 2015). Information classification is a process used in information security to categorize data based on its level of sensitivity and importance. Data associated with web applications also needs to be classified according to the sensitivity of the data. The data can be classified into several categories depending on various factors and methodologies. Data/Information classification according to different security frameworks and the methodologies used in classifying

data/information are listed below (Sullivan, 2023).

- NIST 800-53 data classification has defined 3 levels of data types as 'Public', 'Sensitive' and 'Confidential.'
- General Data Protection Regulation (GDPR) uses four levels of data classification, which are public data, internal data, confidential data, and restricted data.
- According to ISO 27001:2022 Annex A 5.1.2, Information must be classified on various factors According to ISO 27001:2022 Annex A 5.1. 2, information must be classified based on various factors, including legal requirements, value, criticality, and sensitivity to unauthorized disclosure or modification.

Analyzing the above frameworks, it can be identified that the data or information classification depends on the requirement and the level of sensitivity. Hence, this research proposes the following classification on data associated with web applications.

Table 2. Categorization of web applications based on the data

Category	Description
Level 1 - Public data	Data/Information available for the public without no restrictions
	Example: Products, services, contact information of the

	organization
Level 2 - Sensitive data	Data/Information which can be used to identify an individual (PII) or which is available only to a user group or user level. Example: contact information of employees/staff, personal data.
Level 3 - Confidential data	Data/Information which is available only to the individual or to the authorized parties. Example: Authentication parameters, Salary information, bank details, health information
Level 4 - Critical data	Data/Information associated with financial transactions. Example: Credit card details, CVV numbers

The level of security and access restrictions needs to be implemented in align with the proposed classification. Hence, the criticality of data (CD) can also be defined according to the proposed classification. The following questions are developed to determine the data criticality level of the web application.

1. What is the maximum category level of data associated with the web application?
2. What is the financial risk level of exposing the data associated with your web application?
3. How do you rate the requirement of utilizing encryption for the data in your web application?
4. What is the level of risk if an attacker modifies the data associated with your web application?

The above questions are aligned with the 'confidentiality' and 'integrity' of the data and risk level. They can be used to define the scale for the data criticality of the web application.

3.3 Defining Criticality Zones

Measuring the OC and DC is crucial in defining the expected security level for the web application. As described under 3.1 and 3.2 sections, the OC and DC levels are measured independently but the cumulative value needs to be considered in defining the expected security level for the web application. A mathematical relationship can be derived referring to the cumulative value, total criticality (TC) of OC and DC as follows.

$$OC + DC = TC \qquad (1)$$

As OC and DC are independent to each other, they can be mapped to X and Y independent variables which derives total criticality (TC),

This relationship can be denoted in cartesian plane as two variables can be measured independently where the

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cumulative value can be represented as a point in the plane.

Four questions are proposed under one criticality to measure the criticality level. The responses are proposed to be presented on 5-point Likert scale which provides a numerical value between 0 to 5 depending on the opinion of the responder. Responses for all 8 questions defined above mapped to Likert scale and example mapping is as given below.

1. The level of accepted downtime for your organizational web application is.

over 1 h	1
Between 1h to 30 m	2
Between 30 m to 10 m	3
Between 10m to 1 m	4
Less than 1 minute	5

The maximum value for one criticality is 20 while the minimum value remains at 0. Hence the total criticality (TC) value will vary from 0 to 40. The relationship can be represented as follows.

$0 \leq OC \leq 20$ and $0 \leq DC \leq 20$;
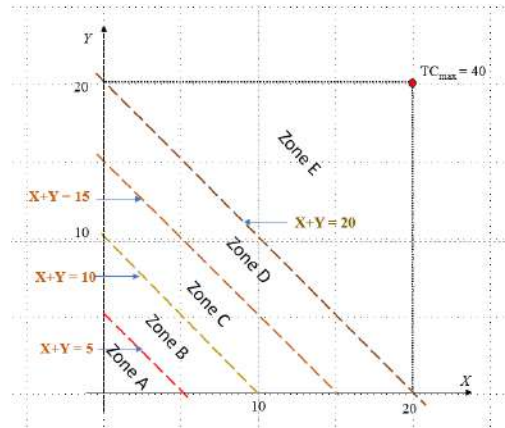
$$OC + DC \leq 40 \qquad (2)$$

Figure 1. Zones defined on OC and DC parameters.

As given in the figure, the following zones can be defined in the cartesian plane where a point (X,Y) is placed according to the definitions given below.

Table 3. Zone Definitions

Zone A	A point (X,Y) in the zone where $X+Y \leq 5$
Zone B	A point(X,Y) is in the zone where $5 < X+Y \leq 10$
Zone C	A point(X,Y) is in the zone where $10 < X+Y \leq 15$
Zone D	A point(X,Y) is in the zone where $15 < X+Y \leq 20$
Zone E	A point(X,Y) is in the zone where $20 < X+Y$

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By analyzing the security requirements in different zones and the available security controls, a clear proportional relationship between the zones and the security controls can be identified. In general, security controls are defined by the security frameworks which are used by the organization according to the security policies and requirements. This builds a strong positive relationship between the zones derived from the research and the security frameworks. The level and the standards of the security controls defined in the security frameworks are increasing proportionally to the zone. For example, security frameworks associated with zone C have advanced security settings and controls compared to the security frameworks associated with zone B.

The proposed security frameworks/controls associated with the zone are given in the following table.

Table 4. Zones and Security Controls

Zone	Security Frameworks / Controls
A	Basic security controls in OS level and Application level, Software updates
B	Security recommendations as of OWASP
C	NIST CSF/ CIS
D	COBIT
E	ISO/IEC 27001 framework + PCIDSS

4 RESULTS AND DISCUSSION

The proposed concept was tested referring to following web applications. Mainly, the input was collected from the web application administrators who are responsible for the security of the web applications. Limited number of web applications were selected depending on the accessibility to the administrators. Mainly most of the web applications were selected from the university and Sampath Vishwa e-banking site was also included to the sample as it provides a real time financial web application to verify the accuracy of the measurements. The values given by the web administrators under operational criticality and data criticality were tabulated and graphed as below.

Table 5. Responses on operational criticality (OC) questions

Website/ Application	Responses				
	Q1	Q2	Q3	Q4	OC
www.nsbm. ac.lk	4	4	3	3	14
nlearn.nsbm.ac.lk	2	3	3	3	11
icobi2023.web.app	2	2	1	1	7
students.nsbm.ac.lk	1	2	2	1	6
rlis.nsbm.ac.lk	1	1	1	1	4
sampathvishwa.com	5	4	4	4	17

Table 6. Responses on operational criticality (DC) questions

Website/ Application	Responses				
	Q1	Q2	Q3	Q4	DC
www.nsbm.	1	1	1	4	7

ac.lk					
nlearn.nsbm.ac.lk	3	2	3	3	11
icobi2023.web.app	2	1	2	2	7
students.nsbm.ac.lk	1	1	1	1	4
rlis.nsbm.ac.lk	2	1	1	1	5
sampathvishwa.com	5	5	5	5	20

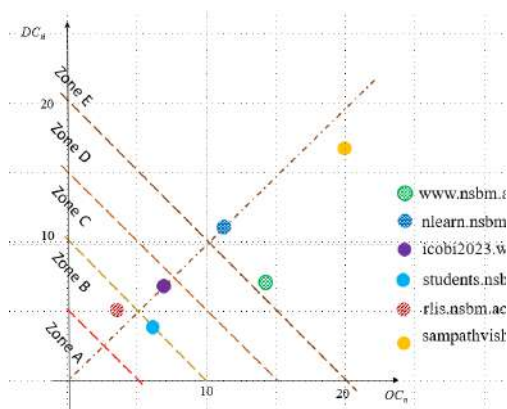The results were mapped to the OC vs DC plot and observed as follows.

Figure 2. Web Applications and Zones.

According to the observations, it is clear that the security requirements for web applications can be defined in different levels and be align to different directions. For example, the security requirements for www.nsbm.ac.lk is placed in a higher zone and align more towards to the operational criticality while the nlearn.nsbm.ac.lk is also placed in higher security zone but align towards to the data criticality. Practically, this observation can be justified as the main website requires high availability while confidentiality and integrity are the main concern in the learning management system nlearn.ac.lk. Web applications

hosted in rlis.nsbm.ac.lk and in students.nsb.ac.lk are not critical applications for the daily operations of the organization. According to the metrics, they have been placed in lower security zones.

5 CONCLUSIONS

This research mainly focused on defining mechanism to identify the security level requirements for web applications and proposing rationalized security frameworks depending on the identified security levels. The researchers propose two important measures as Operational Criticality (OC) and Data Criticality (DC) in defining the security levels and propose value scheme to the position the web application on the zone graph. The outcome of the research aligns with the suggestions of the security experts.

The proposed security level identification for the web applications will help the organizations to reduce the security costs in implementing unnecessary security controls which are not relevant to the application. It also reduces unnecessary resource allocations for security implications including the human resources.

This research proposes the organisations to identify the real security requirements of the web applications and define security levels according to the identified security levels by means of the zones.

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USB-Bouncer: A Hardware Based Approach to Nullify Unknown USB Device Based Attacks on Windows Machines

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ABSTRACT

The Universal Serial Bus (USB) can be considered as one of the main mechanisms of connecting external peripherals to the computers. External hard drives and flash drives are common USB devices, but there are numerous products that plug into USB, making it the most widely used interface on a computer. Even though this technology introduced an effective mechanism to connect devices to computers, it has opened a backdoor for threats and attacks. The average computer user is mostly aware of malware-based threats that could arise from plugging in unknown USB devices. Even though they have taken necessary steps to counter such threats, by maintaining an up-to-date antimalware program, it was observed that users are mostly unaware of threats from power surge and trusted HID attacks. These two attacks are the most common forms of attacks via USB besides malware. The objective of the research was to propose effective defending mechanisms for power surge attacks and for trusted HID attacks. As proof of concepts, the researchers tested the solution on a USB2 device in Windows environment and named the product as 'USB-Bouncer', which can automatically defend the user against such threats. USB-Bouncer is a multi-component hardware-based security solution which acts as an intermediary between a USB device and the user's Windows PC. The system will provide protection to the Windows PC from USB power surge (USB Killer) attacks and Keystroke injection (Trusted HID) attacks.

