NSBM GREEN UNIVERSITY TOWN

ICOBI 2019

INTERNATIONAL CONFERENCE ON BUSINESS INNOVATION

REVIVING TALENT & GREEN LIVING

PROCEEDINGS

2ND INTERNATIONAL CONFERENCE ON BUSINESS INNOVATION

NOVEMBER 22, 2019

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Organized by

NSBM Green University Town
Colombo, Sri Lanka
November 22, 2019

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The views expressed in the papers published in these proceedings are those of the authors. The statement and opinions stated either in the papers published herein or at the conference and discussions does not necessarily represent the views of the NSBM Green University Town of Sri Lanka. All papers are formatted using IEEE Manuscript Template.

CONFERENCE AGENDA

08.00 am - 09.00 am	Morning Tea and Registration
09.00 am - 09.05 am	Lighting of the Traditional Oil Lamp
09.05 am - 09.10 am	Welcome Speech by **Prof. Chaminda Rathnayaka** *Deputy Vice Chancellor, NSBM Green University Town*
09.10 am - 09.15 am	Objective Statement of ICOBI by **Prof. J. Baratha Dodankotuwa** *Head, Academic Development & Quality Assurance*
09.15 am - 09.20 am	Introduction of Keynote Speaker by **Dr. Rasika Ranaweera** *Conference Chair, ICOBI 2019*
09.20 am - 10.05 am	Keynote Address by **Mr. Simon Tham** (MSc, MCR) *Assistant General Manager, CHEC Port City Colombo*
10.05 am - 10.35 am	*Presentation 01:* The Effect of Serious Games on Entrepreneurial Intent *Dr. Jonathan Lean, Dr. Jonathan Moizer and Dr. Robert Newbery* *University of Plymouth and Newcastle University, UK*
10.35 am - 11.00 am	*Presentation 02:* Green Living: Trends and Transformations *Dr. Upuli Perera, Senior Lecturer* *University of Sri Jayewardenepura*
11.00 am - 11.15 am	Official Photograph
11.15 am - 11.45 am	Poster Presentation Session
11.45 am - 13.00 pm	Lunch
13.00 pm Onwards	Parallel Sessions

PREFACE

NSBM Green University Town is honored to present the International Conference on Business Innovation (ICOBI) on 22nd November 2019 for the second consecutive year. NSBM Green University Town, which turned a new page in the Sri Lankan Higher Education being the first of its kind in South Asia, successfully held the first International Conference on Business Innovation (ICOBI) last year attracting a wide recognition. With ICOBI 2019, NSBM takes a giant leap in the academic arena creating a platform to bring together both local and foreign researches. The theme of the second International Conference, Reviving Talent and Green Living has been the objective for many academics, researchers, and strategists over the past decades. NSBM has set examples on green living by readjusting the interface of higher education institutes in the whole of South Asia, thus this lush green campus open its premises to ICOBI 2019 to build discourses on several disciplines with the primary focus on how to develop global green living through reviving talents.

It is our privilege to acknowledge the guidance and unwavering support extended by Prof. E. A. Weerasinghe, the Vice Chancellor of NSBM Green University Town, being the visionary leadership behind the success of this conference and Deputy Vice Chancellor, Prof. Chaminda Rathnayaka, for his support and guidance throughout the process. We also express our most sincere thanks to the keynote speaker of ICOBI 2019, Mr. Simon Tham, Assistant General Manager of CHEC Port City, Colombo. We are grateful for the expert input and constant guidance of Prof. J. Baratha Dodankotuwa, the Head Academic Development and Quality Assurance, without whom the conference would not have been a success.

We would like to extend our gratitude to all the local and international presenters and participants for their fine contribution towards the success of this conference. We are grateful for all the reviewers who helped us to maintain the high quality of manuscripts to compile the conference proceedings. ICOBI 2019 creates a platform for valuable academic traditions and intellectual discourses that will enhance the quality of higher education and will contribute to the development of the world tomorrow. We wish all the attendees a productive and wonderful time at the conference at NSBM Green University Town, Sri Lanka. With your support and participation, the conference will continue its success with a new chapter next year. Until then, we hope your experience with ICOBI 2019 is a fruitful and long lasting one.

The Conference Organizing Committee
ICOBI 2019
November 22, 2019

MESSAGE FROM VICE CHANCELLOR

It is with immense pleasure that I convey my heartiest congratulations to the second International Conference on Business Innovation (ICOBI) 2019, at NSBM Green University Town, which has already acclaimed a historical milestone in our annual calendar after successfully concluding ICOBI 2018 last year.

The main objective of ICOBI is to address the needs and demands of the country in fostering academic research and developments. Through this second International Conference, it is envisaged to share and disseminate information relevant to research and development, treasured experiences encompassing important areas in Green living and Reviving Talent.

In the midst of rapid technological development we have now come to an era where sustainable living has become a life style that needs to be applied to every part of human life. In this context, businesses are actually living systems which are intimately entwined with the various living systems of the society. I believe ICOBI 2019 with the theme of *Reviving Talent and Green Living* will be of topical interest to academia, paving the way to a productive discourse.

I congratulate the organizing committee for attracting a wide range of papers from experts in their fields and wish all the presenters and delegates a most informative and enjoyable conference.

Thank You

Prof. E. A. Weerasinghe

MESSAGE FROM DEPUTY VICE CHANCELLOR

It is with great pleasure that I extend a warm welcome to ICOBI 2019, the second International Conference on Business Innovation at NSBM Green University Town. It is inevitable that the international conference provides a platform to bring together academics, researchers and postgraduate students. With this platform ICOBI 2019, will embark on a whole new process of making new discoveries and contributing to the existing discourse on *Reviving Talent and Green Living*.

NSBM Green University Town, as a pioneer in providing quality education, prepares graduates to meet the challenges of the future industries. New knowledge and discoveries cannot be generated without any research and development activities. Therefore ICOBI 2019 operates as a generator of new knowledge to extend the research outcomes from experiments to practice bringing about a tremendous impact on the future development of the country.

Whilst congratulating all the presenters, I look forward to an exciting day of insightful presentations, intense dialogue and fostering of collegial relationships. Most of all, I thank you, the participants, for enriching our annual conferences by your presence.

Thank You.

Prof. Chaminda Rathnayaka

MESSAGE FROM THE HEAD OF ACADEMIC DEVLOPMENT AND QUALITY ASSUARANCE

It is with utmost pleasure and pride I welcome all to the International Conference on Business Innovation (ICOBI) at NSBM Green University Town. Last year we witnessed a successful completion of ICOBI 2018 leaving behind a discourse worth continuing for the future prospects. I sincerely hope ICOBI 2019 will have a bigger impact as it creates a platform for academics, and researches alike.

We, here at NSBM, believe research and development forms the backbone of our curriculum. The staff and students are engaged in various path-breaking innovative research activities all throughout the year gaining new knowledge in various disciplines and contributing to the existing knowledge. ICOBI is the pinnacle of these attempts which brings researchers both local and foreign together to create discourses on vital contemporary subjects that require attention.

The 21st century confronts humanity with big challenges. These include climate change, secure energy supply and the question of how to ensure a fair distribution of resources. NSBM as South Asia's first Green University Town, as a frontrunner in sustainable development and green living, is assuming the task and the obligation to create a future worth living both for us and for future generations. With this mission in mind, ICOBI 2019 is organized with the theme of *Reviving Talent and Green Living*, hoping to bring the attention of both local and International participants an imperative discourse in the contemporary society.

I congratulate the organizing committee for their hard work in making this event a success. Whilst congratulating all the participants I wish them a very fruitful and rewarding conference.

Thank You.

Prof. J. Baratha Dodankotuwa

MESSAGE FROM THE CONFERENCE CHAIR

On behalf of the ICOBI 2019 organizing committee, I am honored and delighted to welcome you to the 2nd International Conference on Business Innovation (ICOBI) 2019, at NSBM Green University Town. Last year we successfully held ICOBI 2018 with the valuable participation of many academics and researchers, leaving behind discourses on various subjects to enrich the academia and society as a whole. With a record number of participants expected this year, we are delighted to see that ICOBI is becoming larger and more substantial every year. I am equally excited about the record number of sessions, and wide variety of ideas that scholars and practitioners will bring into our fold.

We are living in such exciting times and the communities we serve continue to grow at an unprecedented pace in order to keep up with the global development. With that growth come associated challenges, keeping that in mind ICOBI 2019 has been structured to address those challenges head-on. The theme of the conference, *Reviving Talent and Green Living*, was created to leverage this amazing gathering of professionals, academics and researches to address timely issues of the world we live in. Being South Asia's first Green University Town, NSBM has set examples on sustainable development and green living. We, at NSBM, believe that those two factors are crucial in developing a society where our future generations can live in under better conditions.

I hope ICOBI 2019 will provide participants with a productive discourse, a platform to share and discuss various viewpoints, in the knowledge that all ideas are welcome and important if we are to identify and promote solutions to the economic and social challenges of our society. On behalf of all the members of the Conference Organizing Committee, I extend our deepest thanks to all those who have contributed to making ICOBI 2019 another rousing success: speakers, presenters, session chairs and you, our participants. I sincerely hope you enjoy and benefit from your time with us.

Thank You.

Dr. Rasika Ranaweera

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Prof. J. Baratha Dodankotuwa	Head, Academic Development and Quality Assurance

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CONTENTS

Factors Associated with the Satisfaction of Chartered Accountancy Students in Sri Lanka

Anne Pathiranage

Faculty of Business

National School of Business Management

Homagama, Sri Lanka

anne.k@nsbm.lk

Nisha Palagolla

Australian College of Business and Technology

Colombo 5, Sri Lanka

Nisha.Palagolla@acbt.lk

Abstract—**The main objective of this study is to identify the factors that significantly associated with the satisfaction of the Chartered Accountancy students in Sri Lanka. This scenario has been tested with a sample of 380 randomly selected Chartered Accountancy students from two main institutes located in Colombo. Significant associations were identified by using Pearson Chi-Square and validated by Spearman Rank Correlation analyses. Results reveal significant associations among the academic role, staff quality, examination, marking and feedback, course management, industry and job market implications, and personal attributes towards Chartered Accountancy students' satisfaction on their program. The findings of the study provide valuable insights on the policy prospects of the institute as well as the factors that must be considered on satisfying the students for the future development of the institute.**

Keywords— *Chartered* *Accountancy* *students,* *Accounting Education, Students satisfaction, Sri Lanka*

INTRODUCTION

Satisfaction is a common concept, which is used on every aspect in everywhere in the world, but different perspectives have been used to define this wide concept, where it acts differently on different disciplines and it emphasizes the attachment of the concept of satisfaction with the emotions of the people engaged [1]. In recent research, the attention towards the student satisfaction has increased, in line with the increasing competitiveness in the field of education and the concept of satisfaction is being applied, towards the verification of student's satisfaction. According to the arguments of [2], the education around the world has become so competitive, dynamic and challenging in both private as well as public sector. Through the development of the professional bodies, the responsibilities of the knowledge dissemination have been delegated to the professional bodies and the concentration given on the universities has been diverted towards the professional bodies. This has given the rise to the split between the professional qualification and academic qualification [3]. In the year 1959, the Institute of Chartered Accountants has been established, aaccording to [4], the entire accounting profession in Sri Lanka governed by Chartered Accountants in Sri Lanka, a huge demand has been created on gaining the qualification. As satisfaction plays a major role in the process of attracting students, it is a challenging task to verify how students be satisfied and what factors influence them to be satisfied. In line to the satisfaction of the students, this research is mainly focusing on driving factors with significant association with the satisfaction of Chartered Accountancy students in Sri Lanka. In line to the problem of the research the main research objective is to identify the variables that significantly associated with the students' satisfaction.

LITERATURE REVIEW

Satisaction and its background

According to [5], student satisfaction is defined based on the contentment towards the course they follow, and retention and the loyalty is identified, with the continuation until the graduation from the beginning point of the course. In the process of the education, student as the customer, target at a certain qualification. In line with the global enhancements taken place in the education system, the concentration on the education and its outcomes are increasing. Therefore, the education environment has been identified as a most dynamic as well as a competitive context [2]. It is noted the rapid

change taken place in the education mainly due to the globalization, sudden boom in information technology and the growing need for the knowledge [6]. These changes have altered the simple proceedings in the higher education, where it shows the interactions taken place between the higher educational aspects and the sociological and the psychological understanding [7].

Background of students satisfaction

Student satisfaction is considered as a short-term result and a reaction shown by the student with respect to the education service that they get. It is highlighted that, this result is released by the students based on the experience they obtain throughout the educational journey [8]. Therefore, the experience they get through learning should be positive and favorable and it is a critical to identify the factors influence the student satisfaction, whereby the institutes can invest more resources on upgrading those for better student satisfaction [9]. National Student Survey (NSS) is a popular United Kingdom (UK) based survey instrument launched in year 2005, to assess the student satisfaction in higher education. They have measured the student satisfaction under 21 different dimensions, which will review in this study as well. As the perceived performance and the expectations are related to the satisfaction, the research in the process of fulfilling the gap of utilizing the variable that shape the student's expectations and perceived performances.

Factors influencce students satisfaction

TABLE I. DEFINING RESEARCH VARIABLES

Variable	Definition
Academic Role (AR)	Functions that students are expecting from the academics to perform, such as academic advising, academic care, academic support and student interaction and monitoring [10]–[12]
Staff Quality (SQ)	Teaching method used, the teaching and delivering skill of the academics and research extent of the academics, new knowledge creation inline to the academic and the professional qualification of the academics [9], [13].
Assessments and Feedbacks (EMF)	Variety of tools and methods used to evaluate the outcome, academic completeness, progress, acquisition of skills and the actual needs of students in terms of knowledge. Parallel the assessed program of the student

Variable	Definition
	communication is defined under the feedback [14].
Facilities and Learning Resources (FLR)	The space, atmosphere, the building and its outlook also considered under the facilities. Further in education the class hall, the seating capacities, technology such as internet access, clear view, less disturbance, well equipped library, administrative staff support can be considered as facilities. [15], [16].
Course Management (CM)	Course planning and scheduling, accreditations, resourcing, developing, distributing and monitoring the material updates, linking the course with the industry and practical aspects, student coordination for nonacademic type of reasons, communication of timely important information, bridging the academics and the students, quality assurance are defined as course management [2], [17].
Industry behavior (IJ)	The extent to which the education qualification support to be stabilize in the career and in the profession, through considerable job opportunities and benefits for the profession [18].
Institutional Policies (PO)	Set standard rules, strategies and the procedures of an institute related to all the functions [19].
Personal attributes (PA)	Different set of personal accomplishments, desires, thinking's and behaviors can be identified as personal attitudes [20].