***Keywords* - USB, Hardware, Security, Windows**

1. INTRODUCTION

The USB (Universal Serial Bus) protocol

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has been widely adopted due to its flexibility of use cases, such as mass storage devices, HID devices, and secondary peripherals. However, it also provides a wide range of potential threat vectors, especially for Windows PC users. This project researches the most common threat vectors that originate through USB and suggests an effective solution to defend Windows devices.

2. BACKGROUND

The 2021 USB threat report by Honeywell (How USBs Create a Big Cybersecurity Threat, 2021) states that USB devices have seen a 30% increase in attacks, with 79% having the potential to critically cripple devices and 37% designed to exploit removable media. Similar rises in USB based threats have been noted by many other publications as well. (Bader, 2021; Berecki, The Risk Of USB Threats To Industrials Has Doubled Over 12 Months, 2020; Vijayan, 2021). USB attacks can affect processes in all layers of security, ranging from application-level issues such as malware, ransomware, and trusted HID (Human Interface Device) attacks to physical layer attacks such as USBKiller attacks.

Given the USB based threats mostly come in 3 forms, the research focused on investigating the currently available solutions to each attack form. For the Malware based Threats; current antimalware security solutions were deemed adequate, although there is still space for a separate device to perform malware analysis of unknown USB devices.

However, when it came to USB Trusted HID Attacks, even security solutions such as ESET and Kaspersky etc. that advertises its ability to protect against USB Trusted HID Attacks, failed to detect and prevent HID attacks. The most effective solution being a free software named "duck hunt", was also easily beaten by a newly home-made trusted-HID device due to its simplicity.

Finally, when considering Power-surge (USBKiller) attacks, it was observed that none of the mainstream computers come with any form of USB power surge protection. Whilst highly specialized components such as USB optical isolators do exist; they currently only support USB 2.0 protocol at half and full speed modes. This, together with the lack of public awareness of such devices, leaves the average Windows PC user highly vulnerable to suffering damages from such attacks.

3. MOTIVATION

USB interface is the most widely used HID in the current context. It is the defector standard for cable-based communication for many computational and other programable devices. The popularity and mandatory regulations keep on highlighting its requirement.

The popularity and wide Varity of usage have increased its venerability to various threats both physical and remote. Project is to be focused of a very specific types of attacks which can damage the physical circuitry of USB and systems software.

This research aims to provide a hardware-based prototype with a windows client and mobile application to protect against USB attack vectors. This will fulfil the requirement of a feasible simple solution for the users.

4. LITERATURE REVIEW

4.1 Literature on USB Power Surge Attacks

The study conducted by Angelopoulou (Angelopoulou, Pourmoafi, Jones, & Sharma, 2019) and Vice.com (Franceschi-Bicchierai, 2015) found that 4 separate tests with a USB Killer (2019 version) on 4 separate Windows computers produced an audible spark noise, visible smoke and smell of burnt electronics/fumes, and motherboard failures. However, the hard disk drives and RAM stayed fully functional even after the surge. Prof. Bapat (Bapat, 2018) has found that it is easy for an ill-intending person to acquire or build hardware that can carry out various forms of attacks as the needed documentation or hardware specification is readily available online. It was also found that, the voltage produced by these USB Killers is capped at 220v, making it unlikely that the surge can propagate to the CPU, HDD or other components of the computer.

4.2 Literature on bad USB Attacks (Trusted HID Attacks)

Some studies on bad USB have focused on defending or mitigating the attacks from bad USB, while others have focused on the development and deployment feasibility of such devices. Karystinos (Karystinos, Andreatos, & Douligeris, 2019), and Vouteva (Vouteva, 2015) conducted a study on using an Arduino as a HID attack device, which concluded that it could be done. Marian's paper (Vouteva, 2015) focused on mitigating the risk of BadUSB by using a Raspberry Pi as an intermediate between the unknown USB device and the Windows device. Tian (Tian, Bates, & Butler, 2015) and Kharraz (Kharraz, Daley, Baker, Robertson, & Kirda, 2017) developed a new USB stack for Linux machines which waits for user input to confirm that what the user sees usually matches with what the computer recognizes. Griscioli (Griscioli, Pizzonia, & Sacchetti, 2016) and Brandon (Daley, 2016) discovered that a One-Class SVM machine learning model could be used to detect abnormal key inputs, hinting towards a key injection attack. However, it may suffer from under sensitivity or high false-positive rates.

4.3 Information Analysis

Quantitative and Qualitative analysis were used to understand patterns observed.

A questionnaire was circulated to 76 Windows PC users, ranging from security experts to average day-to-day users. The questionnaire collected information on the participant's level of security knowledge, the Windows version they use, frequency at which they plug in unknown USB devices, types of USB devices they generally plug, their level of knowledge with regards to the 3 primary attack vectors being considered, and any countermeasures they have already

implemented. The majority of the participants had a general awareness of computer security, with 75% using Windows 10, with Windows 11, Windows 8.1 and Windows 7 tied at 13.2%. Only 1 participant was using a Windows version older than Windows 7 early builds. The data collected showed that most Windows users are aware of the dangers of malware-based USB threats, but many are unaware of trusted HID attacks. The level of awareness for USB killer type attacks was even worse, with 93.4% of participants being completely unaware of such threats even existing. Therefore, the research focused on the USB Killer and trusted USB based attacks.

4.4 Secondary Source Analysis

The literature review found that there was a lot of awareness of malware-based threats of different origins, including USB based threat vectors. However, a greater research need existed around the other 2 types of USB based threats. The existing studies revealed that the currently known USB killer devices capped the voltage around 220v, which was sufficient to cause permanent damage to hardware components, but not to damage the data on the hard drives. The available studies provided multiple approaches in tackling the trusted HID attacks, from prevention, mitigation to active defense. However, some vulnerabilities remain unaddressed, so a stronger solution which combines two or more of the studies conducted until today seemed as a logically beneficial approach.

4.5 Personal Research

A personal study was conducted with sample (harmless) malware downloaded through the internet and attempting to run them on 3 computers running ESET Antivirus, Kaspersky Antivirus and Bitdefender Antivirus solutions. As expected, all security solutions were able to address the attack and delete the infected file. However, when testing for trusted HID attacks, none of them were able to detect and prevent a sample attack that was developed for testing purposes. The results to the experiments conducted, indicate that the current market antimalware and security solutions are not sufficient to provide the needed protection against trusted HID USB attacks.

4.6 Market/Competition Analysis

The research investigated current solutions to defend against USB killer attacks. Microsoft Windows Settings offered Windows USB Selective suspend setting, while USB Optical Isolators (USB 2.0 specific) such as ADuM3160 IC (ANALOG DEVICES, 2014) and ADuM4160 IC (ANALOG DEVICES, 2016) can provide isolation up to 2.5kV / 5kV.

The software solutions available in the market to defend Windows Computers against Trusted HID USB attacks such as Duck-hunt (Sosa, 2016), Endpoint protector, USB Guard (USB Gaurd, 2017), Some Advanced Antivirus software like Kaspersky that claim to officially support protection against Trusted HID attacks,

failed to provide adequate protection. There were no hardware solutions found which defend Trusted HID USB attacks.

Other current software solutions such as Duck-hunt, Endpoint Protector, USB Guard, etc. fail to provide adequate protection against Trusted HID USB attacks.

4.7 Summary of Information Analysis

Given the information found during the course of information gathering phase, it was made clear that most windows devices were already well protected against malware-based threats. Therefore, it was decided that providing an even better solution for malware-based threats was not vital, as the current solutions provided adequate protection. However, given that the other 2 forms of threats were largely left unaccounted and undefended against, this research focused on providing a solution that can defend against the said 2 USB based threats.

5. METHODOLOGY

5.1 Requirement Elicitation

Following the information analysis phase, with careful consideration of the current market gaps and needs, the requirement of a solution which can automatically defend the user against above mentioned threats was clearly identified. requirements were drawn up and classified into functional and non-functional requirements.

Following a reevaluation of the feasibility of achieving each requirement, its importance and extent of scope, several requirements were finalized to be pushed till the final product.

5.2 Functional Requirements

The project's functional requirements provide the basic constraints that define the overall system behavior. The success of the final implementation can be judged against the requirements set forth here. The functional requirements for the entire system are listed below:

- Stream USB Connection via Wi-Fi to Windows Client
- To pass on the raw USB port to Windows client without directly connecting it to the client
- Maintaining electrical isolation
- Streamed USB connection must be secure against eavesdropping or similar attacks
- Detect an ongoing Trusted HID attack
- Detect an ongoing attack very quickly
- Alert the user to an ongoing Trusted HID Attack
- Provide user with some output notifying them of the ongoing attack
- React to an ongoing Trusted HID attack
- Render the ongoing attack useless without locking the system off
- Halt an ongoing Trusted HID attack

- Halt an ongoing attack by completely freezing all keyboard inputs until the threat has been controlled

- Eject a trusted HID device that is conducting the attack

- If the USB device connected to the IoT Device is causing the said trusted HID attack, the IoT device should be able to automatically eject the said device.

5.3 Non-functional Requirements

Non-functional requirements define the basic guidelines that can lead to high level of acceptance by end users by setting targets to entertain small learning curves, smooth operations, convenience factors etc.

•Must be convenient for the end user

  o The process of adding extra security should not come at the cost of convenience

    ▪ Users should not feel that they have to out of their way a lot to use the system

•Minimum learning curve

  o The product must be usable by any current Windows User, regardless of their level of knowledge on computer security

•Smooth Operations

  o The entire system should not consume a lot of computational resources

    ▪ The end user should not feel that the system is slowing their devices down

•Should handle any errors elegantly

  o System should not crash due to random errors.

5.4 Solution

A prototype-based development methodology was selected for the early part of the project to ensure a smooth and successful flow of the research. Given the complexity of the project design, and the timeframe, a feature-driven development (FDD) cycle was selected as being the most suitable style of development for this type of project during its mid to late stages of the development lifecycle. Hence, project was built in accordance with the hybrid model between prototype driven development and feature driven development. The proposed solution consists of a windows client, and an IoT implementation which is controlled by an Android application.

This system aims to address two major types of attacks: the USB Killer (power surge) attack and the trusted HID attack. The proposed solution tackles the issue of USB Killer threats by completely isolating the USB device from the windows client by streaming the port wirelessly via Wi-Fi (local network) secured with SSL. To ensure that the proof-of-concept device does not get damaged by a high voltage USB power surge attack, the ADuM3160 Optical isolation IC, designed to safely handle surges up to 2.5kV; was integrated into the design. The trust HID attack detection mechanism is primarily done by the custom-built Windows client, which can either alert the user with a notification, actively react to the code being injected by

dropping some key presses, or inserting additional key presses to make the injected code useless. It can also completely halt all keyboard input until the attack has run its course. Finally, the device can eject the connected device by stopping the USB port streaming, and electronically disconnecting the power line of the said USB.

Defense against USB Killer attacks

The proof-of-concept implementation is completely electrically isolated from the device and connected via Wi-Fi wirelessly, this design is capable of defending against any type of USB power surge attack with the worst-case scenario resulting in damaging the proof-of-concept implementation and not the Windows PC.

Defense against trusted HID USB attacks

The current antimalware solutions that advertise their capabilities of preventing HID attacks failed to stop a test HID device which was built for testing purposes. One of the most prominent anti-trusted HID attack solutions is end-point protection software, which blocks out all USB ports at BIOS level. Another solution is the USB Guard solution, which acts as a mid-way point between the unknown USB and known USB, allowing the user to safely explore the content inside a USB device and copy it to another safe USB device. The closest rival to this project is "duck hunter," which is able to actively detect and react to most trusted HID attacks. However, the complexity of using USB devices and the fact that this can only support USB Mass Storage Devices makes this solution less than ideal. After conducting black box

testing, another HID device was built that could completely circumvent the protection provided by the duck hunter tool due to the mediocre detection algorithm used by the said tool. Additionally, the tool has a large performance cost on my windows machine, with the tool using a great amount of computational resources. This could potentially bog-down a lower-performance machine, making the tool unusable.

5.5 Strengths and Weaknesses

Strengths

The proof of concept has one major strength above all other devices and solutions currently available in the market: providing complete security for both USB killer threats and USB trusted HID threats. The windows client designed to perform the detection of trusted HID attacks was designed to be a very light-weight program, allowing it to perform as expected even on a lower-tier computer. The solution can outperform all other competitive solutions for trusted USB HID attacks in aspects of security, performance, or convenience, and can even protect the user against USB power surge attacks. Weaknesses include transferring raw USB port data via TCP, using SSL to create a secure connection between the proposed solution and the windows client PC, and only supporting up to full-speed USB 2.0 protocols.

The finalized design provided below was finalized after building multiple smaller prototypes to test each specific criteria of the system. The prototypes had to be constantly changed when adding more

features compared to the original plan, to compensate for the lack of parts in Sri Lanka amidst the prevailing situation.

The design phase was done parallelly to the requirements elicitation to minimize the time needed for constant evolution during design.
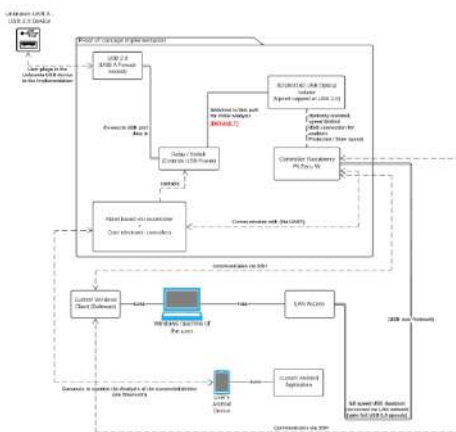
6. DESIGN OVERVIEW

High-level overview

Figure 1. High-level diagram of the system

The system provided uses 1 Raspberry Pi Zero W for the controls of the IoT Device. A windows client is installed on the Windows PC and connects to the Raspberry Pi via SSH. The controller Raspberry pi maintains communications with the electronics of the IoT device through an Arduino Mega board connected via UART (Serial). The mobile application is installed into the IoT device powered by a separate Raspberry Pi 4 running Android. The windows client can request a soft and a hard eject of the connected USB device by requesting the Raspberry to turn the USB

server off and flip the relay to cut the power off from the USB device.

6.1 Connection experience

For establishing a connection with the system, the user must follow one of the 2 paths.

1) First time configuration

2) Day-to-day use

1) First time configuration

During the first-time configuration, the user must boot up the IoT device, and set up the Wi-Fi settings information so that the IoT device could connect to the network properly. Once connected, the IoT device is pollable via a network discovery tool. However, by default, the USB server is fixed behind a firewall so no direct connection to the USB server could be made by any VirtualHere client.

By using the custom-built Windows client, the user can enter the Unit ID of the IoT device, and the custom client would open a SSH tunnel to the IoT device and configure an exception under an SSL connection for the VirtualHere server to connect back to the client PC.

This PC client configuration only needs to be done once if the IPs of the client PC is static and reserved.

2) Day-to-day use

During day-to-day use, the user only needs to provide power to the IoT device, and power up the windows machine. The tunnelling and its related configurations would be done automatically in the

background by the IoT device and the windows client.

6.2 Quality of connection

The connection has been tested under a trial VirtualHere USB server which limits the maximum data transfer speed to USB 2.0 speeds. However, with a license key, the speed can be boosted to full USB 3.0 speeds.

VirtualHere has worked reliably during testing, even when noise was artificially introduced at the server side manually and forcefully.

6.3 Connection safety

The USB server sits behind a firewall that can only be configured by an SSH tunnel made by the custom Windows client. Although this security measure alone is still vulnerable to specific types of MITM attacks, such as ARP-spoof attacks; given that an added layer of security is used by using SSL certificates, even if an attacker attempts a MITM attack, they would only be able to successfully ping the USB server and would be completely unable to hijack the streamed USB socket.

6.4 Development Process

6.4.1 Software Development Process

Software development began with windows client development, using python3 as the language for the build. The application's core features were prototyped, with multiple different prototypes being made for the HID attack detection algorithm. At

its conclusion, a buffer algorithm was used to detect the typing speed and consistency of typing speed between letters. The UI was lastly developed once all the core features of the implementation were finalized and recognized as working.
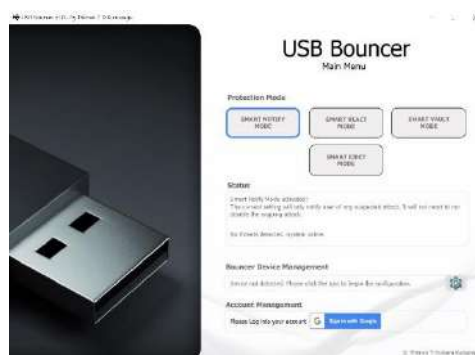

Figure 2. USB Bouncer - Windows Client - Main Menu

Once windows client detection operations were confirmed and tested, the USB Bouncer hardware communication component was created. SSH script automation was used to deliver specific instructions to the raspberry controller that would in turn cause the software ejection of the connected USB device. Following this implementation, finally firebase google sign in was implemented.

Following the Windows client development, the Arduino code was quickly developed so that it would manage to maintain 2 UART connections and pass on

the messages from the mobile application to the raspberry pi, essentially creating a highly restricted and controlled full-duplex communication channel end-to-end between the mobile application and the windows client.

Once the core functions were confirmed, the android application was quickly built to observe the IoT implementation's functioning.

6.4.2 Hardware Development Process

The hardware development process began with basic power supply and control set ups, but quickly moved on to establishing communications at electronics level.

From a hardware perspective, USB 2.0 protocol was thoroughly studied, and was practically tested on using the help of an oscilloscope.

Furthermore, same type of signal health exploration was conducted for UART communications using the Oscilloscope's inbuilt "decode" function, through which, successful TTL/UART transmission of data was confirmed (prior to developing the system).

Once basic communications were established and a full-duplex channel opened, the critical hardware designs were completed. From this point onwards, the focus shifted to quickly making the rest of the electronics components and implementing the same technologies repeatedly to finish the hardware implementation.

6.5 Developing Test Kits

Given that one of the primary attacks this system would attempt to prevent would be that of trusted HID/Keystroke injection attacks; appropriate testing devices needed to be created. Therefore, several Atmel AtTiny85 based boards were sourced to which custom "Rubber Ducky" scripts were fed in. These AtTiny85 chip-based boards successfully provided the required result. The development on these devices has concluded and are ready to be used during final system testing.

Development of high voltage attacks was deemed unnecessary as the currently proposed system is completely air-gapped from an electrical (current/load) standpoint.

6.6 Version Control

During the entire period of the research, version control was conducted to ensure that a proper backup was kept at all times, and that the development workflow would proceed smoothly without any major issue that could present itself following a major code change at a later stage of development.

To fulfill these goals, Git was used, with Git Bash (Windows) being the interface of choice to manage the version control process.

7. TESTING

Given this was an IoT heavy project, the testing was conducted in 2 separate phases, namely, software testing, and hardware testing. Once these individual components

were tested at an individual level, further system testing was conducted to ensure that all worked together as expected without any errors.

The complete test plans and results have been uploaded to the project repository (Link given below. Following the references chapter. Prior to appendices) for further information.

7.1 Testing Methodology

The tests were planned under 4 separate criteria: namely Unit Tests (Type: White-box Testing) Integration Tests (Type: White-box Testing), System Tests (Type: Black-box Testing), Regression Tests (Type: Black-box Testing). The first three tests were conducted for both hardware and software components separately. Regression tests are done following the system tests to ensure that the previously passed system tests would still continue to pass regardless of changes made and to avoid any undesirable changes to the system due to changes made during product evolution.