METHODOLOGY

The main focus of this research is to identify different weightings assigned by students on different factors that they expect in being satisfied, which needs considerable comparisons. Survey is a strategy which enables the researcher to compare data in a quantitative nature [21]. Further the survey strategy will successfully support on verifying the relationships between the factors and the student's satisfaction, which is the main objective of the research to identify the mostly influential factor of CA student's satisfaction. The main method of data collection of this research is the distribution of structured questionnaire. The research is based on the students who are registered as a student of Chartered Accountants Institute, as at 31st December 2015 and the number is exactly 44,611 [22] and 380 CA students we selected as the sample, based on a mix of simple random sampling technique and convenience sampling. the response rate of these students is 98.68%.

The cross tabulations were derived, and the Pearson's Chi-Square test performed to

understand the significant association among the identified independent variables and the satisfaction [23]. Applying only one technique does not exactly confirm the validity of the results of the study and by taking this aspect into consideration, the Spearman's rank correlation has been calculated, as the data are ordinal, Likert scale.
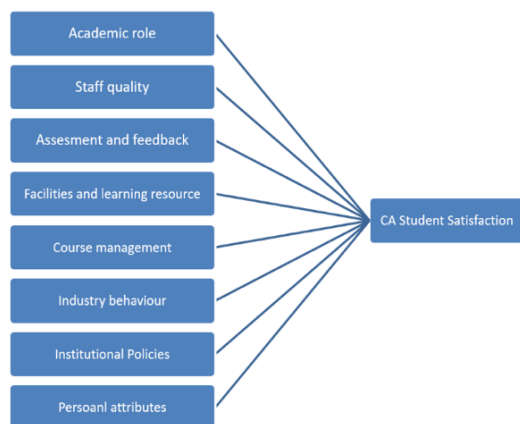
Fig. 1.   Conceptual Framework

Based on the common null hypothesis the alternative hypotheses are,

H1: There is a significant association between the academic role and student's satisfaction.

Range of functions that students are expecting from the academics to perform, such as academic advising, academic care and academic support are lined up as the roles of the academic expect the main function of teaching [10]. When the interactions with the academics are increasing, the relationship will become stronger, where the academic will become a character of influencer for the student. Therefore, the students tend to believe on the character of the academic.

H2: There is a significant association between the staff quality and student's satisfaction

Staff or the academics quality is measured in terms of educational outcomes such as qualifications of the academics, faculty publications and deployment of the faculty. When defining the academic quality, knowledge level, academic qualification and professional qualification also taken in to consideration.

H3: There is a significant association between the assessment and feedback and student's satisfaction

A high gap exist between what taught and what tested, the student can be pressurized and frustrated. Therefore, to be fair, the learning outcome should be properly communicated to the student, which will be helpful for the students to make prepare themselves for the course.

H4: There is a significant association between the facilities and learning resources and student's satisfaction

The facilities can be explained and define with many ideas, the space, atmosphere, the building and its outlook also considered under the facilities. Further in education the class hall, the seating capacities, the technology, clear view, less disturbance can be considered as facilities.

H5: There is a significant association between the course management and student's satisfaction

Managing the course includes range of activities such as course planning and scheduling, accreditations, resourcing, developing, distributing and monitoring the material updates, linking the course with the industry and practical aspects, student coordination for nonacademic type of reasons, communication of timely important information, bridging the academics and the students.

H6: There is a significant association between the industry implications and student's satisfaction

Industry placement is considered as an emerging fact in student satisfaction and in common the ultimate intention of education is to stabilize in a profession and develop a strong career life. Industry behavior basically identified as the extent to which the education qualification support to be stabilize in the career and in the profession.

H7: There is a significant association between the policies and student's satisfaction

Certain educational institutes are developed with their own set of concerns, values and objectives and moreover these educational institute values and the functions are in the focus of catering the demand generated by the environment. Basically, the policies of an institutes represent structural decisions set by the institute, which are used to govern and control the functionalities. In order to be successful in the policy development, a collaborative concern should be paid on all the stakeholder, specifically on the student and it will help to make the policies unbiased and fair to all the parties.

H8: There is a significant association between the personal attributes and student's satisfaction

Different set of personal accomplishments, desires, thinking's and behaviors can be identified as personal attitudes. The personal attributed could differentiate one thing from the other. The difference is mainly occurring due to the inherent difference exist within in different students.

RESULTS AND DISCUSSION

Both the techniques, Pearson Chi-Square and Spearman's rank correlation emphasize that academic role is significantly associated in influencing the student satisfaction, but specifically in the Spearman rank correlation, the variable of AR does not show a strong association to the satisfaction, which 0.287 a weak association. It is highlighted the academic character as a core element in determining the student satisfaction, which is defined basically in terms of interaction and the guidance towards the students [9], [24], [25], but in the context of the CA Sri Lanka student groups though academic role has a significant association to the satisfaction, it has not been highlighted as a very strong or a core element in determining the satisfaction. Staff quality is the second independent variable that basically explain the profile of the facilitators engaged in disseminating the required KSA. this variable also shows a significant association to the student's satisfaction under the both techniques. SQ also does not shows a strong relationship with the satisfaction, where the correlation is only 0.153, which very weakly related under the calculations of Spearman's rank correlation. Further, there is a possibility that the same argument grounded in the academic role is engage with this circumstance. CA does not concentrate more on conducting mass classes for the subjects aligned in the qualification, but there is a huge competition among other external educational institutes in attracting students for their classes in the process of obtaining CA. Most of the research findings two common factors highlighted in determining student satisfaction are the academic role and the quality of the staff [26], [27], which are similarly highlight in determining the CA student satisfaction as well, by providing more evidence on that argument, a significant relationship has been identified between the academic role and staff quality towards determining the student satisfaction, but variables of academic role and staff quality have not identified as a strong element in determining

the satisfaction as in the academic context [25]–[27]. Examination, marking and feedback is another significant factor towards the behavior of student's satisfaction, which is validated by bother statistical tools used in the previous sections. However, this also holds a weak relationship to the CA student satisfaction, which has been confirmed in the academic context through the studies of [28], which is continuously tested in the NSS as well. Though this has a significant association, the association does not demonstrate a very strong attachment in determining the satisfaction. Fourth variable, facilities and learning resources does not demonstrate a significant impact on the satisfaction under the two methods, which has been considered as a determinant of satisfaction [15], [16], but within the CA qualification it is not significant, as student's less engagement with the CA institute itself in terms of learning aspects.

In the academic environment most of the time student spend lot more time in the institutes, which they need to be mingled in an attractive, spacious, supportive, comfortable and equipped atmosphere, but as the qualification is part time basis, students more engagement with external parties and CA's main intention of managing the profession has not made FLR significant in CA context. The variable course management extensively discussed about the timely revisions, upgrades and proper maintenance of the course, which has the highest significant attachment out of all the significant six variables pointed in the analysis and this has been further proved by both the statistical techniques. Accounting is a profession that has high level of emerging competition in the global spectrum and through this statement they further confirm the need of the counting courses to be par with these industry requirements, which is mainly aligns under the concept of course management [17]. Therefore, the moderate significant relationship exist among the student satisfaction can be considered as the variable demanded most by the CA students, which satisfies them more. It is pointed that the ability of university education in mitigating the competency gap, which mainly arise in the industry and that finding highlighted the utilization of academic qualifications [29]. Drawing this concept into the professional accounting context, analysis elaborates that the proper planning and management of the course ability in upgrading the content, which is par with the requirements of the industry [17]. Furthermore, the updated knowledge and

firsthand experience in the professional context is treated as one of the core elements in the accounting profession, which is enables by course management, which prepare a well-armed balanced professional personality for the industry that assure a better job placement [30]. Knowing this fact leads to rely more on course management with respect to the success in the professional career. Another significant variable in determining the student satisfaction is the industry and job market implications. Destination of any qualification is the better job placement [31]. Accounting is considered as one of the recognized and demanded profession in the world, which provides a strong stimulation to accounting students be positive about their future endeavors [17], but the contradictor view is the weak strength that both the variables holds, which does not match with some findings [31], [32] emphasize the uniformity taken place in the accounting profession, which encourage international placements as well, the results derived under the CA Sri Lankan context, IJ is considered as a significant component in determining satisfaction, but not in a greater extent.

CONCLUSION

Satisfaction is a vague concept [1], and student's satisfaction is mainly relying upon the ultimate contentment that they receive from the course that they follow. The main objective of this study is to investigate the factors that significantly influence the satisfaction of the Chartered Accountancy students in Sri Lanka. CA is one of the leaders in professional accounting education in Sri Lanka. According to the Pearson Chi-Square test, validated by the Spearman Rank Correlation, it is highlighted six variables are significantly associated with CA student satisfaction namely the academic role, staff quality, examination, marking and feedback, course management, industry and job market implications and personal attributes of the students. The reviews of the CA Annual Reports highlighted that main concern of the Institute is to manage their members than the students. Students are more attached to external institute for the learning purposes, where Institute's control over the students are activated through certain actions such as registrations, renewals, examination management and evaluations, study pack management etc. These evidences support the possibility of having a weak relationship between the academic role and satisfaction and staff quality and satisfaction. This less frequent attachment of the CA students to the institute in terms of knowledge sharing, made the facilities and learning resources requirement of the student's insignificance in determining the satisfaction, as student very rarely visit institute and gather in the institute for the purpose of study, which has supported by the findings of the studies. Since in early stages, CA Sri Lanka has operated in a highly rigid environment, which was not in a favorable environment to students and the recent statistics of CA Sri Lanka is in a trend of decreasing student base and their student member conversion is seems to be very low [19]. Therefore, a question arises in front of this aspect, whether students are satisfied with the service that they get from CA Sri Lanka, which will be tested under different dimensions in the study. Therefore, the findings can be utilized to identify the factors associated with the student's satisfaction to maintain the reputation of the profession as well as the institution research will exactly be a strong informational source to the institute, in terms of marketing, strategic management and product development, where these findings can be subjected to the changes in their policy making in the competitive field of education in Sri Lanka. Apart from the macro level of benefits, the research has a significant impact on the CA students in Sri Lanka, which provide an insightful understanding about the satisfaction that they obtain through the CA qualification. The discrepancies exist among the professional and the academic education in the education system, will seriously restrict the application of the findings on the assessment and upgrading the satisfaction of the main group called students, because the study is conducted mainly related to the higher education, under the group of professional education. Therefore, restrictions will arise in generalizing the findings of the study among the main group of students, as different students in different educations structures are satisfied with different set of stimulates.

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Fostering Mental Wellbeing among Undergraduates: Posssible Avenues

G.P.K.Perera
Faculty of Business
National School of Business Management
Homagama, Sri Lanka
prasanna.p@nsbm.lk

M.K.Weerasekara
Faculty of Computing
National School of Business Management
Homagama, Sri Lanka
manoja@nsbm.lk

Abstract— **Psychological distress and mental disorders have become a major health hazard among university students. There is strong evidence indicating that undergraduates are at a very high-risk phenomenon, and this will continue to grow across student populations around the globe. Thus, the current study focuses on analysing an existing counselling process within a university context to identify the focus and efficacy of the process. Data were extracted using counselling reports published under the university's Health and Wellbeing Unit from 2017 January to 2018 December. Results indicate that 881 counselling sessions have been conducted focusing on various psychological and non-psychological issues. In all the cases, the traditional one-to-one counselling approach was used to elicit the required information from the client. It was evident that 'personal issues' are the most significant contributor to psychological issues amongst undergraduates. They have also received counselling service related to academic matters. However, findings emphasise that only few percentages of undergraduates seek for counsellors' support while larger cohort who needs attention remain unobserved. The records elaborated that undergraduates are not willing to open up and share their thoughts. Thus, the current study focuses on identifying various novel avenues to better serve the population.**

Keywords- Undergraduates, mental wellbeing, psychological counselling, mental health promotion, ICT

I. INTRODUCTION

Transition to university life from school life is a critical turning point in one's life. The new environment and new experience will create a stressful situation for every fresh undergraduate. To mitigate the negative impact of such stressful conditions, every university offers a range of wellbeing services in form of academic assistance, financial support, counselling, and health services. Despite the facility and resource availability it has been known that only a minority of undergraduates who experience psychological distress seek professional advice within the university[1], [2]. This global situation reflects the target institution as well. University students experience tremendous stress from personal issues, academic pressure, career emphasis and social problems during their university period. University counselling is meant to provide linear paths for students to address their problems.

Further, counselling services aim at assisting and supporting students that experience psycho-sociological problems especially as they transit into university life and during the university period. Such issues can potentially disrupt their academic, inter-personal and campus-life adjustments [3]. Thus, the purpose of counselling services in the educational institutions is to offer psychological support to students [3]. However, some students are reluctant to seek help from counsellors though they are undergoing severe psycho-sociological problems. Thus, this study aimed to identify what services undergraduates seek from a counselling center and how a university could remodel the traditional counselling process to serve their students effectively.

II. LITRATURE REVIEW

Counselling, Mental Health and Wellbeing service

There is a strong relationship between Counselling, Mental Health and Wellbeing service. During the time students are being studied at the university they might feel overwhelmed, stressed and experience problems in their personal life, or studies which will have negative impact on their

mental health [4]. The wellbeing service centers within the university could provide counselling sessions and could help students overcome their difficulties. Wellbeing centers offer a confidential, professional service, ensuring that students receive personal support, recognizing people as individuals, all with different needs[4].

Wellbeing Advisors and Wellbeing Centre

Wellbeing advisors provide guidance on issues relating to student wellbeing, and our advisors offer support and advice to all students[5]. The advisors provide assessments, follow-up appointments, signposting, and can act as a liaison with both internal and external teams to help support students in their studies. Wellbeing Centre offers a confidential, professional service, ensuring that you receive personal support. It recognizes people as individuals, all with different needs. This support service is extensive, and it can provide advice in many areas including alcohol and drug use, addictive behaviors, safety concerns, bereavement, stalking and harassment, forced marriage, physical health needs/injuries, victims of crime, and domestic violence as well as any incidents caused mental disturbances [4] [5].

Psychological Counselling

Psychological counselling is a one of mental therapeutic methods. As defined by the British association for counselling and psychotherapy (BACP) counselling and psychotherapy are umbrella terms that cover a range of talking therapies[6]. They are delivered by trained practitioners who work with people over a short or long term to help them bring about effective change or enhance their well-being. In the counselling sessions the client can explore various aspects of their life and feelings, talking about them freely and openly in a way that is rarely possible with friends or family members. The counsellor will encourage the expression of feelings and as a result of their training will be able to accept and reflect the client's problems without becoming burdened by them [6].

Wellbeing Centers at the University:Importance

A healthy university is defined as one that: 'aspires to create a learning environment and organizational culture that enhances the health, wellbeing and sustainability of its community and enables people to achieve their full potential'[7]. Given that a substantial proportion of students will experience mental health difficulties during their time at university, through a well-established wellbeing services within the universities could ensure 'health-promoting' environments within the university.