7.2 Test Tools

To conduct the unit and integration tests, for hardware implementations, an oscilloscope and a multimeter was used in combination to confirm that the expected signals were correctly passing and to make sure that the electronics remained at the expected voltages and current draw levels.

The software side unit and integration tests were conducted manually by using Unity Test Runner for unity mobile app

development, to manual observation-based unit testing for Windows client and the raspberry pi scripts.

Final system and regression testing results were resolved using direct manual observations, to ensure that the system acted in the way expected for each test.

7.3 Results Summary

7.3.1 Hardware testing results summary

In hardware testing, everything from basic power supply voltages and currents, to signal creation, to communication (tested for UART under simplex, half-duplex, and full-duplex modes) were tested and they provided the expected results. Once moved into more complex queries, given all the units were tested at unit and integration scale; the system and regression tests also concluded successfully. The hardware testing went as smoothly as originally planned.

7.3.2 Software testing results summary

In software testing, some minor issues rose at first with regards to timely detection of trusted HID attacks. However, with further fine-tuning of the detection algorithm, the software unit, integration, and system tests passed as expected. Android application development and tests ran without any issue and concluded smoothly as originally planned.

7.4 Conclusion

The entire system was tested as both hardware and software components, from

unit test level, up to regression level. The testing concluded successfully, and the proof-of-concept deliverable was able to meet the originally set objectives for the project provided in the project initiation document (PID).

8. FUTURE RESEARCH

This system can only cater to speeds up to USB 2.0. Further research into exploring the possibility of streaming USB 3.0 connections may open a new segment of research due to the added complexity of the protocol. A system could be developed to integrate the functionality of malware analysis on a similar IoT device in order to provide total protection against all 3 major attack vectors that affects USB ports/protocols. As the system stands, it takes up a lot of network usage to stream a USB port via Wi-Fi to the targeted Windows machine, and the added SSL and SSH overheads make the problem worse if multiple users of such devices are logged into the same network. Therefore, researching into a different implementation to get the USB port streamed to the windows machine (possibly with the use of Fiber Optic connections) may serve to be a better implementation of the concept.

9. CONCLUSION

This project set out to address 2 primary threats that plagues the USB protocols for Windows PC users, namely, the trusted HID attacks threat and the USB Power Surge attack (USB Killer Attack) threat. Having completed the long journey of the research, by gathering information on background and context, requirement

elicitation, design, implementation, and testing of the proof of concept, many lessons were learnt. This chapter focuses on reflecting on the findings in a summarized manner.

The project was able to deliver on all the nominated deliverables successfully, creating primary knowledge sources and secondary sources to add to the current body of knowledge. However, lessons were learnt such as avoiding Network use and using a USB via fiber extension to implement electric isolation.

This research has concluded in general success, having achieved all objectives and met all requirements set forth during the requirements elicitation phase. It provides a unique solution to the problems addressed, and the lessons learnt, future research avenues discovered, and benefits received outweigh any limitations.

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Business Process Advancement of Outdoor Cooking Businesses Using Autonomous Datawarehouse

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ABSTRACT

Been able to sustain and compete continuously in any domain in the business world, is getting more and more challenging day by day. Grasping Data driven solutions instead of traditional and structured computerized solutions plays a major role in the modern business world. This study focuses on gaining competitive business advantages by making dominant decisions based on accurate insights over competitors and achieve efficient query processing, resource utilization, scalability, adoptability, recovery from a fully autonomous data warehouse design integrated with real time processing dashboards.

Keywords - **Datawarehouse, Data Mining, Machine Learning**

1. INTRODUCTION

Outdoor cooking has been recognized as one of the emerging businesses with growing profits. When the business gets spanning, challenges and problems relate to business processes also getting higher. Scheduling the processes, managing the resources, maintaining the supply chain, continuing the customer sustainability, management of both human and hardware resources are key objectives that owning stakeholders needs to address daily in these types of businesses. This research study aims to support the organization top management and middle level management on their decision making towards the growth of the business.(Najib and Kiminami, 2011)

Implantation of a platform independent, adoptable and efficient data driven solution such as data warehouse seems changing the direction of businesses in higher frequency. Compared to traditional relational databases DW provides robust data management, scalability, higher efficiency, quicker query processing, integration with number of applications such dashboard tools(Ex-Power Bi) and data sources. A centralized cloud based datastore which can handle large volume of data flown in greater velocity over time with number of variants can reduce the complexity of accessing data in real-time.

Identifying trending food menus, peek business hours, regular customers, areas producing highest profits, machine up and down status etc. are very vital to introduce new food variants and packages with challenging cost matrices, increase the

productivity of resources for peek hours to maintain very good customer satisfaction levels while achieving more income. To introduce new outlets or increase counters like drive through pickups it's very important to have a consistent record on branch wise profits. With the solution top management will be able to make more accurate decisions on spanning the business.

Centralized data storing, processing and retrieval will reduce number of miscommunications and data transmission errors in the overall process. And in the other hand all the stakeholders getting enable to access same data from any geo location at anytime will always become a competitive advantage over rivalry businesses. (Tanwar, 2013)

Smoothly integrated machine learning models or AI models with the system will uphold the proposed solution for another technical level.

2. METHODOLOGY

2.1 Data Preprocessing

To obtain higher accurate forecasts and predictions from the data warehouse solution, one of the crucial stages is data preprocessing phase. Datawarehouse feeds from data that well preprocessed always seems to have more confident making correct decisions. In this context for the centralized data repository data will enters from different processes, locations, and stakeholders therefore there is a high tendency to have in accurate forms, missing values, and outliers. To upgrade the data to

be more complete, accurate, precision, no-redundancies, derivation integrity, valid we can use various types of ETL tools. Instead of using traditional cleansing methods most of recent studies recommending using methodologies and tools such,(Suneetha and Krishnamoorthi, 2009)

- Classic and advanced data preprocessing.
- Customize frameworks like User-Model abstraction.
- Tools like WEKA, YALE
- To boost the efficiency of the data warehouse can use the Materialized approach to optimize queries.
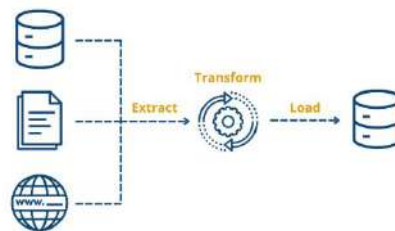

Figure 1. Data Preprocessing

In the above figure, the data that generates from different sources will be transform into factorized nominal and ordinal categories and numeric data
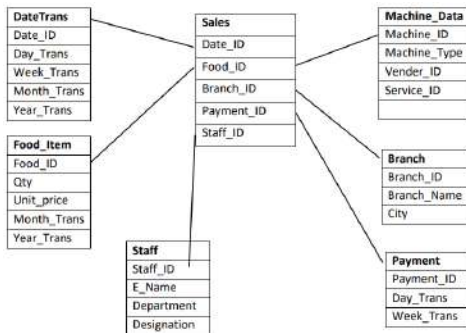
2.2 Data Scheme Design

Figure 2. Star Schema

Figure 2 presents a normalized star schema for the solution. Sales the single fact table including the Primary keys of four-dimension tables.

DateTrans table stores all the date, day, week, month, year related of each transaction that establishing the 1 to M relationship with Sales table through the Date_ID the PK as the Foreign Key for the Sales table. Later provide smooth data retrieval with conditions for time constraints against the sales. Ex- Total sales in month of January 2023.

Branch Table contains all the attributes of each branch that establishing the relationship with the sales table through Branch_ID as the FK

With regard to partial implementation and the performance measures such as Throughput and the latency most of studies identified that schemas which not well normalized into upper levels like NF3, and Boyce Code Normal form perform much better than the normalized schemas. But in the other hand generating data retrieval queries and parameter selections in data

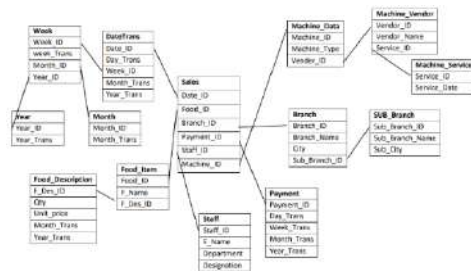will suffer from the Un-Normalized data schemas.(Sidi, El and Amin, 2016)

Figure 3. Snowflake Schema

Figure 3 is identified as the snowflake schema of the context; multiple sub dimension tables are created with same sales fact table.

Every sub dimension tables have own PK creating the 1 to M association with the owning table as the Foreign key. Normalized version of the star schema enables the different level of accessibilities for the report generation.(Subekti et al., 2017)

Week data table provides the cross view on weekly transactions, profits, machinery status and many more. Like wise all the sub dimensional tables satisfies number of use cases identified during the requirement gathering and analyzing phase such as,

Weekly stat on breakdown of machines.

Counter wise sales.

Monthly sales in each selected branch.

2.3 Oracle warehouse Architecture

For the implantation of the proposed solution this study will use the three tire oracle data warehouse approach. (Shahzad, 1999)

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First Layer – Data accessing, daily transactions from classified counters, machinery updates, weekly and monthly profit, or loss updates etc. such various sources will provide large volume of data in different levels of velocities. In here solution can use SQL advanced stored procedures, Oracle transport gateways.

Second Layer – Cloud Based Autonomous Warehouse (Server Based), implementing the multidimensional schema while enabling the client-server connection string up 24/7. Accessible to planned logins all the time with all the report generating purposes.