BACKGROUND

The wellbeing center at the case university started in 2017. At the time of initiation center was named as "counselling center" and then renamed to "wellbeing center" to attract a larger audience and to avoid stigma and fear related to term "counselling". The unit provides professional services to students and consultation/education to the NSBM community to address students' personal, academic, and social issues. Wellbeing center offers its services in an atmosphere that welcomes diversity in culture, sexual orientation, religion, and other factors of difference. At the wellbeing center mainly covers four critical areas: Therapeutic services, outreach, training, and support to the administration. A variety of services, individual, group, couples counselling & in-person consultations are provided to assist clients in understanding and addressing their concerns. Apart from individual counselling sessions center also offers group counselling service to its clients. This group process allows to gain support and knowledge from peers while giving the opportunity to learn and practice skills for self and interpersonal interactions.

METHODOLOGY

This study relied upon the data collected from the university wellbeing center participants from 2017 to 2019. Data set contains client profiles (student, academic staff, non-academic staff, other), and type of counselling services received through the wellbeing center. Collected data were analysed using descriptive analysis techniques using Excel. The authors assure the anonymity and confidentiality of the responses.

Research Question and Research Objectives

The main objective of this study is to examine the current status of the existing wellbeing center process and to recommend new strategies to promote mental health and wellbeing within the University.

RESULTS

This section describes the result of the descriptive analysis process. The analysis represents psychological and non-psychological issues identified among students based on their gender and stream of study. Further, review will also report the proportion users accessing counselling from 2018-2019.

Issues addressed and Core Needs Identified

The core needs and issues identified in cases are covered in the six main categorizations as shown below.
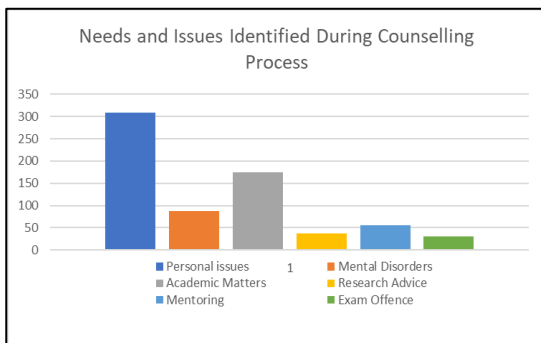
Figure 1: Needs and Issues Identified During the Counselling Process

As per results majority of cases (44%) false under personal issues category. Then 25% of cases were related to academic matters and 12% were categorized under mental disorders.

Types of Personla Issues and Mentol Disorders catered

Below table shows the types of personal issues and mental disorders identified during the counselling sessions.

TABLE I: TYPES OF PERSONAL AND MENTAL ISSUES IDENTIFIED DURING THE COUNSELLING SESSIONS

Type of Personal issue	Mental Disorders
Drugs use	Stress
Love Affair related problems	Obsessive Compulsive Disorders
High temper	Simple Depression
Conflicts with parents	Exam Phobia
Inter-relational problems	Addiction to E-media
Difficulty to concentrate	Suicidal Ideation
Learning New Subjects	Psychotic Disorder
Environmental Difficulty	
Problem with teachers	
Sexual Harassment	
Homo-Sexual issues	

Service Distribution

Following figure shows the service distribution based on the gender and faculty. It was noted that out of the cases identified majority of them are female students. Looking at the faculty wise distribution larger portion falls into the faculty of business but this may be because the faculty of Business holds larger student base than in other two faculties.
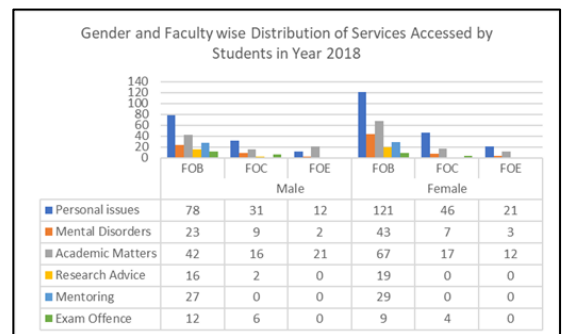
Figure 2: Gender and Faculty wise Distribution of Counselling Services

Year wise Service Distribution

Based on the collected data it was evident that there's a difference between the cases handled in year 2018 (695) and year 2019 (324). However, in both the years majority of the counselling cases were fall under personal issues categories and more female students received the service than the male students.

	2018		2019*	
	Male	Female	Male	Female
Personal issues	121	188	62	117
Mental Disorders	34	53	18	12
Academic Matters	79	96	24	23
Research Advice	18	19	13	13
Mentoring	27	29	11	8
Exam Offence	18	13	16	7

Figure 3: Year and Gender wise Distribution of Service Users
January- September 2019 only

Proportion of service users by Faculty
Following table and diagram represents the faculty wise distribution of counselling service receivers in year 2018 and 2019. It's worthwhile to notice that on average only a minority of them receive services from the wellbeing unit.

TABLE II: SERVICE USERS AS A PROPORTION OF TOTAL STUDNET POPULATION

	Faculty of Business (FOB)	Faculty of Computing (FOC)	Faculty of Engineering (FOE)
2018	12%	5%	29%
2019	4%	3%	6%
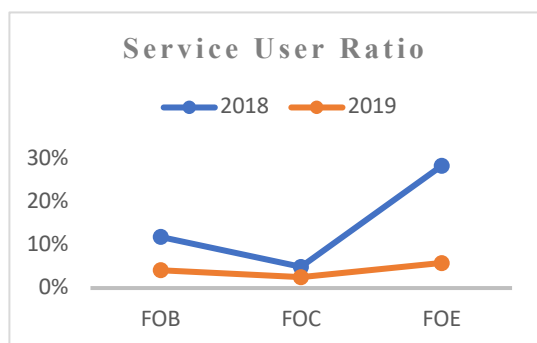
Figure 4: Service User Ratio Based on the Faculty

DISCUSSION

There is a strong and expanding evidence base indicating that university students are a 'very high risk population' for psychological distress and mental disorders, and that the prevalence and severity of mental health difficulties is growing across student populations[7]. According to research evidence substantial proportion of students will experience mental health difficulties during their time at university and it's worthwhile to understand how universities can ensure they provide effective solutions for them[8]. Though the problem is severe and growing phenomenon literature shows that only minority of students within the university seeks professional support[9] [1] [2]. Current study findings also revealed similar situation. Though there's a well-established wellbeing center facility available at the target institution less than 10% of the student population received services. Therefore, it's essential to understand what the actions university can take to promote wellbeing services among students.

Based on the study findings following framework is proposed to promote wellbeing within the university. The framework comprise of components extracts from the existing practices as well as proposed new avenues.

Framework components:
Embed wellbeing into the university curriculum

Within the current context wellbeing center reach student through a variety of presentations and tabling events. Besides introductory sessions many workshops are conducted in the areas of alcohol/drugs concerns, stress management, academic development, relationship handling, etc. Going beyond the existing practices new framework suggests including a mental wellbeing promoting module to the existing curriculum. This may appear as a new module or a component of the existing module. E.g. adding mental wellbeing into professional development core content. This will help to raise an awareness among students on the wellbeing and mental health.

Train the trainer: Lecturers as councellors
As evident in the results only minority of the student attend counselling sessions where majority remains unobserved. The lecturer's role as counselor is vital in this context. They are the key persons who meet students in regular basis. Thus, lecturers can be the first contact point for students to discuss their problems. If lecturers are educated as wellbeing advisors or counsellors, they can provide effective solutions to students and promote health environment within the university.

Ensure access to effective services

Ensuring that students who may be experiencing mental health difficulties have access to appropriate services and resources is essential. Thus, Information and Communication Technology (ICT) supported interventions could perform a better role in this aspect. The Counseling Services could expand to online psychoeducational workshops, online resources materials and self-assessments to help students identify their problems. Such initiatives will promote individual wellbeing but also help to reach larger audience without any time or geographical barriers.

Breaking the barrier

The stigma of mental illness is common and defines a process involving discrimination, stereotypes and prejudice [10] Mental health stigmatizing attitudes continue to be prominent in Sri Lankan as well. Mental health stigma has been reported to affect health-seeking behaviors [11] and quality of treatment received [12]. Research studies show that active and positive participation in online communities and social media allows people to learn about different worldviews and positive strategies that can spread to local context. Thus, such ICT tools could be introduced among students to break the social and personal stigma on mental health to reach wellbeing services.

CONCLUSION

The results of this study could contribute to the already existing knowledge base, giving a better understanding of the possibilities and difficulties related to wellbeing service practices within a University context. It also suggest possible new technology related initiatives could embed into the current practice to foster mental wellbeing among university students.

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Reflection on Technology and Work Life Boundaries

Sulakshana De Alwis
Faculty of Business
NSBM Green Univeirsty
Sri Lanka
sulakshana@nsbm.lk

Abstract— **This review paper focused on current discussion on technology and work life boundaries. Contemporary workplaces are filled with technology-based communication devices such as smartphones connects employees with the organization anytime, anyplace, anywhere. In the light of such development work home boundaries have become blurred and more challenging to maintain. This paper discusses the theoretical underpinnings of work home boundary theory and how they are challenged by new developments in technology intense workplaces.**

Keywords—work life boundaries, boundary management, technology, work life conflict

INTRODUCTION

As individuals we all have to play multiple roles in our lives simultaneously. Hence, an individual may have to play the role of a husband/ wife, a father/ mother, an employee and a friend at the same time. sometimes the simultaneous-role-playing leads into conflicting demands [1]. Boundary theory suggests that people create mental models around their multiple life domains in order to manage the demands of each life domain (e.g. work and family). These mental models often called as boundaries which may have different characteristics based on individual circumstances such as individual preferences and constraints they face [2]. Accordingly, some people will have strong boundaries between life domains, which clearly distinguish their life domains while others will have more permeable boundaries which allows different life domains to interact freely [3].

In the preindustrial revolution era work and family domains were not separate. Since, most people were engaged in agriculture, they did not have specific workplace, start time and end time. Family members was also a significant part in agricultural production [2]. However, industrial revolution caused a disruption between the unified work and family domains. Inception of factory-based workplaces caused separation of work life from family life. This led people to separate their work domain from family domain both physically and mentally [2, 4]. This separation was more prevalent with the development of management philosophies such as scientific management and bureaucratic management [2, 5]. Application of these managerial thinking in the organizations pressured people to be more professional in their work, keeping their family aside [2]. Accordingly, social norms developed facilitating people to separate their work life from family [2]. Hence, people had to create their own set of rules (i.e. mental fences/ models) to sperate their professional life from their personal life. These mental fences often discussed as boundaries in literature [2].

However, socio-economic and technological development in post 1960's era challenged the traditional view of distancing work life from non-work life [2, 6]. Increased women participation in the workplace tested the validity of separation of family from work as working mothers had to attend their work as well as family commitments equally [2, 7]. This was more prevalent in families where both partners were employed (i.e. dual career couples). These developments in the social sphere created a new challenge for employees how to manage their non work (i.e. family) commitments while distancing them from their professional work life [8]. Often researchers called this phenomenon as work life (or family) conflict [3].

Technological development also contributed to blur the boundaries between work and non-work spheres [1, 9]. Ubiquitous devices such as smart phones have increased the interpersonal connectivity making people available any time anywhere [1]. Hyper connectivity has challenged the maintenance of traditional boundaries between

work and non-work life [10]. In modern days, it is not infrequent that a person check is office e-mails while eating dinner at home or a spouse sending a text message to an employee who is in office to pick up their child from school. This new socio technical atmosphere has created a whole avenue of research in work–non work life interaction [1].

These developments led more scholarly attention towards the subject of work life interaction [8]. New concepts such as work family integration and work family enrichment emerged in the literature to explain as contemporary work life interactions [11, 12]. Traditional separation hypothesis was replaced by the integration hypothesis which describes work and non-work lives are no more separated in isolated domains [2]. Work family enrichment talks about co-existence of work and family lives of people opposed to the conflict model which described work and non-work lives are enemies [13]. These new developments suggest the boundaries between work and non-work spheres of human life is now blurred [2]. But the question is whether the blurred boundaries are a positive phenomenon or a negative phenomenon. To answer this question, it is important study these boundaries in depth. Hence, scholarly studies have emerged to discuss the application of boundary theory to explain the human experiences in work and non-work interactions in contemporary societies [2].

THEORETICAL UNDERPINNINGS OF WORK LIFE BOUNDARIES

Most scholars in the past have studied work -non work interactions in an organizational perspective [14]. Hence, they focused on how organizations should develop their human resource policies to tackle work family conflicts of their employees [3]. However, in the recent past attention was given to discuss the work family issues in an individual perspective [3, 15]. Work boundary theory emerged as a theoretical foundation to explain the individual level processes related to work non work interactions [8]. Roots of the work boundaries lies in the organizational role theory [8]. Organizational role theory explains that organizations are open systems of roles, where people play multiple roles [16]. Role theory explains people experiences stress when two more roles are not congruent (i.e. inter role conflict) [16]. In fact, the concept of work

family conflict was based on inter role conflict discussed in role theory [17].

Hall and Richter [18] in their review discussed how organizations should understand the boundaries between work and family lives of employees, in order to help them to balance the work and family commitments. Further, work boundary theory has also taken the view of multiple roles in human lives and how they demarcate lines to make their lives more simplified. Apart from the organizational role theory, boundary theory was also enriched through the work of Zerubavel [19] who talked about cognitive boundaries between different life roles. Frone, et al. [20] explained boundaries are not symmetrically preamble. Hence, boundaries may be more open to work to spillover to family life than vice versa. Also, the landmark ethnographic study done by Nippert-Eng [21] is also noteworthy milestone in literature. Nippert-Eng [21] described some people like to integrate their work and non-work roles while others tried to segment the work and non-work roles.

Taking the insights from above studies on boundary theory Clark [4] proposed a new theory called work/family border theory. Clarks's [4] theory was a theory about work life balance developed using the insights of boundary theory. An important contribution of Clarks's [4] is the introduction of the role of boundary participants (i.e. boundary keepers). Hence, Clark (2000) explained individuals alone cannot implement the boundaries between work and family domains. The nature of the boundaries also depends on other people such as supervisors and family members. Ashforth, et al. [22] discussed the impact of micro role transitions with regards to work non-work boundaries. Micro transitions explain the experience of one existing one role and entering another role through surmounting the boundaries between them. Using these theoretical bases, researchers have expanded the scholarly discussion on work life boundary theory on many aspects such as boundary preferences, boundary management, boundary tactics and bullring boundaries in new world of work.

TYPES OF BOUNDARIES

Different scholars have come up with different models to explain the types of boundaries that people create between their different domains. Integration and Segmentation are the main types of boundaries that have been discussed in the literature [2]. In fact, all other models of boundary typologies

have based on the basic notion of integration and segmentation of boundaries [2]. Segmentation means fully distancing different roles from each other. Segmented boundaries are inflexible and impermeable. Hence spillover of content from one domain to another is not welcomed in segmented boundaries [2, 8]. On the other hand, integration means flexible and permeable boundaries. In the context of integrated boundaries, spillover of content from one domain to another is welcomed and accepted [2, 8]. In fact, at full integration there is complete overlap of work and non-work roles where in complete segmentation roles are completely distinct from each other [8]. For example, integrator would like to attend the phone calls and e-mail from work when they are at home while segmentors will not like to receive any call or e-mail from work out of office hours. However, most people lie in between the two extremes. Fully segmentation and fully integration may not be possible due to contextual circumstances such as organizational rules, demands in the family, professional norms [8].

Some scholars argue integrated boundaries and segmented boundaries are not two types of boundaries it the final outcome of boundary management [2]. Hence, boundary types are the different aspects or bases that people use to delineate one role from another [2]. According to Nippert-Eng [21] there are four types of boundaries spatial, temporal, cognitive and emotional. Languilaire [23] developed a more refined typology based on his qualitative work which included seven types of boundaries. They are spatial, temporal, cognitive, behavioural, emotional, psychosomatic, human.

PREFERRED BOUNDARIES AND ENACTED BOUNDARIES

Boundary preference closely associated with the concept of boundary management; Boundary management is the decision-making process involved in creating boundaries between multiple life domains [2]. When creating boundaries, some people like to create segmented boundaries while others like to integrate them [24]. For example, segmentor will like to keep his work matters only at office while integrator would like to take work home. However, in reality people may not be able to enact the preferred boundary due contextual factors such as social norms in work and home, cultural factors, institutional requirements, technology [3].

Some scholars argue preference and enactment is intertwined. Hence, enacted boundaries derive from the preferences [25]. For example, a segmentor will not like to take any work home, even his boss wants to finish a report at home over a weekend. This will lead segmentor to come up with more moderated enacted boundaries. For example, he or she will come to work dropping his or her kid at friends place to finish off the report. Ammons [25] describes that work family conflict occurs when there is an incongruence between preferred boundary and enacted boundaries. Whereas, work life balance occurs when individual feel that they can enact the boundaries they prefer. Kreiner, et al. [3] explains the mismatches between preferred boundary and enacted boundary as boundary violations. Further, in their study they discuss about two types of boundary violations. Intrusion type boundary violations happen when a person preference segmentation, but contextual factors forces integration. Next type is distance violations; these violations happen when a person wants to integrate but contextual factors force to enact segmentation.

BOUNDARY PERMEABILITY, FLEXIBILITY AND CONTROL.

Boundary permeability is defined as "extent to which a person physically located in one domain may be psychologically or behaviorally involved with another domain" [8] For example, if an employee answer a personal call at the workplace, his or her work home boundaries tend to be more permeable. Although boundary preference has an impact on boundary permeability, it does not solely depend on preference [26]. Contextual factors such as supervisors, coworkers, family members, organizational culture, rules and regulation, nature of the job could also influence the boundary permeability [27]. The permeability of boundaries is not always symmetrical. Hence, permeability could be asymmetrical where boundaries will be differentially permeable based on the direction of spillover [26]. For example, employees may be prohibited from answering personal calls at work time, but the employer may expect employees will answer work-related calls at home.

Boundary flexibility is more related to spatial and temporal boundaries [8]. Hence, more flexible boundaries enable roles to be enacted in various places and various times [8]. For example, in a family run business, family members can play the role of family member at any time any place. In flexible boundaries restricts when and where the

roles could be enacted. For instance, bus driver cannot enact his or her work-related roles at home. Boundary strength is determined by the extent of permeability and flexibility of the boundaries [4]. More stronger boundaries between life roles restrict the spillover of elements of one role to another. Hence, stronger boundaries do not allow blending of elements of one domain with another [4, 8].

Individual's ability to control their boundaries between life domain also plays an important role in boundary management [28]. Concept of boundary control explains the impact of contextual factors in enacting preferred boundaries [2]. In other words, it is the individual's power to control their life circumstances. Individuals who have higher boundary control can enact their preferred boundaries while lower boundary control will not allow to enact the preferred boundaries between life roles [28, 29]. Similar to permeability, boundary control is not symmetrical. Hence, Individuals may have different controls over their boundaries depending on the direction of spillover [15].

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TECHNOLOGY AND BOUNDARYLESS WORK-LIFE BOUNDARIES

Connectivity between individuals and outside world rapidly increased with the development of mobile technologies and internet [1]. Devices such as smartphones have fundamentally changed the boundaries between different life roles. In fact, they have made people available to anyone, anytime, anywhere [1, 30]. Hence, the availability created through omnipresent technologies has blurred the boundaries between work and home domains [31]. However, research shows blurred boundaries have varying effect on work life interactions. Some scholars suggest that technology has increased the flexibility in managing boundaries causing work home enrichment; while others argue that technologies have challenged the distinctiveness of life domains which leads to conflict between work and home spheres [31].

In the light of this discussion, it is worthy to understand how technology would affect different boundary types between work and life domains. Temporal boundaries which dictated the separation of time between different life domains has a significant affect due to the contemporary technologies. Unlike earlier days, technology has extended work beyond the stipulated work hours of employees [1, 31]. For example, some managers expect that employees will respond to their e-mail even after working hours which challenge employees to maintain distinct temporal boundaries work and home domains. Some scholars argue that blurred temporal boundaries would lead to over work, exhaustion and work-family conflict [31]. Spatial boundaries related with place where people decide to engage in given life roles [1]. For example, some employees will only perform their work-related duties at workplace, not in their homes. But technology has enabled teleworking where individuals can make their home a temporary workplace [1]. Further, technology has challenged the relational boundaries between work and home domains [1]. For example, widespread usage of social media networks has revealed the public presence of people, there by connecting them to colleagues without any boundaries [32]. Technology plays a vital role in contemporary work-home boundary management. Hence, it is important to investigate how people experience this phenomenon under different contextual circumstances such as different socio-cultural backgrounds, professions and industries.

Further, it is important to investigate how technology influence the individuals with different boundary preferences. Derks, et al. [33] revealed that technologies' influence on work life conflict depends on the boundary preference. Specifically, this study indicated integrators perceive technology helps to enhance work family role performance than segmenters. Duxbury, et al. [9] found that segmenters does not like to use smartphone for work purposes outside their work hours. However, integrators do like to use smartphone for work purposes outside their work hours. In fact, the meaning given to the technology will be different from person to person [34]. Golden and Geisler [34] revealed that influence of technology on work life boundaries depends on the socially constructed meaning given to the technology by individuals. Hence, segementers will use technology to segment their boundaries and integrators will use it to integrate [34, 35]. Senarathne Tennakoon, et al. [36] in their research found that perception towards technology is a determinant of using them across different life domains. Individuals who have

negative perception towards ICT will not embrace technology-based interruptions from work to home and home to work. Hence, they will perceive higher work family conflict as a result [37].

Further organizational expectations on technology use for work matters after hours also has impact on boundary management of people [38]. After employer's expectation of technology use after hours could lead increased work life conflict [39]. Further, Piszczek [39] revealed that organizational expectations on after our technology use will be positively perceived by integrators than segementers. Hence, segmenters will feel more conflict between work and family domains than integrators due organizational expectations of technology use. Mellner [40] found that boundary control is a significant moderator between technology use and work life conflict. People who have higher perceived boundary control will experience less work life conflict from after hour technology expectations of organizations.

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The relationship among the factors affecting on professional empowerment of the nursing professionals in Sri Lanka

H.P. Sashini R. Caldera
School of Business
NSBM Green University Town
Homagama, Sri Lanka
sashinicaldera@yahoo.com

Ganga Karunathilaka
School of Business
NSBM Green University Town
Homagama, Sri Lanka
ganga.k@nsbm.lk

Abstract—**The purpose of this study is to explore the relationships among the Career Choice -CC, Continuous Education- CE and the Social Support-SS towards the professional empowerment-PE of the registered nurses in Sri Lanka who is currently following their undergraduate studies. A cross-sectional survey design was used with 191 female nurses in state hospitals in Sri Lanka. All these factors having a moderate association with the professional empowerment. It was noticed that there is a strong joint association between the individual factors and professional Empowerment with the multiple correlation "R" value of 0.636. R-square of 0.405 indicates that 40.5% of professional empowerment has been covered by this model.**

Keywords—Professional Empowerment, Social Support, Continuous Education, Career Choice, Registered Female Nurses

I. INTRODUCTION

Registered nurses in Sri Lanka is joining in their service as diploma nurses. The state will provide post-basic training courses for a limited group of nurses' times to time to get with the promotions in the carder and skill development. As there are fewer opportunities; Some of them are following their higher studies personally while working. The total population of the registered nurses in Sri Lanka will be approximately 40,000. Though they are well skilled in the clinical set up only a limited number has engaged in the continuous education ladder comparatively less than 10%. They are doing a lot of sacrifices with long hours of duties due to the lack of staff and other family commitments while reserving a personal time for their studies. Most of their ultimate achievements are ending with self-satisfaction; as there are no proper scales that impact their increments in their salary scales where other countries paying high scales with higher studies. In the preliminary studies/interviews with their comments, it was noticed they are facing physical, attitudinal and structural barriers which can impact for their empowerment while continuing their studies with their other commitments. As much of the professionals are females; it is essential to address how would be empowerment has developing among them with the opportunities. Literature is available on western and Asian countries; But according to the Sri Lankan context there is no enough literature of any kind that has been written exclusively in the context of professional empowerment of nursing community. This research will hence contribute theoretically to fill the gap of knowledge existing in literature concerning the career choice, continuous education and social support with planned behavior of female nursing professionals who follows higher studies in the Sri Lankan context.

The performance of health care systems depends on the knowledge, skills and motivation of the people responsible for delivering services. Education and training are key investment tools as old skills become obsolete with the advent of new technologies. Nurses can be introducing as lifelong learners. Continuous professional Development-CPD through education is plays an important role to empower them.

The nursing profession has always been considered as a female's job. They have also stated that the concept of gender ideology is

affected by social, political, and economic factors. Career development between men and women, indicated there is evidence of differences in performance [1]. Compared with male nurses, female nurses are not behaving more spontaneously, participate more actively in professional work, and not have higher ambitions for developing and advancing their careers. Gender issues must be considered when we look at career development [1].

Nursing is still challenged by negative stereotypes and nurses continue to lack empowerment. professional empowerment is essential for enhancing nurses' roles, strengthening their professional image, and continuously improving the health care system nationally and globally [2]. Nurses need to maintain competency and keep up to date with the most recent research and developments in patient care. The nursing profession is accountable for providing high-quality care for patients and families in the society. Hence that it is extremely important in the nursing profession to empower their community.

Nursing education positively impacted as above and health outcomes [3].The continuing professional development of the registered nurses is not exclusively the responsibility of the individual or the employing authority but of both. The individual nurse has the right to expect the provision of training opportunities, and the employer should expect the nurse to maintain and develop the skills for which she is employed [4] [5] [6].

Nurses are facing various difficulties engaging in their continuous education. Physical barriers can include lack of time due to working hrs., family and child care responsibilities; difficulties in paying course fees and fear of losing benefits; ill health; difficulty with reading and writing; difficulties with English if this is not the learner's first language; and difficulties with statistics. Attitudinal barriers refer to being nervous about going back to the classroom and concern about not being able to keep up; skepticism about the value of continuing education; low self-esteem and lack of confidence both generally and in relation to learning; low aspirations and lack of role models;

lack of trust in formal institutions; and a perception that they are too old to learn. Structural barriers include lack of support; limited opportunities for learning near to place of residence/work; lack of the necessary entry requirements to post registration programmes; and lack of knowledge about learning opportunities.

Theory of Planned Behavior is based on the premise that people are reasonable and evaluate consequences before engaging in certain actions. Attitude toward behavior is one's positive or negative evaluation of self-performance of the behavior. Subjective norm is one's perception about the behavior as influenced by social pressures and can lead to doing or abandoning the behavior. Perceived behavioral control is one's perceived ease or difficulty of performing the behavior. This theory has used in various studies in predicting the behavior of different groups of healthcare providers, including nurses too.so it can be address with the career choice, social support and the continuous education of the Nurses towards their professional empowerment.

Social support and professional empowerment were significantly and positively correlated with nursing career development among male nurses [7]. Changes in their professional role can also lead to a great deal of frustration for the profession, when trying to satisfy the demands of the organization and the needs of the staff [8]

Nurse managers faces the dilemma of either releasing staff for training, which may result in staff shortages, or discouraging nursing skills development - and the manager is more likely to be criticized for being short of staff than for having nurses who are short of skills. These comments contributed to arousing the researcher's interest in finding the relationship of the identified factors towards their professional empowerment. where the problem is in terms of the professional empowerment Nurses themselves want to feel cared for. Caring involves being treated with dignity and respect. The need for nurses is growing with the ever increasing ageing population in the western world [9]and the approaching retirement of a major part of the nursing workforce in these countries who are aged over 45 years

[10].According to a qualitative and quantitative studies in the United States of America found that the nursing shortage was not related to recruitment of students into programmes, but rather workplace issues such as job stress, management issues and failure to nurture new nurses [11]. Other factors included education issues such as a lack of qualified facilitators and clinical sites to allow more students to be admitted into programmes.

Therefore, this research has been carried out to find the relationship among the professional empowerment of the Sri Lankan Nurses who are following continuous education.

II. RESEARCH QUESTION

Nurses need to maintain competency and keep up to date with the most recent research and developments in patient care. The nursing profession is accountable to society for providing high-quality care for patients and families. Hence that it is extremely important in the nursing profession to empower their community.

To understand the relationship of the career choice, continuous education and the social support towards the professional empowerment in Sri Lankan context, the researcher has the following question;

- How would be the relationship of the identified factors (CE, CC, SS) towards the professional empowerment (PE) of the nurses in Sri Lankan context?

III. RESEARCH METHODOLOGY

This study was designed as a quantitative cross-sectional study with 191 female registered nursing officers who are following their graduate studies in Sri Lanka with the random sampling method to follow the survey. At the end of the data collection process -SPSS- statistical package for social science, has been used to analyze the data.

The population of this study can be considered as the entire population of the female registered nurses in Sri Lanka. The researcher to objectively study registered nurses in the higher educational institute in which they currently study. So that it can considered a population of 3000 nursing undergraduates who are currently following higher education while working in government hospitals in Sri Lanka.

A random population as mentioned above has targeted for data collection and a random sample will extracted from this population. Out of them those who are studying in their final year of degree studies had taken for the sample of the study. Further; the sample design it is referring only for the female nursing officers who are at the final year studies at KIU.