Third Layer – Intelligence System, Decision Supporting, real time updating dashboards will provide vital reports for the stakeholders to make any decisions to gain the business advantage in the real time.
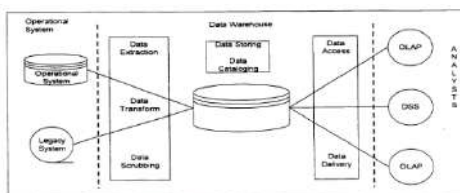

Figure 4. Proposed Implementation

2.4 System Implementation

Domains such as food and beverages are always making changes responding to dynamically changing environments, social trends, scientific research etc. For rapidly changing environments like these are well recommended to go under agile development methodologies. (Widom, 1995)

2.5 Evaluation

2.5.1 Sales and Profit margins for Decision Makings

The main objective of this implementation-based study is to up the overall profit margins while reducing the costs.

2.5.2 Apriori Algorithm and Decision Tree Classifier for up selling and cross selling.

Frequent Item set identifier the Apriori algorithm with association mining rule will provide one of the vital information to decide and introduce foods and beverages for customers to encourage them to buy the highest end menus or complementary items with positive evidence. Which increase the ability of both up selling and cross selling power towards the business. For example-

Let's determine frequent set identified by the Apriori as follows. {PC1, PB2, CTC -> LI}

70% confidence that transactions include Poke BBQ and Chicken Tikka customers wants to by Long Island Cocktail. Therefore, business now can introduce very high-level combined menu or satisfying complementary package to customers.(Marchant, 2006)

2.5.3 Machinery update and the maintenance

With the centralized repository in the context, data warehouse can provide real time update of all the machinery equipment directly involved in the food processing in multiple insight levels through dashboards. Advanced quiring and options like Oracle miner, standard data classification and

clustering tools provides the most important descriptive statistical details such as,

- Overall machine status.
- Branch wise machine status.
- Production performance against the machines.

In the other hand system will enables the access point with the machinery suppliers will provide advantages for both business itself and suppliers to,

- On time screening the breakdown machinery which leads them to assist on duties with less delay.
- Prior information for service days will run the business smoothly with less delays.

2.5.4 Scalability Of the Proposed System

In this research study we had to cover the business processes of at least 500 branches including both rush hours and normal hours. In these time variants approximately more 500 sources will feed the data to the centralized DW and number of preprocessing, querying, mining algorithms and users will log into the system at the same time. (Morgan et al., 2019)Therefore, database replication and portioning is very important to handle verry large amount of clients and data. To achieve such a requirement oracle server provides,

- Provisions of partitioning
- Handling thousands of users in both first and the last tiers
- Server availability in partial breakdowns and maintenance.

3.MAPPING WITH BUSINESS OBJECTIVES

Satisfied customer relationship management- smooth running business process among all the branches has a great tendency to provide very good customer experience in reducing waiting time, consistently quality goods, flexible customer service etc. which directly influence the customer retention and acquire more customer base. Integrated data mining algorithms helps to classify loyal and regular customers very easily and allow business to reach to new levels like,

Loyalty cards

Special discounts and coupons

Supplier Force Management – Costing of the finishing foods and the accountable services are always directly proportional to the supplier demands. A well-organized DW architecture which provides limited accessibility for suppliers provides the demanding power over suppliers and gives the ability to get the attention of more customers due to the organized processing. Which leads the business to be less stressed about the supplier chain management.

Workload and resource management – Providing more efficient and scalable workload matrices for both human and hardware resources is one of the key advantages of these type businesses. While getting real-time updates on all the business processes it guides the top management to set up the best approach profiting both business and the resources.

Decisions to integrate new business interfaces such as Drive through windows, more inner counters, new branches need go under confident evidences and insights on consistent profit margins, therefore with

research deliverables top management will have that ability.

4. FUTURE WORK

As an advancement for the proposed intelligent solution, we can include an agent-based simulation process to handle certain queries of different stakeholders at different levels. Ex: multiagent system consisting with chatbot agent, classification agents and data retrieval agents binds with ML algorithms can response to stakeholders' queries in very less time when they wanted to make a decision.

Beyond standard ML algorithms, if we can invoke advanced AI models to forecast and predictions will boost the accuracy and confidence level of ongoing results.

5. CONCLUSION

During this research study the proposed data warehouse design aim to achieve the competitive advantages over rivalry food chains on different aspects such real time business process monitoring, quick decision making in both short term and long term, regular growth in food, menu, machinery variations, getting a strong supplier chain with a larger pool of suppliers and customer satisfaction and retention while achieving large scale profits.

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Assessing public awareness of information technology regulations in Sri Lanka

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ABSTRACT

The field of information technology (IT) is expanding rapidly, and this evolution presents new difficulties for the legal and governmental bodies. To regulate IT use and ensure users' security and privacy, Sri Lanka has put in place a number of laws and regulations. To find out how much the general public is aware of these laws and regulations, there isn't much research accessible. This study intends to close this gap by surveying Sri Lankan individuals to learn about their familiarity with IT-related regulations. Participants will be questioned on their knowledge of specific laws and rules governing IT use, such as the Computer Crimes Act and the Data Protection Act, in the survey. Additionally, it will probe them on their general familiarity with privacy and IT security issues. To determine the

participants' level of familiarity with Sri Lanka's IT-related legislation and regulations, survey results will be evaluated. The findings will give

policymakers, legislators, and law enforcement agencies

information about how much the general people is aware of the laws pertaining to IT, which will be helpful in devising successful measures to raise public awareness and assure compliance with the law. Finally, this study is significant because it emphasizes how crucial it is for Sri Lankans to be informed of the laws and regulations pertaining to information technology. It also offers a starting point for additional research on the subject and can give lawmakers and policymakers advice on how to better inform the public and enforce IT laws.

***Keywords* - IT laws, Sri Lankan IT laws, public awareness**

1. INTRODUCTION

Information Technology (IT) has become an integral part of modern society, revolutionizing the way we communicate, work, and live. As the IT landscape continues to evolve at a rapid pace,

governments and legal bodies worldwide face the challenge of adapting regulations to safeguard the security and privacy of their citizens in the digital age.

Sri Lanka, like many other countries, is no exception to this global phenomenon. To address the growing importance of regulating IT use and protecting the rights of individuals online, Sri Lanka has implemented a series of laws and regulations. These regulations encompass a range of issues, from cybersecurity to data protection.

1.   Internet Usage in Sri Lanka: In 2021, approximately 32% of Sri Lanka's population had access to the internet, showing significant growth compared to previous years.

2.   Cybersecurity Incidents in Sri Lanka: While specific statistics for cybersecurity incidents in Sri Lanka might be limited, the global increase in cyberattacks and data breaches suggests that Sri Lanka is likely not immune to such threats.

Despite the critical role that IT regulations play in ensuring a secure and private digital environment, there is a notable gap in our understanding of how well the general public in Sri Lanka is informed about these laws and regulations.

Even among IT professionals, there seems a significant lack of literacy in IT laws and regulations in Sri Lanka. Despite their expertise in technology, many IT professionals may not be fully aware of the intricacies of the legal framework governing their field. This gap in understanding extends to matters such as

data protection, intellectual property rights, and cybersecurity regulations. Addressing this knowledge deficit among IT professionals is equally vital, as they often play a central role in implementing and maintaining IT systems, making their awareness of legal requirements crucial for compliance and security.

Laws that were once sufficient may quickly become outdated in the face of emerging threats and innovations. This underscores the urgency for ongoing education and awareness among both the general public and IT professionals. By keeping pace with the evolving IT legal landscape, Sri Lanka can not only ensure the protection of its citizens' rights but also foster an environment that encourages innovation and responsible use of technology.

This study seeks to bridge this gap by conducting a comprehensive survey to assess the level of awareness among Sri Lankan individuals regarding IT-related regulations and their understanding of broader privacy and IT security issues. Ensuring that individuals are aware of their rights and responsibilities in the digital realm is essential for the effective implementation of IT-related legislation.

2. MOTIVATION

As a recent LLB graduate and a current student pursuing a bachelor's degree in software engineering, my academic journey has allowed me to straddle two vastly different but interconnected worlds: the intricate realm of legal regulations and the ever-evolving landscape of IT. During this academic journey, I couldn't help but notice a glaring gap in our society – the lack of

literacy in IT laws and regulations in Sri Lanka.

Through this research, I aspire to shed light on the current state of awareness among Sri Lankan citizens, including IT professionals, regarding IT laws and regulations. By uncovering the gaps in knowledge and understanding, I aim to contribute to a more informed society where every individual comprehends their rights and responsibilities in the digital age.

3. LITERATURE REVIEW

A study done by Nipuna Dissanayake, University of Plymouth UK, introduces a research paper focusing on cyber warfare and the adequacy of laws and authorities in Sri Lanka to control and safeguard against future cyber threats. The introduction sets the context by highlighting that nations are currently facing various threats and challenges, especially in the realm of technology. It mentions that researchers have been focused on issues like terrorism, ethnic conflicts, and fraud, all of which have evolved with advancements in technology. The paper aims to address the question of whether Sri Lankan law and authorities can effectively safeguard the nation from future cyber warfare. The central research problem revolves around the ability of Sri Lankan law and authorities to protect against cyber warfare. This research provides an overview of the research paper's objectives and the key questions it seeks to answer. It emphasizes the need to assess Sri Lanka's legal framework and government measures in the context of cyber warfare.

A study done by Senith Iddagoda, University of Plymouth UK, outlines the key points of a study focused on understanding the legal framework in Sri Lanka concerning cyber warfare deterrence. The review highlights the significance of Sri Lanka's need to address cyber warfare due to its involvement in international trade, politics, and communication. The main aim is to understand Sri Lanka's legal framework related to cyber warfare deterrence and identify existing laws. The objective is to analyze Sri Lanka's existing laws, understand their strengths, and identify potential loopholes to enhance cyber warfare deterrence. The research problem centers around Sri Lanka's limited success in combating cyber warfare due to its outdated laws and legislation. The primary research question is how Sri Lanka can update its legal framework to align with international laws and protect its cyber space effectively.