A written questionnaire about their view of their continuous education, career choice and the social support impacted on their professional empowerment has been distributed among the sample to answer with a Likert scale. The researcher assigned a separate instructed personal to distribute the questionnaire and get the filled responses. Permission was obtained from the management of the KIU for questionnaires to be distributed. Questionnaires were delivered to registered nurses who were on final examinations on that period. Then it was explained the explain the guidelines for completion of the questionnaire. Out of the distributed questionnaires 191 respondents were considered for the final study excluding 5 international nurses and 7 male nurses who were given their responses.

IV. RESULTS

TABLE II. RELIABILITY ANALYSIS OF ALL THE RESPONSES

Variable	Cronbach's Alpha value at pre test	N	Cronbach's Alpha value at sample	Number of Items	N
Continuous Education	.832	25	.859	15	191
Career choice	.800	25	.702	10	191
Social Support	.753	25	.813	10	191
Professional Empowerment	.848	25	.904	14	191

According to reliability analysis, all the variables are having Cronbach's alpha values more than 0.6 at the pretest sample. This indicates that there is an internal consistency between the items. Therefore, variables can be created with respect

to the corresponding items included in the questionnaire. Researcher used all the Likert scale items without dropping any items as they consist of internal consistency. The study results indicate that there is a significant and a moderate positive level of correlation among the identified factors towards the professional empowerment. This means that career choice, continuous education, and social support are having positive association with the professional empowerment of the Government Registered Nurses in Sri Lanka who is upgrading their knowledge to a degree level.

TABLE III. DESCRIPTIVE STATISTICS

		CE	CC	SS	PE
N	Valid	191	191	191	191
	Missing	0	0	0	0
Mean		3.3848	3.8258	3.8174	3.6057
Std. Deviation		.81630	.46536	.53527	.51251
Variance		.666	.217	.287	.263
Skewness		-.822	.494	-.255	-.434
Std. Error of Skewness		.176	.176	.176	.176
Kurtosis		1.184	1.895	-.108	1.185
Std. Error of Kurtosis		.350	.350	.350	.350

According to descriptive statistics, all the mean values of variables are very close to the Likert scale 4. It can consider that the responses regarding the variables are on the agreed level. The highest standard deviation belongs to continuous education with a level of 0.81. This says that continuous education has a comparatively higher variance. The minimum variance belongs to career choice with a minimum standard deviation of 0.46. This indicates career choice has a minimum variance comparatively. With reference to the figures of skewness, all are laid between -1 to +1. it can be assumed that the data are normally distributed. Therefore, parametric techniques had been applied in the analysis.

TABLE V. PEARSON CORRELATION

		CE	CC	SS	PE
CE	Pearson Correlation	1	.276**	.268**	.381**
	Sig. (2-tailed)		.000	.000	.000
	N	191	191	191	191
CC	Pearson Correlation	.276**	1	.343**	.424**
	Sig. (2-tailed)	.000		.000	.000
	N	191	191	191	191
SS	Pearson Correlation	.268**	.343**	1	.552**
	Sig. (2-tailed)	.000	.000		.000
	N	191	191	191	191
PE	Pearson Correlation	.381**	.424**	.552**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	191	191	191	191

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

Coefficients of correlation between them are positive. All these factors having a moderate association with the professional empowerment. It was noticed that there is a strong joint association between the individual factors and professional Empowerment with the multiple correlation "R" value of 0.636. R-square of 0.405 indicates that 40.5% of professional empowerment has been covered by this model. Adjusted R-square is also representing that 39.6% of the dependent variable has been covered by the model. Durbin-Watson test statistic was 1.827 where close to 2 and will be between 1.5 and 2.5. Therefore, residuals are independent, and the model is valid. The regression ANOVA is highly significant as the P-value is 0.000 it can say the model is jointly significant and independent factors jointly influence on professional empowerment. Probabilities of tested variables are significant with positive beta values. Their probabilities are less than 0.01. This says that they are significantly influenced positively by professional empowerment. In the model summary, the D-W test is in the accepted level and residuals are independent. All the Variance Inflation Factors (VIF) are less than 10 and it indicates that independent factors are not highly or perfectly correlated. Therefore, no multicollinearity problem in the regression model. Accordingly, the regression model is highly valid.

TABLE I: DEMOGRAPHIC DETAILS

Age	25-29	30-34	35-39	40-44	45-49	50 <
	111	54	14	6	4	4
Work place	NHSL	Teaching Hospital	District Gen. H	Base Hospital	Primary Hospital	Health

						Clinic
	24	52	22	51	39	3
Working Dept.	Theater	ICU	ETU	Inpatient dept	Psychiatric ward	other
	8	24	13	64	41	41
Designation	Chief Nursing Officer	Special Grade Nursing Officer	Ward Sister/Ward Master	Nursing officer		
	4	8	12	167		

The sample were consisting of various demographic factors. The heights number of respondents had received through the Grade III nursing officers. Most of the respondents who were in the sample are reflecting the young adults and only fewer percentage are reflecting as senior adults. It can be a good symbol for future in health sector to have more qualified nurses for the patient care as most nursing officers are who directly connected with the patient care. Most of the respondents in the sample will reflects with the inpatient departments. Considering the ward managers and peers support impact with the work schedules can consider the reason behind the high number or respondents regarding this. Less number of respondents are the theater sections considering their duty schedules.

V. DISCUSSION

The nursing profession is accountable to society for providing high-quality care for patients and families. Nurses need scientific knowledge to improve their decision-making skills regarding what care to provide to patients and how to implement that care [12]Practicing nurses need to be supported by their employers to enable them to pursue continuing formal education. It does, however, appear that to a proportion.

Continuing professional empowerment is extremely important in the nursing profession, especially because of staff shortages with aging matters. Nurses need to maintain competency and keep up to date with the most recent research and developments in patients' care.

It can be concluded that the current health care structure has expanded the opportunities for the Sri Lankan nursing professionals to come forward in their disciplines compare to the early decades which is a good understanding to develop the collaborative professional development. Though they are doing these continuous education programmes for their achievement with self-satisfaction; there are no proper scales which impacts with their increments in their salary scales where other countries paying high scales with higher studies. The state should have more workforce development and personal career planning programmes in more effective and divided manner. As there is a shortage of professionals to fulfill the carders motivating, appreciating, rewarding and personal and career development is essential to satisfy them.

Open communication between the health services practice areas, nursing registration bodies and higher education institutions are regarded as vital to maintain relevancy in career development and patient care.

In the SL the context for learning beyond registration has not changed significantly. The perceived value of professional accredited and recognized awards by nursing registration bodies have been eroded as part of a more general shift towards award-bearing academic learning.

Educators in the tertiary institutions must communicate these changes to authorities since these have implications for workforce planning and the granting of study leave.

In SL, after the registration by the SLNC, there was no periodical evaluations moving regarding the nurse's development. It should be addressed in a level of appreciation as they have achieved the professionally qualified levels and the demands on the specific areas belong to the specializations and upgrade their certification by evaluating their achievements.

Further, this report will provide baseline information about the relationship of the selected factors towards the professional empowerment and it is open to continuing this study for future research studies too.

VI.   CONCLUSION

The nurses are a group of health care professionals who are almost engage in the patient care. They are facing great challenges and require thinking critically and to be able to make suitable prompt decisions. Consequently, healthcare organizations must empower their nursing staff and permit their participation in Continuous education and Decision making which in turn lead to improve nurses' satisfaction, commitment, retention, and over all patient care. This study was going to see relationship of the CC, CE, SS towards the professional empowerment the female registered nurses in Sri Lanka.

Based on the study results it was proven that there is a moderate positive relationship among the factors and professional empowerment who are currently following BSc nursing programmes.

These findings may be due to the highest percent of the study subjected were nurses (less than 40 years), so they accept the work challenges, need to refine their knowledge and skills, and searching for opportunities to improve their position in the hospital in future. However, it was notice that there was less frequency for the promotions of these officers with considering the years of service.

Based upon the results received majority of them have an intention towards professional empowerment based on the tested independent variables. According to the found results majority has strongly agreed with the positive attitudes and beliefs that they are getting empowerment based on the factors which has tested in this study. But considering some responses given in the study it says that there are some areas should be concerned to empower them with motivational concerns.

VII.   LIMITATIONS

This research was run with a limited time factor and it could not check deeply regarding the data entry issues faced with the data set. This should be expanding more deeper for the individual factors specially for the professional empowerment with other suitable assessing models and find out the barriers if occurs for the empowerment of them.

It can be separately studying how these factors affects in the private /state sector working disciplines and the gender impact in each set up. Further; based on the different age limits how the empowerment distributed of the nursing professionals and with their working disciplines and the work places impact on their professional empowerment and the how the designations had impact on this also can be address in future

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User perception on Smart Card Technology as Service Quality Improvement in Highway Ticketing

Prelis Supun
Department of Logistics and Transport
Faculty of Management, Humanities and Social Sciences
CINEC Campus
Malabe
supunpreli@gmail.com

Ranwala Lakshmi Udeshika
Department of Logistics and Transport
Faculty of Management, Humanities and Social Sciences
CINEC Campus
Malabe
lakshmi@cinec.edu

Abstract— A smart card is special type of a physical card that has an embedded integrated chip with a high security. Systems that are upgraded with smart cards have been implemented in several key applications, including healthcare, banking, entertainment, and transportation. This study is aimed to find the passenger perception towards "Smart Card" as a service quality enhancement in expressway ticketing and to propose "Smart Cards" for Southern expressway. Primary data gathered using questionnaires by Simple random sampling technique. 300 questionnaires distributed among expressway users and 272 questionnaires received. During data cleaning process only 266 questionnaires retained, where the response rate is 88.6%. Dependent variable of the study is User perception towards smart card technology for toll payments in expressway. After descriptive analysis, hypothesis testing carried out to check the relationship between identified factors and the user perception. Explanatory factor analysis carried out using principle component analysis to identify determinants of user perception. KMO and Bartlett's test statistics were adequate to perform the factor analysis. 62% of the total variability is explained by the factor model which consists of four factors namely, User benefits of smart cards, efficiency of toll collection process, toll collectors' behaviour and preference of using smart cards. Regression models being built for each factor to express how demographic factors influenced on each factor. User benefits of smart card experienced is depending on the income level, age and the willing to pay extra service charge. Toll collectors' behaviour experienced by the users is depending on their age, preferred recharge method and the income level. Efficiency of the toll collecting process experienced by the highway users is depending on the travel purpose and their previous experiences in using Katunayaka expressway. Smart card user preference factor is depending on the age, method of recharging the smart card, frequency of usage of expressway and the previous experiences in using Katunayake express way.

Keywords—Expressway ticketing, Smart Card technology, User perception, Factor Analysis

I. INTRODUCTION

After World War II, the Japanese government initiated the construction of expressways by crossing expressways by connecting local cities and the longitudinal expressway as a remedy for the traffic congestion. Expressways are the most significant infrastructure to scrutinize in order to solve urban transport problems by eliminating car traffic, easing congestion in the town areas, and affording space to human and public transportation. In most of the countries, the usage of expressways can be seen as a strategy to increase the service quality of the transportation sector. When consideration paid towards whole expressway process, Toll Collection takes the prominent place out of whole expressway concept. There are several methods that has already been used by various countries for highway ticketing. Out of all those methods "Smart Card" plays as a vital part, as it has become the trend in payment scenario at present. But in Sri Lanka, toll collection and the payment is still being done manually. There are so many positive impacts could be adapted on application of Smart Card System to local highway ticketing instead of manual toll collection.

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II.   RESEARCH PROBLEM

Southern expressway has 15 toll collecting points. In current system, the registration number of the vehicle and the driver license are mandatory to track a vehicle or a driver. This semi-automated system consumes much time and it affects both the consumers and authorities. Furthermore, both the toll collector and the user face many difficulties during the tolling process regarding the change money. These problems should be rectified for better service.

Objectives of the research are

- To find the passenger perception towards "Smart Card" as a service quality enhancement in expressway ticketing.
- To identify barriers, exist among expressway users, Toll collectors, Security Authorities, Statistic department, policy makers and passengers in adherence to this card system

III.   LITERATURE REVIEW

Electronic ticketing or E-ticketing technology exists which records the same information found on the traditional paper tickets automatically improving the efficiency and safety of paving operations. Although electronic tickets have existed for some time in various industries, it is a relatively new concept in highway construction. In the United States, e-Ticketing was first brought in the spotlight by Iowa Department of Transportation (IowaDOT). Iowa started the process of incorporating e-Ticketing in its highway paving projects in 2015 and conducted multiple pilots during the paving season. The results were extremely promising and in 2016,

IowaDOT successfully achieved 100% paperless processes on a construction project. The eTicketing efforts of Iowa were highlighted in EDC-3 under eConstruction and the agency shared their experience with other DOTs through both in person and virtual peer exchanges. [1] RFID-based services is good management, compliance with Data Protection Regulations and providing user's an experience of greater ease-of use and added-value in their everyday lives in comparison to previous systems. [2]

In the Integrated System Management concept, demand for transportation would be managed through information: users would have a choice of modes and routes and an array of ways to pay for a trip. The charge would incentivize the most efficient transport choice and the market would drive the provision of capacity. Highly complex systems, such as roadside-vehicle-traveler communications would be required, but system usage is expected to be highly efficient. Required conditions include market flexibility and access to information. [1]
The author mentioned that the micro simulation model for the automated toll plaza system using RFID technology. The PIC microcontroller is used for the control system. With this simulator, the optimal operation strategy of highway tollgate was proposed by benefit-cost analysis on the basis of benefit in saving total waiting time and operating cost. The signal is   sent to the PC via RS-232 cable from the PIC and the output will be displayed on the LCD display. And then, the microcontroller sent the signal to the motor driver for opening the traffic gate. The author also described about the GSM modem to update the balance amount in the user account. The author mentioned that the Central server is used in the RFID based toll deduction system. Central server is connected to LAN (local area network). All computer system of LAN is connected to a central database via a WAN (wide area network). The whole record of toll deduction will be stored at the Central server and monthly transaction will

be sent to the consumer from the Central server. The account number is included on the statement. Consumer will receive a statement of accounts on the monthly basis from the Central server. The author explained that the RFID based automatic toll gate system. The 928 MHz frequency is used for the communication between RFID and control system (Storm-[2]. The microcontroller was programmed using c language and Visual Basic was used in serial communication. The database was developed using Microsoft Access because it can contain up to 32768 records of object. [3]

Contactless smart card systems are closely related to contact smart card systems. Like contact smart card systems, information is stored on a chip embedded within the contactless smart card. However, unlike the contact smart card, the power supplied to the card as well as the data exchanged between the card and the reader are achieved without the use of contacts, using magnetic or electromagnetic fields to both power the card as well as to exchange data with the reader.

The contactless smart card contains an antenna embedded within the plastic body of the card (or within a key fob, watch or another document). When the card is brought into the electromagnetic field of the reader, the chip in the card is powered on. Once the chip is powered on, a wireless communication protocol is initiated and established between the card and the reader for data transfer.