The research of "Are the Sri Lankan Cyber-crime laws Sufficient to safeguard IT Professionals and the victims?" done by Dulanjali Senarathna, Faculty of Computer Science, University of Plymouth, UK examines the state of cybercrime laws in Sri Lanka and compares them with the regulations in the European Union (EU) to protect IT professionals and victims. The paper highlights the escalating challenges posed by cybercrime in the digital age, emphasizing the need for effective legal frameworks. The paper identifies various cybercrime activities, including cyberbullying, spamming, ransomware attacks, and more, illustrating their impact on personal and national security. The

advent of cloud computing is also acknowledged for its role in globalizing cyber threats. Comparisons between Sri Lanka's Computer Crimes Act and EU directives are made in terms of identifying computer crimes, investigation procedures, penalties, and protections. The EU's comprehensive approach and emphasis on victim protection and cybersecurity are noted as strengths compared to Sri Lanka's legal framework.

Another research done by Asiri Iroshan, Nanjing University of Information Science and technology shows the Sufficiency of Sri Lankan Cyber Crime Laws to Safeguard the It Professionals and Victims of Cyber Attacks. This paper explores the effectiveness and comprehensiveness of Sri Lanka's Computer Crime Act in providing legal protection for IT professionals and victims of cybercrimes. The review also includes a comparative analysis between Sri Lanka's Computer Crime Act and the cybercrime directives of the European Union (EU). The key findings of this paper are types of cybercrimes, cybercrime and the cloud, Analysis of Sri Lanka's Computer Crime Act, Identification of Computer Crimes, Comparison with EU Directives and Investigation of Computer Crimes.

Another research done by W. Ravindu Yasas provided outlines the key points and themes discussed in a research study focused on Sri Lanka's laws to prevent cyber-attacks and their sufficiency in safeguarding against cyber warfare. This critically analyzes existing laws and statutes in Sri Lanka related to cybercrimes, including the Electronic Transaction Act,

Information and Communication Technology Act, Telecommunication Act, Computer Crime Act, and Intellectual Property Act. It highlights the need for stronger cybersecurity measures and legislation to safeguard against cyber threats.

Another study done by Kasun Rukmaldeniya, university of Plymouth UK, provides insights into the state of cyber warfare, cybersecurity laws in Sri Lanka, and their effectiveness in preventing cyber warfare. Cyber warfare is a significant global concern and is increasingly recognized as a security issue, even in developed countries. The need for robust cybersecurity laws to address emerging cyber threats and prevent future cyber warfare is emphasized. The study highlights the challenges posed by cyber warfare and the existing gaps in Sri Lanka's cybersecurity laws, emphasizing the importance of enhancing legal measures to address this evolving threat.

4. LITERATURE REVIEW ANALYSIS

From the papers presented above, several key gap identifications can be derived. These papers consistently highlight the inadequacy of Sri Lanka's current legal framework in addressing cyber warfare and cybercrime effectively. Both Asiri Iroshan and Dulanjali Senarathna's studies conduct comparative analyses with EU directives. These comparisons reveal significant gaps in Sri Lanka's legal framework when measured against international standards, particularly in terms of victim protection and cybersecurity measures. The studies collectively highlight the escalating

challenges posed by cyber warfare, emphasizing the need for urgent action to enhance legal measures and cybersecurity laws in Sri Lanka.

In summary, the gap identifications from these papers consistently point to the inadequacy of Sri Lanka's legal framework in the face of evolving cyber threats. The need for comprehensive and up-to-date legislation, as well as alignment with international standards, emerges as a pressing concern. Addressing these identified gaps is crucial for Sri Lanka to effectively safeguard its IT professionals and victims against cyber warfare and cybercrime.

OBJECTIVES

1.   Spreading Awareness about IT-Related Laws in Sri Lanka:

This objective focuses on increasing knowledge and understanding among the general public, as well as IT professionals, about the existing IT-related laws and regulations in Sri Lanka. The rationale behind this objective is to ensure that individuals are aware of their rights and responsibilities in the digital realm. By spreading awareness about IT laws, people can make informed decisions and take necessary precautions to protect their data, privacy, and digital assets. It also helps them understand the legal consequences of their online actions. This objective aims to bridge the knowledge gap and create a more legally aware population in Sri Lanka.

2.   Stopping Cybercrimes:

This objective is centered around mitigating cybercrimes and enhancing cybersecurity in Sri Lanka. By raising awareness about IT-related laws, individuals and organizations are better equipped to recognize and report cybercrimes, such as hacking, identity theft, online fraud, and cyberbullying. Additionally, an informed populace is less likely to engage in illegal online activities, reducing the overall incidence of cybercrimes. Effective cybersecurity measures can also be put in place when individuals and organizations understand the legal framework surrounding IT security. Ultimately, this objective aims to create a safer digital environment by reducing the risks associated with cybercrimes.

3.   Contributing to a Safer Digital Environment:

This objective encompasses a broader perspective on ensuring the safety and security of the digital environment in Sri Lanka. It involves not only preventing cybercrimes but also promoting responsible digital behavior, data protection, and privacy. By spreading awareness of IT laws and regulations, individuals become more conscious of their online actions and the potential legal consequences. This, in turn, encourages responsible IT practices and ethical behavior in the digital space. A safer digital environment also extends to the

protection of sensitive data, which is essential for individuals, businesses, and government entities. Thus, this objective seeks to create a holistic and secure digital landscape where individuals can confidently engage in digital activities while adhering to legal and ethical standards.

6. METHODOLOGY

6.1 Introduction

To address the above-mentioned need for accessible legal information and guidance, this conceptual paper introduces a web-based platform. Designed to empower individuals and organizations alike, this platform aims to provide comprehensive insights into IT-related laws in Sri Lanka, serving as an invaluable resource for those navigating the intricacies of this digital domain. The proposed web-based platform aims to provide comprehensive information about IT-related laws in Sri Lanka, serving as a valuable resource for individuals seeking insights into legal matters related to information technology. Users can access the platform to gain knowledge about IT laws, address specific concerns, and seek guidance on legal issues.

In the following sections, this paper will delve into the proposed system architecture and functionality of this innovative platform, outlining how it operates and empowers users. From browsing up-to-date IT laws to seeking legal advice and accessing a wealth of knowledge resources, this platform aspires to bridge the gap between complex legalities and practical understanding.

6.2 Functionalities

This research paper introduces a web-based platform designed to facilitate access to IT-related laws in Sri Lanka and enhance the user experience in navigating the intricate legal landscape. The platform offers a range of user-centric features, each meticulously crafted to empower individuals, businesses, and organizations seeking clarity on IT laws. In this section, it discusses about the core features of the website, highlighting their significance and impact:

The system illustrates the user journey within the platform:

Dashboard:

The dashboard serves as a central hub for all user activities and interactions with the platform. It offers quick access to features such as browsing IT laws, asking legal questions, accessing the knowledge base, and managing subscriptions. The dashboard can display personalized content recommendations, updates, and alerts based on the user's preferences and legal interests.

Browse IT Laws:

IT-related laws are meticulously categorized based on legal domains, making it easier for users to find information relevant to their specific needs. The robust search feature allows users to enter keywords or phrases to find specific laws or legal topics quickly. Each law is accompanied by detailed explanations, historical context, and links to relevant legal documents, ensuring comprehensive understanding.

Ask Legal Questions:

Users can submit legal inquiries or questions directly through the platform, eliminating the need for third-party legal services. Legal questions are routed to legal experts or authorities specializing in the relevant IT domain, ensuring users receive well-informed responses. User data and inquiries are handled confidentially, respecting the privacy and security of user interactions.

Knowledge Base:

The knowledge base offers a repository of frequently asked questions (FAQs) and common legal issues, providing users with quick answers to common queries. In-depth articles, legal guides, and resources provide users with a deeper understanding of IT-related legal matters. The knowledge base can serve as an educational resource for individuals and organizations looking to enhance their legal literacy.

Updates and Alerts:

Subscribing to updates and alerts ensures that users receive timely notifications regarding changes in IT laws, legal developments, and relevant news. Users stay informed without actively seeking updates, enhancing their ability to adapt to legal changes proactively.

Feedback and Support:

Users have the opportunity to provide feedback on platform usability, content quality, and their overall experience. User insights are used to make iterative improvements, ensuring the platform evolves to meet changing user needs and preferences. The feedback and support feature also serves as a channel for users to

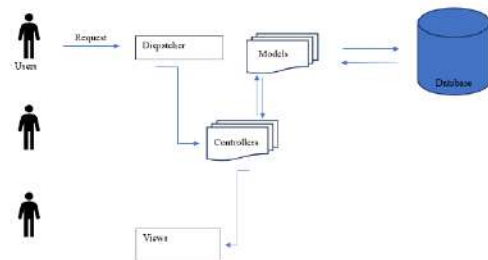seek technical assistance or clarification on platform usage.

Figure 1. System architecture of the system

6.3 Stakeholders

1. Users:

Individuals and Organizations: Users encompass a diverse group, including individuals seeking legal guidance on IT matters and organizations navigating complex IT legalities.

Legal Queries and Concerns: Users may have a wide range of specific legal queries or concerns, from data protection regulations to intellectual property rights in the digital sphere.

Empowerment Through Information: Users leverage the platform to empower themselves with knowledge, make informed decisions, and ensure legal compliance in their IT endeavors.

Primary Beneficiaries: Ultimately, users are the primary beneficiaries of the platform, as it equips them with the tools and resources to navigate the legal intricacies of the digital age.

2. Legal Experts:

Specialists in IT Laws: Legal experts are professionals with specialized knowledge and expertise in IT-related laws, encompassing areas such as cybersecurity, data privacy, and intellectual property.

Providing Informed Responses: Legal experts play a pivotal role in the platform by providing accurate and well-informed responses to user inquiries.

Support and Guidance: Their contributions offer users the guidance they need to address legal challenges, make compliant decisions, and resolve IT-related legal issues.

Contributors to Legal Knowledge: Legal experts are instrumental in enhancing the platform's credibility and value by contributing their insights and interpretations of IT laws.

3. Platform Administrators:

Overseeing Platform Operations: Administrators are responsible for managing and maintaining the day-to-day operations of the platform.

User Registrations: They oversee user registrations, ensuring that the user base remains secure and genuine.