The following four functions describe at a high level the sequence of events that happen when a contactless smart card is brought near a card reader:

- Energy transfer to the card for powering the integrated circuit (chip)
- Clock signal transfer
- Data transfer to the contactless smart card
- Data transfer from the contactless smart card

Hence, once the card is brought within range of an electromagnetic field of the required frequency, the card will be powered up, ready to communicate with the reader. Since the contactless smart cards described in this FAQ are based on the ISO/IEC 14443 standard, this frequency is 13.56 MHz and a reader that complies with the standard would have an activation field (range) of about 4 inches (approximately 10 centimeters). In other words, the card needs to be within 10 centimeters of a reader for it to be effectively powered; however, the effective range for communications for the card to be read will depend on a number of factors like the power of the reader, the antenna of the reader and the antenna of the card. [4]

When it comes to the service quality of public transport, a research reveals that the passengers' satisfaction with the city transport plays a major impact in deciding the overall service quality of public transportation. In terms of public transportation factors such as punctuality, cleanliness in the vehicle, proximity, speed, fare, accessibility, safety of transport and availability of information are some of the key factors determining passenger perception towards public transport service quality [5].

Above said study also states that measuring the service quality of public transport in terms of passenger perspective would require an understanding of the passenger perception towards factors characterizing the service [5]

Passenger perception regarding any transport mode could be easily subjected to changes depending on the service quality of a particular mode and the expectations of the passengers [6]. Perception of a person depends on the attitude of that person, which has a psychological influence, as well as acts as a major criterion in determining the behavior of people (Hu, Zhao, & Wang, 2015).

A similar study has stated, that advertising leads to create perception towards any product or a service by informing, convincing, and reminding the brand or by increasing awareness [7].

Apart from that determinants like reliability, responsiveness, competence, access, courtesy, communication, credibility, security, understanding the customer and tangibility could be used as aspects determining the customer perception towards service quality of any service [8].

IV. METHODOLOGY

This paper analyses the user perception towards "Smart Card", and the importance of implementing "Smart Card" for expressway ticketing in Sri Lanka. Dependent variable of this research is the user perception on "Smart Card" as a service quality improvement, while the factors impacting the user perception towards "Smart Card" are considered to be the independent variables of this research, supported by research articles mentioned in the Literature Review chapter.

In this study, around sixteen factors have been identified to be questioned by the respondents regarding, the user perception towards "Smart Card" as a service quality improvement in expressway ticketing. Likert scale method is used to collect data. Target population of the study is Southern expressway users. 300 Southern highway users are being selected as the sample where Simple Random Sampling techniques has been used as the sampling technique in data collection process. During data cleaning process only 266 questionnaires retained, where the response rate is 88.6%. Dependent variable of the study is User perception towards smart card technology for toll payments in expressway. After descriptive analysis, hypothesis testing carried out to check the relationship between identified factors and the user perception. Explanatory factor analysis carried out using principle component analysis to identify determinants of user perception. KMO and Bartlett's test statistics were adequate to perform the factor analysis.

V. ANALYSIS AND INTEPRETATION

Out of 266 respondents 58% are employed and 48% had the income above LKR 50,000.00 per month. 48% of the sample occasionally use the southern Highway, 20% use monthly and 21% used only during weekends. Majority of their travel purpose is personal activity.

42% of respondents stated that their point of origin is Godagama and 26% says that it is Kottawa.

Majority of the approximately 56% use the expressway during 5.00am to 10.00 am. When considering the vehicle type used by the respondents, 53% of them used motor car and second highest is 36% which is Bus.

Majority of 47.4% respondents are agree the statement of "It takes a lot of time in exchanging high value notes". It influenced them to perceive Smart card as a service quality improvement in expressway ticketing.

Similarly, a majority of 53.4% of the respondents are agree "It takes a lot of time in exchanging the notes with low values since it takes a period to check the balance". It influenced them to perceive Smart card as a service quality improvement in expressway ticketing.

Considering the Statement of "The behavior of the Toll Collector is not supportive towards exchanging high value notes." around 42.8% of the respondents are considered this factor to perceive Smart card as a service quality improvement in expressway ticketing. While 33.8% of the respondents are states "**Neither Agree nor Disagree".**

Most of the respondents as a percentage of 70.7% considered the "Long queues occur in the peak time in comparison to the off-peak time" influenced them to perceive Smart card as a service quality improvement in expressway ticketing.

54.2% of respondents are agree to the statement of "The consistency of the service provided by the toll collector is satisfying"

Same as the above 50.4% of respondents are agree the statement of "The efficiency of the

service provided by the toll collector is satisfying"

27.8% respondents are disagreeing the statement of "Number of slots in the expressway exits are sufficient" while 40.6% of the majority agree that statement.

97.7% of the respondents agree that the smart card system will improve the quality of service.

88.8% of the respondents are agree that smart card system help to reduce the cash handling.

81.2 respondents think smart card is easy to handle.

Proposed method has more benefits than the existing method. 88.7% of the respondents are agree for this.

77.4% of the respondents in agree level of that it has security of money transaction through smart card.

Majority of the respondent have experience of using of smart card. 44.3% disagree of the statement.

41.4% respondents are worrying about their privacy.

44.4% of the majority are ready to adopt the proposed method.

Proposed method help to reduce human errors 84.2% respondents are agree for this.

Below hypothesis checked during the data analysis process to check the correlation between user perception and the identified factors.

H_0: User perception is independent from the ith factor.

H_1: User perception is depending on the ith factor.

TABLE 1: HYPOTHESIS TEST RESULTS

Factor	Test Statistic (Pearson Correlation)	P value Sig.(2-tailed)
Satisfaction of existing method	-0.277	0
Consistency of service	-0.162	0.008
Number of slots	-0.156	0.011
Reluctant of adapt	-0.13	0.034
Privacy	-0.109	0.077
User benefits	0.107	0.081

Experience of using smart card	-0.097	0.115
Minimized human errors	0.083	0.175
Congestion in peak time	0.082	0.182
Collector behavior	-0.069	0.263
Less cash handling	0.058	0.348
Efficiency of service providing	-0.045	0.469
Impact of high value notes	0.024	0.703
Speed of toll collection	0.013	0.828
Easy to use	0.011	0.862
Impact of low value notes	-0.006	0.923
Security of money transaction	-0.003	0.959

According to the results it is worthy to note that, satisfaction of existing method, service consistency, available no of toll slots, reluctant to adopt variables are significant at 5% level and they have negative impact on the perception towards smart card technology. Privacy and user benefits variables were significant at 10% level.

Factor Analysis

TABLE 2: KMO AND BARTLETT'S TEST RESULTS

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.754
Bartlett's Test of Sphericity	Approx. Chi-Square	1548.601
	df	120
	Sig.	.000

Kaiser-Meyer-Olkin (KMO) and Bartlett's test is used to measure the strength of the relationship among variables. KMO test statistic measure the sample adequacy. As KMO test statistic is greater than 0.5, it can be concluded that sampling is adequate for a satisfactory factor analysis to proceed.

Following hypothesis has been checked during Bartlett's test

Ho: correlation matrix is an identity matrix.
H1: correlation matrix is not an identity matrix.

As p-value of the Bartlett's test is 0.000, null hypothesis is not accepted. It can be concluded that, correlation matrix is not an identity matrix which further supports the strength of the relationship among variables used in factor analysis.

During the factor analysis 04 factors has been identified which explains the 62% of the total variability in the user perception where First factor accounts for 23.987% of the variance, the second 16.527%, the third 13.065%, and the fourth 8.800%.

TABLE 3: RELIABILITY OF FACTORS

Factors	Cronbach's Alpha	N of Items
Factor1	.869	5
Factor2	.759	4
Factor3	.674	4
Factor4	.683	3

As all extracted factors have satisfactory value of cronbatch alpha, all four factors are taken into consideration in doing further analysis.

According to the variables under each factor, extracted factors are labeled as follows.

Factor1 – Benefits of smart card
Factor2 – Speed of toll collection
Factor3 – Delays and problems in existing method
Factor4 – Reluctance of using Smart Card

TABLE 4: HYPOTHESIS TESTING FOR FACTOR 1

Factor1 (Benefits of smart card)	Test Statistic (Pearson Correlation)	P value Sig.(2-tailed)
Income Level	.175	.004
Age	.172	.005
Extra Service charge	.126	.040
Gender	.080	.196
Aware of ETC	.075	.224
Frequency of usage	-.053	.387
Katunayake Usage	-.052	.400
Payment method	-.033	.590
occupation	-.014	.825
Recharge method	.011	.855
Purpose of travel	.008	.896

Smart card benefits experienced by users are depending on the Income and age of the respondents.

TABLE 5: HYPOTHESIS TESTING FOR FACTOR 2

Factor2 (toll collection speed)	Test Statistic (Pearson Correlation)	P value Sig.(2-tailed)
Age	.240	.000
Recharge method	.230	.000
Income Level	.169	.006
occupation	.100	.105
Extra Service charge	-.073	.235
Purpose of travel	-.055	.374
Frequency of usage	.048	.432
Gender	-.034	**.584**
Payment method	.019	.762
Aware of ETC	-.016	.800
Katunayake Usage	-.014	.823

Speed of toll collection experienced by the users is depending on their age, recharge method and income level.

TABLE 6: HYPOTHESIS TESTING FOR FACTOR 3

Factor3 (Delays and problems in existing method)	Test Statistic (Pearson Correlation)	P value Sig.(2-tailed)
Payment method	.162	.008
Purpose of travel	-.137	.026
Katunayake Usage	.129	.036
Extra Service charge	-.128	.036
Aware of ETC	.112	.068
Frequency of usage	-.090	.143
Recharge method	-.083	.176
Gender	-.079	**.197**
Income Level	-.069	.264
occupation	.063	.304
Age	.021	.730

Existing payment method, purpose of travel, previous experience using Katunayake expressway, willingness to pay extra service charge and awareness of ETC is highly significant with Delays and problems in the existing methods experienced by the users.

TABLE 7: HYPOTHESIS TESTING FOR FACTOR 4

Factor4 (Reluctance of using Smart Card)	Test Statistic (Pearson Correlation)	P value Sig.(2-tailed)
Recharge method	-.230	.000
Age	-.194	.002
Katunayake Usage	.157	.010
Frequency of usage	-.146	.017
Payment method	-.102	.097
Income Level	-.093	.132
Gender	0.57	**.350**
Aware of ETC	.034	.579
Extra Service charge	.032	.599
occupation	-.031	.614
Purpose of travel	-.025	.685

Preferred recharging method, age, previous experience in using Katunayake expressway, usage frequency, and payment methods are significant with the reluctance of using smart cards. Regression models are built for each factor as follows based on significant variables on each factor

1. **Benefits of smart card (factor1) = 1.114 + 0.058(Income Level) + 0.020(Age) – 0.130(Extra service charge for smart card)**
2. **Speed of toll collection (factor2) = 1.076 + 0.053(Income Level) + 0.045(Age) + 0.292(Recharge the smart card)**
3. **Delays and problems in existing method (factor3) = 3.901 – 0.639(Purpose of travel) – 0.322(Katunayake Usage)**
4. **Reluctance of using Smart Card (factor4) = 4.717 (Intercept) – 0.048(Age) – 0.442(Recharge the smart card) -**

0.493(Katunayake Usage) + 0.581 (Frequency of usage)

VI. CONCLUSION

Dimensions of user perception towards smart card technology in highway ticketing can be identified as

Factor1 – Benefits of smart card
Factor2 – Speed of toll collection
Factor3 – Delays and problems in existing method
Factor4 – Reluctance of using Smart Card

According to the results if regression analysis it can be concluded that benefits of smart card is expected to increase by 0.058 if the income level increase by 1. Benefits of smart card is expected to increase by 0.020 if the age increase by 1. Benefits of smart card is expected to decrease by 0.130 if the extra service charge for smart card increase by 1.

Also, the attributes of toll collection is expected to increase by 0.053 if income level increase by 1. Attributes of toll collection is expected to increase by 0.045 if the age is increase by 1. Attributes of toll collection is expected to increase by 0.292 if the recharge smart card increase by 1.

The delays and problems in existing method is expected to decrease by 0.639 if the purpose of travel is increase by 1 and the delays and problems in existing method is expected to decrease by 0.322 if the Katunayaka usage increase by 1.

And, the reluctance of using smart card is expected to decrease by 0.048 if the age increases by 1 and it is also expected to decrease by 0.442 if the recharge of smart card increases by 1. Also, the reluctance of using smart card is expected to decrease by 0.493 if the Katunayaka usage increase by 1 while it is expected to increase by 0.581 if the frequency of usage increase by 1.

The preliminary limitation encountered in this research is the difficulties in data collection from

the passengers. Since this study was restricted to southern expressway only, data collection could not identify a large sample, where the sample had to be limited to the passengers travelling using above mentioned routes only.

In addition to that, the second limitation encountered was the lack of knowledge regarding the subject matter of the research. Passengers had lack of knowledge regarding the smart card, or regarding the mechanism of how the card is operated. Therefore prior to conducting the survey, the respondents had to be provided with some knowledge regarding the mechanism of using a smart card, to pay fares.

Apart from that, since the study was focused on "passenger perception" which is a qualitative concept, sometimes there might be room for bias in the responses being obtained. In addition to that, even though Google Forms were distributed to gather more responses, the number of respondents via Google Forms were very low.

According to the results obtained from the survey conducted for the passengers, the researcher would recommend the factors such as convenience to handle the Smart card, benefits of smart card (factor 01), attributes of toll collection (factor 02), delays and problems in existing methods (factor 03) and reluctance of using smart card (factor 04) the Smart card must be implement and promoted more among the users of the expressway to create a positive attitude towards Smart card.

Besides that, Smart card must be further implemented to other expressways as well.

And also, it needs to motivate the people to use public vehicles than private vehicles it will help to mitigate that congestion situations.

Further, government intervention is highly recommended to change this fare collection mechanism from a less prevalent concept for a more prevalent concept.

Moreover, Smart card must be promoted to other public transport modes such as trains, where the passengers have to stand in long queues in front of ticket counters to obtain their tickets.

The researcher has achieved the primary objective of determining the passenger perception towards Smart card, by conducting a survey. According to the key findings of the survey, passenger perception towards Smart card as a service quality improvement is a moderate perception. Though the passengers perceive smart card as the best solution to overcome the problem of poor vehicle and driver tracking system, time consuming of existing method, delays of toll collecting process. Still some passengers state smart card is a small development to enhance the service quality of expressway ticketing, while there are plenty of other service quality attributes that needs to be improved in expressway ticketing to enhance the service quality.

However, passengers revealed smart card is satisfactory to be implemented to other services in Sri Lanka, similar to that of other countries using Smart Card technology for public transportation, without confining to expressway ticketing only.

Therefore, finally it can be concluded the consent from the passengers, as well as the government must collaborate their ideas in order to look forward for a better implementation of smart card for expressway ticketing in Sri Lanka.