Content Updates: Administrators play a crucial role in keeping legal content current and accurate by managing content updates and additions.

User Support: They provide user support, addressing technical issues and inquiries, and ensuring that users have a positive and seamless experience on the platform.

Platform Evolution: Administrators use user feedback and insights to drive continuous improvement, ensuring that the platform evolves to meet the changing needs of its user base.

Significance of Stakeholders:

The involvement of these stakeholders ensures a user-centric approach to the platform's development and operation. Users receive valuable legal information and expert guidance tailored to their needs. Legal experts contribute to the platform's credibility by providing authoritative responses, enhancing its value as a reliable legal resource. Administrators ensure the platform's viability by managing user registrations, maintaining up-to-date content, and offering responsive user support. The continuous feedback loop involving users, legal experts, and administrators helps refine the platform, making it more effective and user-friendly over time.

6.4 Database

The proposed system will utilize the Oracle database management system (DBMS) for robust data storage, retrieval, and management. Oracle offers scalability, security, and reliability, making it suitable for a platform that requires efficient data handling. The database will store information related to IT laws, user accounts, legal inquiries, FAQs, user feedback, and more. It will be designed with appropriate data structures to ensure efficient querying and retrieval of information, enhancing the overall user experience. The choice of Oracle as the DBMS aligns with the platform's goal of providing a reliable and scalable solution

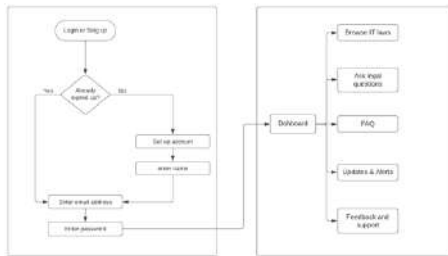for users seeking information on IT-related laws in Sri Lanka.

Figure 2. Flow diagram of the system

7. FUTURE IMPLEMENTATION

While the proposed web-based platform for accessing IT-related laws in Sri Lanka is designed to address immediate needs, there are several avenues for future enhancements and expansions to make the platform even more comprehensive and valuable.

Multilingual Support:

Consider adding multilingual support to make legal information accessible to a broader audience, including those who may not be proficient in English.

Mobile Application:

Develop a mobile application version of the platform to cater to users who prefer accessing legal information on their smartphones and tablets.

User-Generated Content:

Allow users to contribute legal resources, such as case studies, legal interpretations, or summaries, creating a collaborative legal knowledge repository.

Legal Assistance Directory:

Create a directory of legal experts and professionals specializing in IT law to facilitate direct consultations and legal services.

Legal Document Generation:

Implement tools for generating legal documents, such as templates for contracts, privacy policies, or terms of service, to assist businesses and individuals in legal compliance.

Interactive Chatbots:

Integrate AI-powered chatbots capable of answering frequently asked legal questions and providing instant guidance to users.

These future implementations will not only enhance the platform's functionality and user experience but also ensure its long-term relevance and usefulness in the ever-evolving field of IT law. By staying agile and responsive to user needs, the platform can continue to empower individuals and organizations with valuable legal knowledge and resources.

8. CONCLUSION

This research addresses a critical knowledge gap by examining the awareness of IT-related laws and regulations among the general public in Sri Lanka. By doing so, it contributes to the broader discourse on digital rights, policy development, and the need for public awareness in an increasingly interconnected and digitized world. The study's findings will have far-reaching implications for enhancing digital rights protection and ensuring the effectiveness of IT-related legislation in Sri

Lanka. Moreover, this research serves as a foundation for future studies in the field, encouraging further exploration of IT regulation and public awareness issues.

In conclusion, the proposed web-based platform for accessing information on IT-related laws in Sri Lanka represents a crucial and timely initiative. As the digital landscape continues to evolve rapidly, the need for readily accessible and up-to-date legal guidance in the field of information technology is more significant than ever before. The methodology outlined for the development of this platform ensures that it will effectively address this pressing need while also prioritizing security, user-friendliness, and ongoing improvement.

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Enhancing CNN Models with Data Augmentation for Accurate Fertilizer Deficiencies and Diseases Identification in Paddy Crops

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ABSTRACT

The current study focused on developing an algorithm for the detection of diseases and fertilizer deficiencies in paddy crops (i.e., good or bad paddy crops) using image detection. The dataset for this research was generated based on images obtained from the internet and real-life images of paddy fields obtained from several parts of Sri Lanka. Once data preprocessing was completed with the use of steps such as data augmentation, the CNN algorithm and TensorFlow framework in machine learning were used to make predictions on the dataset. The acquired dataset produced an average of 99% accuracy while training. This led to successful predictions through the trained model.

Keywords: Paddy, Crop disease and Fertilizer deficiency identification.

1. INTRODUCTION

Rice farming, also known as paddy cultivation, is essential to ensure food security and meet the dietary needs of millions of people worldwide. In Sri Lanka, paddy cultivation is crucial as rice is the primary food source for the entire population. Ensuring optimal paddy crop yields is not only an agricultural concern but also a socioeconomic necessity in countries like Sri Lanka, where agriculture is the foundation of the economy and provides employment for many people. However, diseases that can significantly reduce yields and have an impact on both the availability of food and the stability of the economy pose a constant threat to the productivity of paddy agriculture (De Silva et al., 2007; Ekanayake, 2009).

Traditionally, farmers have used labour-intensive techniques and subjective visual examinations to identify and address these issues. While these methods are informative, they are often time-consuming and prone to human error. Machine learning (ML) has revolutionized many industries, including agriculture (Alfred et al., 2021). It is now possible to

quickly identify trends related to crop nutritional deficits and diseases by analyzing vast amounts of data from paddy fields by utilizing the capabilities of ML algorithms (Kiruthika* et al., 2019).

The use of machine learning (ML) methods, particularly deep learning algorithms, has spurred a revolution in several disciplines in recent years (Kiruthika* et al., 2019). Deep learning, and more specifically Convolutional Neural Networks (CNNs), have demonstrated incredibly promising results in the interpretation of challenging agricultural data Deep learning, and more specifically Convolutional Neural Networks (CNNs), have demonstrated incredibly promising results in the interpretation of challenging agricultural data (Lu et al., 2017). CNNs, which were initially created for image analysis, have successfully been modified to understand visual data from paddy fields. The neural networks have a natural capacity to learn hierarchical patterns, which makes them especially well-suited for image recognition tasks like recognizing the visual signs of diseases and deficiency in nutrients on crops (Ahmed et al., 2019; Alfred et al., 2021; Lu et al., 2017).

The current study examines the possibilities to address Sri Lanka's common paddy crop conditions, diseases and fertiliser deficits with the expectation of ensuring efficient diagnosis towards swift responses through automating the identifying process using CNN's computing capability. This strategy has enormous potential, both in terms of accuracy and the potential to revolutionize the agricultural landscape by giving farmers data-driven insights that can help them make effective choices and produce greater yields of harvests.

2. RELATED WORK

The analysis of other published research reveals that many studies using various machine learning algorithms have been conducted to identify diseases and nutritional deficiencies in various plants. Moreover, it was observed that Supervised machine learning was frequently employed in past years.

An autonomous approach for oil palm plant diagnosis of diseases was suggested by Asraf et al., (2012). In this research the study has used support vector machines (SVM) with numerous kernels, such as linear kernels and polynomial kernels with soft and hard edges, to explore the detection of nutritional diseases, specifically phosphorus, nitrogen, and magnesium in Malaysian oil palm trees. In this study, the polynomial kernels with soft margins were able to classify objects correctly with an accuracy score of 95%.

Another study conducted by Xu et al., (2020) using Deep convolutional neural networks (DCNNs) on rice plants to identify fertilizer deficiencies using four DCNNs, Inception-v3, ResNet50, NasNet-Large, and DenseNet121, has revealed the accurateness of over 90%. Per their study, the highest accuracy scores of 98.62% on training and test accuracy of 97.44% were obtained for DenseNet121. However, they obtained the dataset using hydroponic experiments rather than from actual paddy fields. Yet this suggests that neural

networks provide promising results for classification.

Sethy et al., (2017) suggested using fuzzy C-Means clustering and K-Means clustering to extract features in their study. This is an SVM classifier used to identify mineral deficiency in rice crops. Their study further consisted of a technique for diagnosing mineral shortage in rice crops using these algorithms and obtained 85% and 92% accuracy, respectively for C- Means and K-Means. Future research was however using ANN and CNN, supervised machine learning due to their popularity in the field of image categorization.

In a study performed by Lu et al., (2017) using the deep convolutional neural networks (CNNs) technique on a dataset of 500 images of diseased and healthy rice leaves, an accuracy score of 95.48% was obtained. Although the dataset was significantly low creating a low variance of data, it is observed that this is a relatively higher accuracy score. Hence it could be argued that these simulation results for identifying rice diseases demonstrate the viability and efficiency of the suggested approach. A CNN is a kind of network architecture for deep learning algorithms and is specifically used for image recognition and tasks that involve the processing of pixel data (Guo et al., 2017). Therefore, this algorithm was decided to best suit the current study.

2.1 Background to Rice Crops

The main agricultural crop of Sri Lanka is Paddy or Rice. Moreover, it is the main source of food for the country's population and hence directly correlated with the economy of the country (Weerasekara et al., 2018). Paddy fields are a common sight in the country, and the agricultural methods have evolved since the prehistoric recorded documents of the country. The Kings in the past developed irrigational systems to facilitate the cultivation of this crop (Knox, 2019; Maddumabandara, 1985; Weerasekara et al., 2018).

Moreover, it is observed that Sri Lanka has many varieties of rice crops (Withanachchi & Mendis, 2017). Therefore, it is important to identify the characteristics of these crops to distinguish between the varieties of crops and the symptoms of crop disease and fertilizer deficiencies.

2.2 Common factors contributing to bad rice crops.

Many researchers argue on the causes of poor yield and diseases in paddy crops. The most significant factors causing the paddy fields to turn yellow appear to be:

Climate change and variations in the Rainfall (i.e. not getting rain in the proper season) (SEO et al., 2005)

The type of fertilizer (liquid fertilizer distributed by the government) (Perera, 2023)

Deficiencies in Nitrogen (N2) and potassium (K) in soil (Sunday Times, 2023)

Not cultivating during the seasons (Yala & Maha) - this also is understood to cause the paddy to be infected by bugs provided that the Yala and Maha seasons are designed opposing the lifecycle of the crop infectious bugs, hence if cultivated off-season the probability of bugs infecting the crops are

high (Knox, 2019; Maddumabandara, 1985; Perera, 2023; Weerasekara et al., 2018).

Given the increasing demand for rice and the global need to enhance yield, it becomes crucial to employ the assistance of technology. Machine learning algorithms have proven to be a valuable tool in automating similar projects. Past research indicates that the deep convolutional neural networks (CNNs) technique is particularly useful in such projects, as it provides a higher probability of accuracy due to its robust ability to classify image datasets. Since paddy crops are not grown in controlled environments and since these crops display specific features that suggest they require attention, an image dataset is the most suitable option to detect crops with diseases or fertilizer deficiencies. Farmers, with their cultivation experience, would understand the problem of the crop similarly the model will be smarter based on the richness of the dataset.

3.DATASET COLLECTION AND PREPROCESSING

Convolutional Neural Networks (CNN) are capable of using image data as direct input to generate data features without requiring pre-processing. These networks utilize image processing techniques to extract low-level features such as colour, texture, and shape, medium-level features like a histogram and visual vocabulary bag, as well as high-level features such as semantic information, SURF, and SIFT. However, when picture data is fed directly to the CNN network, there is no need to use external methods for feature extraction. Compared to standard machine learning methods, CNN networks require a substantial amount of data for training. Nevertheless, the training phase can be completed quickly by adjusting the network parameters across a pre-trained CNN network (Dönmez, 2022). A diverse and representative dataset must be gathered to train a model using convolutional neural networks (CNN) (Lu et al., 2017). As we discussed earlier, the performance of the CNN model is limited by the length of the dataset. However, it is possible to improve the performance of the model by enhancing it. Enhancing a Convolutional Neural Network (CNN) model involves improving its capabilities and performance. CNNs are a type of deep learning model that is commonly used for processing images and videos. There are several ways to improve CNN models to make them more efficient and successful in tackling specific problems. The following are some of the most common techniques and methods for improving CNN models:

i. Data augmentation: techniques such as rotation, flipping, scaling, and colour jittering to increase a model's ability to generalize and perform effectively on new data.

ii. Architecture Design: Adding extra layers to a CNN or employing advanced designs like ResNet, Inception, or VGG can improve a model's ability to learn complex information.

iii. Data Preprocessing: Proper data preprocessing, such as mean-centering and standardisation, can improve model performance (Han et al., 2018).

Considering these features of the CNN model was chosen and enhancement of the model was expected to be performed through data augmentation as it would also facilitate cumulative the dataset. In order to create a diverse dataset, images of paddy crops were collected from various parts of the country, including healthy plants, various stages of the plant life cycle and diseases, and various levels of fertilizer deficits as seen in Figure 1. These images were collected from real-life paddy fields and the final dataset has 770 such images. Moreover, images already available on the internet for crop disease identification were also used to enrich the dataset, this constituted 210 images in the dataset.

Once the Dataset of original images was identified and finalized, the images were categorized as Yellow/Bad Paddy and Good Paddy whilst labelling accordingly. Next, the data was augmented in various aspects such as rotating, flipping zooming to obtain a suitable dataset. During this stage, each image was replicated 10 times and a dataset of 970 images was used during this research. The dataset consisted of 460 images for Yellow/Bad Paddy and 540 images for Good Paddy. Upon completion of the data labelling and augmentation stages, the data is required to be pre-processed to feed into the CNN (Lu et al., 2017). Hence the images were resized, cropped to the centre, & normalized appropriately.
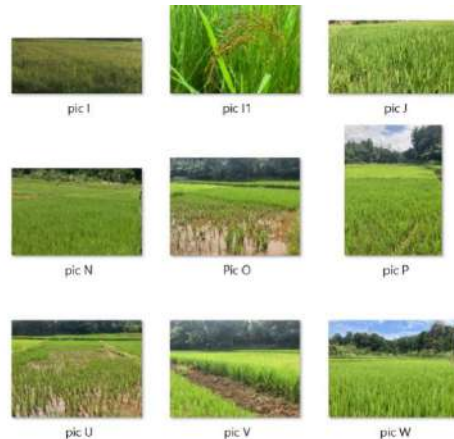

Figure 5. Images from the original Dataset

The data was next split into the training set and test set, using the common ratio of 80%-20% (Guo et al., 2017). However, there could be class imbalances where some scenarios such as a rare disease may have fewer samples. Whilst this is common for agricultural datasets, techniques such as under-sampling, oversampling, or generating synthetic data can help mitigate such problems (Kiruthika* et al., 2019).

Upon completion of these steps, the preprocessed data will be prepared to train the CNN model to identify diseases or fertilizer deficiencies in rice crops.

4. METHODOLOGY

A subclass of deep neural networks called CNNs has been developed expressly for processing images, which is a grid-like dataset. Due to the hierarchical architecture of images, CNNs are highly suited for the analysis of paddy crop photographs, which makes feature extraction from visual data very effective (Guo et al., 2017).
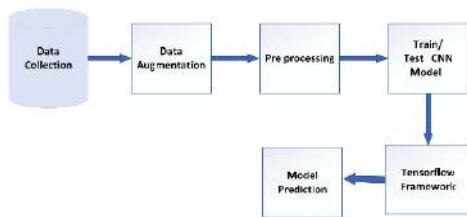
Figure 2. The framework of the system

As discussed, the current data set includes a diverse collection of images from various parts of the country, covering the lifecycle of rice plants. Also, the dataset consists of images with common diseases and known features of fertiliser deficiencies in the rice crops which were obtained from the internet.

The machine learning framework used for this project was TensorFlow. This is an open-source machine learning framework that is widely adopted among research communities and has the potential to ease the learning curve and troubleshooting process (Cynthia et al., 2019). TensorFlow presents a wide set of libraries & tools which are precisely aimed to accomplish deep learning tasks, that also involve image classification using CNNs. Both high-level and low-level APIs are available in TensorFlow, giving developers the freedom to alter any component of their models as desired. High-level APIs offered by TensorFlow include Keras. This is essential for customizing pre-existing architectures and testing out radical structural modifications (Cynthia et al., 2019; Ghosal & Sarkar, 2020).

Considering these factors TensorFlow mechanism was deemed suitable for the current research topic. Moreover, TensorFlow offers both high-level APIs, such as Keras, and low-level APIs. This is vital for modifying current architectures to suit specific research requirements or testing out novel architectural modifications. Deep learning projects, particularly those employing CNNs, can be extremely computationally demanding. TensorFlow supports a seamless interface with GPUs and TPUs (Tensor Processing Units) to expedite training and inference procedures. This could substantially speed up experimentation whilst reducing training times. TensorFlow Hub presents a source of pre-trained models and model components, supporting leverage transfer learning. This is specifically helpful for the current research; it could initiate pre-training of the CNN architecture and fine-tune it employing the specific dataset. This can lead to faster convergence and better performance.

TensorFlow allows for distributed training, making it ideal for expanding the study over larger datasets or more complicated models. The framework also includes tools for translating trained models into formats suited for deployment on a variety of platforms, such as mobile devices and web applications or even IOT devices (Ghosal & Sarkar, 2020; Rahman et al., 2020).

In the present study, initially, the testing and training data sets were selected. Initially, the images obtained were differentiated based on good/ healthy paddy and infected paddy which showed signs of fertilizer deficiency. Once the suitable images were selected based on these two categories, data augmentation was performed on the images. During data augmentation, the images were flipped, rotated, and zoomed. This enables us to explicitly identify the aspects covered on each image while also helping to enrich the dataset. Next, these images were preprocessed, such that all images were of the same size and cropped to the center.

Next, the images were split between test and training models. The training dataset was tasked with training the model and test dataset. The TensorFlow framework was used in the study due to the features t provided for image processing data sets.

5. ACCURACY AND MODEL PREDICTIONS

Upon completion of splitting the data and training the algorithm, the testing dataset was used to generate the accuracy of the model. During testing, the model returned an average of 99% accuracy. The final training accuracies are depicted in Figure 3.

Provided that CNN models require large datasets, it was required to constantly increase the dataset to obtain suitable accuracy scores. Smaller datasets cause overfitting during model testing. Once the data preprocessing and training stages were completed and a reliable accuracy score was generated, predictions were performed.

A new dataset was used to generate predictions from the trained model. The model then predicted the images in the new dataset as a good or bad crop. It was evident that the predictions were reliant on the trained dataset as certain leaves with pests in the prediction dataset were not identified as the trained dataset did not have similar
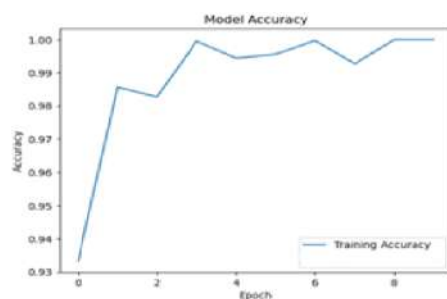
features.

Figure 3. Model Accuracy

6. DISCUSSION AND CONCLUSION

In this study, researchers aimed to identify unhealthy paddy crops that suffered from fertilizer deficiencies and diseases. They developed a model that accurately distinguishes between healthy and unhealthy crops, achieving a 99% accuracy score. However, to identify the specific type of disease or fertilizer that causes crop damage, the model will require a larger and more diverse dataset of unhealthy plants.

Despite these limitations, the researchers successfully developed a well-trained model with a high accuracy score within the constraints of freely accessible resources and timeframe. With additional datasets, the model could be enhanced by introducing more layers for accurate prediction of the reasons behind unhealthy crops.

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