The researcher would recommend a larger sample size for further research, in order to obtain more accurate results.

Since the study concluded, that most of the parties' perception other than just the passengers are important to implement the smart card, the researcher would recommend conducting future research to all those influential parties to implement the smart card.

Although this study was confined to southern expressway the researcher would recommend future research to be extended to other expressways.

In addition to that researcher recommend using the wide data collection methods such as interviews, focus group discussions and also use

wide range of expressway users rather than the occasionally expressway users.

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Does Board Independence Moderate the Association between Sustainability Reporting on Performance? Empirical Evidence from Sri Lankan Non-Financial Listed Firms

Dilini Dissanayake
School of Business
NSBM Green University Town
madu.d@nsbm.lk

T.D.S.H Dissanayake
Department of Accountancy and Finance
Rajarata University of Sri Lanka

Dr. Roshan Ajward
Department of Accounting
University of Sri Jayewardenepura

Abstract— **Sustainability Reporting has gained prominence from the industrial developments in 1980s. One of the outcomes of industrial developments has been emergence of the link between economy, ethics and politics as well as an interaction between economic issues and moral and social values As a result of that, managers of the business entities no longer purely focus on higher productivity, but also pay their attention on numerous environmental, ethical, social and cultural issues, and board governance practices (particularly independence of the board) has been highlighted for its paramount importance. With this contemporary importance and dearth of studies of this nature in the local context, this study aimed to investigate the link between sustainability reporting on the firms' performance with the moderating role of board independence. Accordingly, the first objective of the study was to examine the direct impact of the sustainability reporting on firms' financial performance and secondly, to examine the moderating impact of board independence towards this association between sustainability reporting on firms' financial performance. All the non-financial companies in the Colombo Stock Exchange were selected amounting to 174 for a four years period (2014 to 2017) and thereby six hundred ninety-six (696) firm-year observations have been used in the study. Using the Global Reporting Initiative (GRI) based index for measuring sustainability disclosures, it was found via the pooled OLS regression and panel regression analyses that such sustainability disclosures have a significant (p<0.01) positive association on firm financial performance. Furthermore, the results of panel regression analysis also indicated that greater availability of independent directors positively (p<0.05) moderated the relationship between sustainability disclosures and financial performance of firms, and this finding is consistent with the agency theory, which posits that a more independent board of directors can better monitor the firms due to their independency. This study contributes to the literature by showing such a moderating impact. Furthermore, this study offers insights to policymakers on enhancing their monitoring.**

Keywords—Sustainability reporting, board independence,

I. Introduction

Sustainability reporting can be regarded as a new trend incorporate reporting which integrates financial, environmental and social performance of the company into one report [1]. Sustainability reporting refers to the practice of measuring, disclosing and being accountable to internal and external stakeholders for organizational performance towards the goal of sustainable development [2]. It is a voluntary reporting practice which demonstrates the inclusion of social and environmental concerns in business operations as well as in the interaction with stakeholders [3]. This idea of sustainability that has three dimensions stems from the triple bottom line concept which was coined by John Elkington in 1994. It is demanded and expected by investors, customers, employees, government and other stakeholders [4]. Sustainability reporting generates many benefits, for example, enhances transparency [5], improves stakeholders' relations [6], attracts long-term capital [7], generates a favorable investment climate and manages corporate reputation [8]. Sustainable reporting is an extensively debated subject in the extant literature, with studies focusing on two primary research directions. On one hand, the analysis focuses on the determinant factors of sustainable reporting, such as corporate governance [9], profitability, ownership

structure, company size [10], debt and liquidity [11], or even board gender [12]. On the other hand, research focuses on the effect of reporting sustainable actions on the indicators of economic results, namely company value [13], cost of capital [13] and operating performances [14]. Previous empirical studies reveal that publishing sustainability information can be seen as positive news and can therefore improve the firm's reputation (with positive effects of performance) and can help to avoid a decrease in share price [14]. Thus, certain studies as Bodhanwala and Bodhanwala [15] identifies a positive relationship between sustainability and financial performance of the firm. Aras and Crowther [16] identified that the conducting a sustainable activity allows companies to reduce their costs of capital by inducing investors to believe that the risk associated with their investment is lower. Moreover, Dhaliwal et al. [17] provided evidence that the information published by firms with superior CSR performances generate a subsequent reduction in their costs of capital. However, Barth et al. [18] analyzed annual reports of listed companies from South Africa, where integrated reporting is mandatory, and they identified a positive association between sustainability reporting and the companies' liquidity and cash flows. Thus, literature suggest that CSR is used to build a win-win relationship between corporations and shareholders by enhancing firms' performances [19]. However, contrary to aforesaid literature, Mathuva and Kiweu [20] found a significant negative relationship between CSR and performance. While there are other studies that have found no significant relationship between these variables [21; 22 and 23] as well.

Collapse of high-profile companies and financial crisis, up-surged the need of corporate governance to the world to mainly reduce the agency cost and thereby investors demand for corporate governance mechanism to be executed in a transparent manner [24]. Due to corporate scandals and financial crisis, corporate governance become more crucial for organizations which emphasize the investors' protection [24]. Corporate governance can be considered as an atmosphere where it promotes trust, moral values and judgement and faith in organization practices and decision making.

Specifically, this acts as a valuable guide for organizations to maintain a long lasting positive and unbroken relationship with their stakeholders of the society including shareholders, government, professionals and all the stakeholder groups [16]. Mechanisms of corporate governance are implemented by the "agents" appointed by its owners. Hence the responsibility of planning and execution of effective corporate governance practices within the organization lies on the shoulders of these agents [16]. These agents are non-other than board of directors, who are considered as the engine of the organization [25]. Brennan and Solomon [25] mentioned that board of directors are the controlling party who decide upon the disclosures and this might be highly influenced by the characteristics of board of directors (Sheila et al., 2012) Jensen and Meckling [45] stated that agency theory provides the platform to link board governance and voluntary disclosures. It is agency theory which suggests that monitoring role of board influence the firms to disclose information to reduce the agency cost and information asymmetry [25]. Moreover, the theory suggests that corporate governance strengthen internal control system of the company and provide "intensive monitoring package" to reduce opportunistic behavior of managers and thereby enhance the level of voluntary disclosures [25]. Legitimacy theory also finetunes the activities of board of directors since it extends the agency theory to other stakeholders who represent the societal interests. This theory paves the path to broaden the corporate governance activities and align firms' activities to kindle interest of wider stakeholders [26]. Among many corporate board governance characteristics, board independence receives an importance role in sustainability reporting. It is argued that non-executive directors on board restrict the opportunistic behavior of CEO and control the board [25]. Moreover, these directors support to enhance monitoring of quality of information disclosing and minimizing benefits gained from some information withheld. This may lead to transparency of information and enhance the public confidence of organizations [25]. It is argued by Rashid et al. [27] that independent directors might provide skills and knowledge for the betterment of the corporation and on the other hand those directors create platforms to reduce opportunistic behavior of

managers. Many researchers have found out that appointment of outside directors significantly influence the better performances of corporation [28; and 29]. Moreover, Rosenstein and Wyatt [30] argued that appointment of independent directors caused to escalation of share prices of corporations. Same results stated by Tian and Lau [31] who mentioned that independent director's impact positively on economic performances. However, literature on this area is mixed since few researchers could not find any systematic association between economic performances and independent directors [32:33 and 34]. Apart from that it is said that board independence has significant impact on sustainability reporting. Ionel-Alina, Emil and Maria [35] found that impact of independent directors on sustainability disclosure is considerable and their role enhances the transparency of environmental information and the objectivity. Lattemann et al. [36] who have done a research using sample of 68 large firms from China and India found that there is significant and positive impact on sustainability and CSR disclosure. Similarly, Herda, Taylor and Winterbotham [37] found significant positive relationship between non-executive directors and sustainability reporting among the largest 500 companies in USA. The authors mentioned that their findings support the suggestion of monitoring function of independent directors improves the transparency of organisation through voluntary disclosures. Ramadhan [38] also supported the same finding of existence of significant relationship between independent directors on board and voluntary disclosure level. Since extant literature provides enough evidence on the impact of board independence on both financial performances and sustainability reporting, it can be argued that higher number of independent directors leads to higher level of sustainability reporting and thereby enhance firms' performances.

Gray et al. [39], bear the idea that sustainable companies are likely to show better financial results in their performances. This is due to sustainability reports that pave path to identify whether company is sustainable or not and it will help to reduce costs associated with waste, liability and clean up [39]. With reference to the extant literature, although the importance of sustainability reporting is immense which is benefited in different ways for an organization, still Sri Lankan firms have not shown much stimulation in this area [40]. Thus, voluntary disclosure level is not at a satisfactory level in Sri Lanka compared to developed markets. Especially, the sustainability reporting is rather new chapter to Sri Lankan corporate sector [26]. Since sustainability reporting is not a mandatory requirement for listed companies in Sri Lanka, board of directors may not give a considerable weight to it [41]. Due to non-mandatory requirement, there are considerable variation in sustainability reporting in the corporate sector such as high to low [42]. Since the primary task of any company is to oversee and exercise its control over the management in ensuring the stakeholders interests [43], absence of sustainability disclosure is one of the necessities of stakeholders and may damage the image of the company in the society and loose its public faith. Lack of disclosure on sustainability creates an information asymmetry for stakeholders and this ultimately result in an inefficient resource allocation which has unfavorable impact on economy at the end [44]. In this situation, this paper investigates the role of sustainability in enhancing economic performances of corporations. Further, taking the paramount importance of board independence into consideration, this study aims to identify the behaviour of board independence as a moderating role to the relationship between sustainability reporting and firm performances. As there is dearth of studies which tested the effect of board independence over the relationship between sustainability and firm performances, findings of this study might contribute to extant literature with fruitful insights. Accordingly, based on the contemporary importance, availability of contradictory evidence and dearth of studies observed in the study area, the main issue addressed in this study is "Does board independence moderate the association between sustainability reporting on performance?". Based on this problem statement, as the first objective, the study attempts to measure the level of sustainability reporting and firms' performances among non-financial listed companies in Sri Lanka. Secondly, this study aims to investigate the association between sustainability reporting

and firms' performances. Finally, it examines the moderating role of board independence over the aforesaid relationship

II. SIGNFICANCE OF STUDY

According to extant research, there are concerns on sustainability reporting in terms of social and environmental indicators in Sri Lanka and considerable variation in the levels of reporting could be seen among large to medium scale corporations as well [42]. Moreover, most of the studies have used a one-dimensional measure to capture the level of sustainability or consider the merely the availability of sustainability reports only. In contrast, this study uses a comprehensive sustainability index to measure its level using the Global Reporting Initiative (GRI) G3 framework for all the listed companies in Sri Lanka except financial firms. Apart from that, to the best of our knowledge, there is no study that has taken place in Sri Lanka to test the moderating role of board independence on the relationship between sustainability reporting and firm's performances. Thus, it is expected that this study will contribute to the extant local and international literature by filling these gaps observed. Moreover, findings of this study might provide fruitful insights to the policymakers and relevant decision makers.

III. CONCEPTUAL FRAMEWORK

The conceptual framework based on the extant literature is shown in Figure 1 as follows.
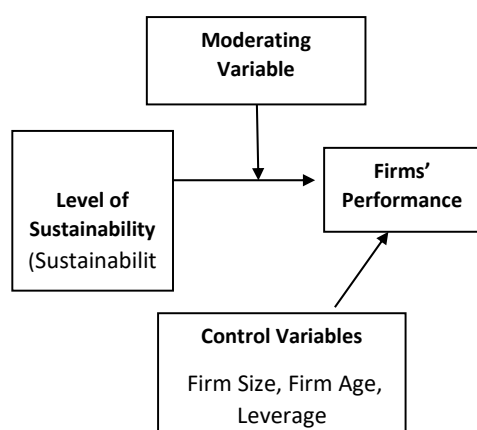
Figure 1: Conceptual Framework (Source: Author Constructed)

This study used the quantitative research approach because it examines the current level of sustainability reporting and firms' performances as well as investigates the relationship between these two constructs, which is therefore deemed appropriate. Other studies too have used a quantitative approach in achieving similar objectives as of the current study [44]. As of 31st March 2017, there were 222 listed non-finance companies, which forms the population of this study. From those, 31 companies removed which have different financial period (31st December) and 17 companies were not taken due to unavailability of information. Thus, 174 companies have been selected as the final sample of the study for the period of 2014 to 2017 and thereby 696 observations were made.

IV. DEVELOPMENT OF HYPOTHESES

Publishing sustainability information can be seen as positive news and can therefore improve the firm's reputation [14]. To this end, certain studies have identified that significant association between sustainable reporting and operational performance [15 & 18]. Thus, in determining the impact of sustainable reporting on firms' performance, the following hypothesis is developed and tested in this study

H1: There is a significant association between sustainable reporting and economic performances of firms.

It is said that independent directors on board restrict the opportunistic behaviour of CEO and control the board [25]. Further, they are dedicated to monitoring of voluntary disclosures and thereby supports to increase public confidence as well. On the other hand, many researchers found that independent directors' impact positively on economic performances [31]. Thus, this research designed to investigate the moderating role of independent directors to the relationship between sustainability reporting and performances and to achieve this, following hypothesis have been developed:

H2: The Board independence positively moderates the association between sustainability reporting and financial performance of firms.

V. Operationalization

Level of sustainability reporting ($SR_{i,t}$) was measured based on Global Reporting Initiative (GRI) G3 framework which is one of most comprehensive frameworks prevailing among other similar indexes which covers considerable area of sustainability via its indicators [46] and it is currently the most widely accepted model in terms of Sustainability Reporting [47]. 79 indicators that consist of Economic, Environment and Social dimensions are considered for data collection on sustainability. The scale adopted from Al Tuwaijri, Christensen and Hughes [48] was used to collect data where a maximum of 3 points was given for detailed quantitative disclosures related to indicators were made, while a score of 2 was assigned for non-quantitative but specific information related to indicators were disclosed, and lowest value of 1 was given for general qualitative disclosures, and finally a score of 0 was assigned for firms which has not disclosed any information related to the relevant indictors. Under dependent variables, the study used Return of Assets (ROA) to represent firm financial performance. $ROA_{i,t}$ was calculated as: (Net Income + Interest expenses) / Total Assets (Senanayake & Ajward, 2017) The board independence ($BI_{i,t}$), the moderating variable in the study was operationalized as the proportion of independent non-executive directors on the board to the total board of directors [49]. In terms of control variables, the study used Firm size ($FS_{i,t}$) which was measured as the Natural logarithm of total assets for the firm i at the end of the period t [11], Firm age ($FA_{i,t}$) which was operationalized as Number of years from incorporation for the firm i and until the end of the period t [14] and Leverage ($LEV_{i,t}$) measured through Ratio of total debt at the end of the period to the total assets at the end of the period t of firm i. [50].

VI. Data Analysis Strategies

This section discusses the analytical strategies used in the study to achieve its objectives. Data cleaning and screening strategies were used before performing both the descriptive and regression analyses. Variables were winzorized in order to address the issue of outliers. Measures of central tendency and dispersion such as mean, median and standard deviation were estimated to assess the level of sustainability reporting and firms' performances to achieve the first objective of this study. Next, for the second and third objective of this study, which was to find out the impact of sustainability reporting on firms' performances, and the moderating role of board independence, correlation and multivariate regression analyses were performed.

TABLE I: DESCRIPTIVE STATISTICS

Variable*	Obs.	Mean	Median	Std. Dev.	Min	Max
$SR_{i,t}$	696	.352	0.071	.0443	.011	.256
$ROA_{i,t}$	696	.064	0.061	.05	-.01	.147
$BI_{i,t}$	696	.668	0.666	.196	0	1
$FS_{i,t}$	696	21.697	21.79	1.162	19.66	23.39
$LEV_{i,t}$	696	.32	0.31	.207	.03	.65
$FA_{i,t}$	696	45.618	35	29.365	16	106

VII. Data Analysis

Table 1 shows the measurements describing the distribution of values associated with the main variables included in the study. The variable of sustainability reporting ($SR_{i,t}$) shows a median and mean value of 7.1% and 35.2% respectively, which indicates a quite low value and high variation among the listed non-financial companies. Next, the average value of firm performance ($ROA_{i,t}$) is 0.064 and median value is 0.061. Further, it ranges between -0.01 to 0.147. Board independence ($BI_{i,t}$) is 66.8% on average signifying that the boards consist of 66.8% of independent directors. In terms of the control variables, mean value for firm size ($FS_{i,t}$) is 21.697 (natural logarithm). Average for the firm leverage ($LEV_{i,t}$) is 0.32, while Firm Age ($FA_{i,t}$) is 45.618 years on average among listed non-financial firms in Sri Lanka.

Table 2 presents the results of the correlation analysis on the relationships between the selected variables of the study. Accordingly, there is a significant *(p<0.05)* positive association between level of sustainability reporting ($SR_{i,t}$) and firm performance ($ROA_{i,t}$).

TABLE II: CORRELATION ANALYSIS (*P<0.05; **P<0.01)

	$ROA_{i,t}$	$SR_{i,t}$	$BI_{i,t}$	$SR_{i,t} \times BI_i$	$FS_{i,t}$	$LEV_{i,t}$	$FA_{i,t}$
$ROA_{i,t}$	1						
$SR_{i,t}$	0.202*	1					
$BI_{i,t}$	0.111*	0.054	1				
$SR_{i,t} \times BI_{i,t}$	0.232*	0.977*	0.197*	1			
$FS_{i,t}$	0.127*	0.424*	-0.076	0.414*	1		
$LEV_{i,t}$	-0.103*	0.088	0.007	0.098*	0.099*	1	
$FA_{i,t}$	0.027*	-0.037	-0.031	-0.031	0.174*	-0.172*	1

Further, there is a significant *(p<0.05)* positive association between board independence *(BI_{i,t})* and firm performance *(ROA_{i,t})*. Moreover, there is a significant *(p<0.05)* positive association between firm size *(FS_{i,t})* and firm performance *(ROA_{i,t})*. However, there is a significant *(p<0.05)* negative association between leverage *(LEV_{i,t})* and firm performance *(ROA_{i,t})*. Further, there is a significant *(p<0.05)* positive association between firm age *(FA_{i,t})* and firm performance *(ROA_{i,t})*.

TABLE III: CORRELATION ANALYSIS

	OLS Regression Analysis		VIF	Panel Regression Analysis	
	Coefficient	*p*-Value		Coefficient	*p*-Value
$SR_{i,t}$	0.037**	0.002	1.17	0.299**	0.008
$BI_{i,t}$	0.007	0.501	1.08	0.001*	0.031
$SR_{i,t} \times BI_{i,t}$	0.099	0.303	1.36	0.053*	0.041
$FS_{i,t}$	0.002	0.141	1.32	0.011	0.289
$LEV_{i,t}$	-0.032**	0.000	1.07	-0.114**	0.000
$FA_{i,t}$	0.001	0.974	1.08	0.001	0.451
Pseudo R² R^2	0.091			-0.118	
F - test	-			5.59	
Chi-square	10.30			-	
Prob > F	-			0.000	
Prob > chi²	0.000			-	

Table 3 presents the ordinary regression analysis and panel regression analysis. There is a systematic *(p<0.01)* positive association between sustainability reporting *(SR_{i,t})* and ROA *(ROA_{i,t})*

under both OLS regression and panel regression analysis. Furthermore, the results also indicated that greater availability of independent directors positively *(p<0.05)* moderates the relationship (under the panel regression analysis) between sustainability disclosures and financial performance of firms. Moreover, the firm leverage *(LEV_{i,t})* shows a systematic *(p<0.01)* negative association between firm performance *(FP_{i,t})* under both OLS and panel regression analysis. Thereby, it can be state that both hypothesis of the study is supported by the obtained results.

VIII. DISCUSSION

The level of sustainability (mean: 35.2%; median: 7.1%) is still not at a satisfactory level among listed non-financial firms in Sri Lanka. However, this level is slightly higher than Pakistan and Bangladesh whose sustainability reporting levels are 32.71%and 22.3%, respectively [51]. Liyanagedara and Senaratne [40] who have examined compliance to GRI guidelines among listed companies in Sri Lanka, presented in their research findings that level of compliance to GRI in disclosing sustainability is low among public listed companies and it varies largely among companies. This is true for the study since there is high standard deviation (0.443) recorded for level of sustainability disclosures in summary statistics. One of the main reasons for low level of sustainability reporting is the nature of the regulation over sustainability reporting in Sri Lanka. Since sustainability reporting is still non mandatory, companies might not pay considerable attention on this [26]. Both OLS and panel regression showcase that sustainability reporting influences for better economic performances in a firm and

this finding supported the first hypothesis of this study. This result is consistent with the Bhatia and Tuli [14] as they identified that the publishing sustainability information can be seen as positive signal and can therefore improve the firm's reputation (with positive effects of performance) and further helps to avoid a decrease in share price. Further, Bodhanwala and Bodhanwala [15] and Clarkson et al. (2013) found similar positive relationships between sustainability and financial performance. The main reason for this situation could be the fact that higher level of sustainability reporting uplifts the reputation of the entity and make a favorable impression on stakeholders which in turns improves the performances [52]. Besides that, Gray et al. [39], bear the idea that sustainable companies are likely to show better financial results in their performances. This is due to sustainability reports that pave path to identify whether company is sustainable or not and it will help to reduce costs associated with waste, liability and clean up [39]. Furthermore, the findings of this study indicate that board independence positively moderates the association between sustainability reporting and performances, which is consistent with Alipour et al. [52] who found that board independence significantly moderates the aforesaid relationship. Similarly, Kao, Hodgkinson and Jaafar (2018) have also generated the same results by finding out that board independence significantly affects firms' performances in listed companies of Taiwan. Independent directors put more pressure on managers to enhance sustainability reporting to align actions of the entity with societal values and expectations which ultimately increase organizational legitimacy [54 and; 55]. In other words, independent directors play a significant role in implementing strategies to enhance voluntary disclosures to protect interest of different stakeholder groups and thereby influence to performances of corporations [56]. In terms of control variables, negative impact of leverage on firm performances is consistent with the results of Hovakimian et al. [57] who stated that leverage may negatively affect performances in long run. Similarly, Alipour et al. [52] found out that firm leverage has negative impact on all the measurements of performances in listed Iranian countries over six years period. However, this result is contradictory to Palaniappan [58] who found no significant association between them.

IX. CONCLUSION

It is debated in literature that sustainability reporting is expected to increase public confidence in organization and more trustworthiness in managing resources such as human, finance, etc. which have direct impact on performance of the entity. With the low level of sustainability reporting in Sri Lanka, investigating on influence of sustainability reporting on firm performances is a contemporarily important. Since there's dearth of studies to examine the role of board independent as a moderator to the association of sustainability reporting and firm performances and considering the paramount importance of it, this study expanded its scope to investigate the importance of board independence on the aforesaid relationship. All the listed non-financial companies amounted to 174 were used in the study which covered 16 sectors in Colombo Stock Exchange. According to descriptive statistics, the level of sustainability reporting in line with GRI G3 guidelines was not at a satisfactory level (mean: 35.2%). However, the level of board independence is at a satisfactory level (66.6%), yet below the level of developed economies. Moreover, OLS regression analysis revealed that sustainability disclosures have a significant positive impact ($p<0.01$) on firms' financial performance. Furthermore, the results also presented that greater availability of independent directors positively ($p<0.05$) moderated the relationship (under the panel regression analysis) between sustainability disclosures and financial performance of firms which is a strong affirmation for agency theory. In terms of policy implications, it could be suggested that the regulators and the policymakers need to take necessary steps to promote sustainability disclosures among listed companies in Sri Lanka as it has a positive impact on economic performances of corporations from which stakeholders would gain numerous benefits. It should be note that present study is limited to listed companies in Sri Lanka due to the convenience of access to reliable information, and thus this scope could be widened to non-listed companies in future studies.

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The Role of Workers' Remittances in Economic Growth: The Sri Lankan Context

Sunari Bandara

Faculty of Business

NSBM Green University

sunarib@nsbm.lk

Abstract— **Workers' remittances have grown in importance as a source of foreign exchange in Sri Lanka over the past few decades. Many Sri Lankans migrate to other countries in search of employment and remit their earnings back to their families in their home country. Though workers' remittances tend to uplift the financial situation of receivers, it is doubtful whether remittances have a real impact on the growth of an economy. This has been an area of interest to may research scholars. Since Sri Lanka is a recipient of a large amount of remittances, it is worthwhile to identify the relationship between workers' remittances an economic growth in the country.**

Hence, this study is focused on identifying the significance of the relationship between workers' remittances and economic growth, in the Sri Lankan context. As per the results of the statistical analysis conducted, a negative, but insignificant relationship is found between workers' remittances and economic growth. The analysis is followed by the conclusion, where the author concludes that, though workers' remittances is a steady source of foreign exchange, seeing that it has a negative impact on growth, the country should not rely on workers' remittance inflows as a source for growth

Keywords— workers' remittances, economic growth

I. Introduction

Remittances are an important source of foreign exchange to recipient countries. Moreover, remittances are a very important capital source for developing countries according to the 'International Migration Outlook SOPEMI 2006 Edition' published by OECD [1]. Compared to other sources of external capital inflows, workers' remittances are considered to be more stable in nature([2];[3]). Reference [4] states, 'Remittances were one of the least volatile source of foreign exchange earnings for developing countries in the 1990s'(p. 160). When considering South Asian countries, the region is seen as dependent on remittances. India is the largest receiver of remittances worldwide. The top five remittance receivers in the region in 2015 were India, Pakistan, Bangladesh, Sri Lanka, and Nepal in order of value of receipts. The amount of remittances to the region are significant in absolute terms, and as a proportion of GDP [5].

Remittances is a significant source of foreign exchange inflow to Sri Lanka as well. Sri Lanka, being a developing country is becoming more and more dependent on workers' remittances for export income. From a mere 11.75% in 1980, workers' remittances have grown up to 41.4% of export income of the country[1]. As a percentage of GDP, it was only 4.9% in 1986, but grew to 8.9% in 2016. When comparing remittance inflows with other sources of foreign earnings, for example in 2015, remittance inflows were US$ 7 billion, while net FDI inflows were US$0.681 billion, and net official development assistance (ODA) received were US$0.427 billion. Hence, remittances received is almost ten times the magnitude of net FDI inflows and sixteen times the magnitude of the net ODA received[2]. Workers' remittance flows in Sri Lanka has always displayed a growing trend, yet in 2015 it

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[1] Calculated by author according to world bank statistics obtained from the website: data.worldbank.org

[2] Calculated by author based on World Bank data on concerned variables

showed a slight decrease than the previous year. However, 2016 has recorded the highest amount of Workers' remittances yet, which was US$ 7.242 billion. Sri Lanka was among the top 5 remittance recipients of South Asia, in the two consecutive years, 2014 and 2015[6].

In Sri Lanka emigration for work has helped in reducing the unemployment issues in the country as well as reducing poverty. These are the main reasons why Sri Lankans seek foreign employment. This is proven by the fact that departures for foreign employment increased from 14,456 in 1985 to 263,307 in 2015. According to Sri Lanka Bureau of Foreign Employment statistics, the departures for foreign employment was 14,456 back in 1986 and has been increasing over the years and reached 263,307 in 2015. The increasing amount of departures for foreign employment increases the amount of money remitted to Sri Lanka from other countries.

The importance of workers' remittances in a country's economy has been a subject of interest over the years, especially in developing countries. Many researchers have conducted researches to study the impact as well as causal relationship of workers' remittances and several macraeconomic dimensions such as economic growth, education, poverty and inequality, and financial development.

A. Research objective

The current study aims to identify the significance of the relationship between workers' remittances and economic growth in Sri Lanka.

II. LITERATURE REVIEW

Numerous studies have been conducted by scholars on the importance of Workers' remittances and its impact on different dimensions of the economy, some of them being the impact on poverty alleviation, financial development, and economic growth. Some of these empirical studies which concern the same or a similar theme as the study carried out have been discussed in detail throughout this section.

Reference [7] in the effort to determine the impact of workers' remittances on growth and poverty reduction in developing Asia-Pacific countries, study panel data of 17 developing countries in the Asia-Pacific over the period 1993-2003. Generalized methods of movements (GMM) was used in the study. Based on the extended neoclassical model [8] the role of remittances on economic growth has been studied. It was found out that remittances have a significant impact on poverty alleviation. However, though positive and significant, only a marginal impact on economic growth was observed in this study.

Reference [9] carry out a study in a panel of 66 countries to determine whether remittances and financial development are substitutes, or complements in economic growth. Data from 1970 to 2004 is considered. Regression analysis and Small group mathematical modelling are used for the analysis, to arrive at the conclusion that impact of remittances on economic growth is negative in countries where bank efficiency is low, and positive where bank efficiency is high.

Reference [10] uses a cross-country data series spanning from 1975 to 2002 covering over 100 countries, to investigate the interaction between remittances and financial development and its impact on growth. Generalized Method of Moments approach is used in the analysis. Since borrowing is difficult in developing countries, they test the hypothesis that remittances can be used as a substitute for lack of financial development, which can promote growth. The analysis concludes that remittances can promote growth in less financially developed countries.

Reference [11] carry out a study to find out whether international migration and remittances reduced poverty in developing countries. Cross-country data from 71 developing countries is analysed in the study using Ordinary least squares method. The result is that international migration, and remittances significantly reduce the level, depth, and severity of poverty in the developing world.

In [3], the researchers study the relationship between workers' remittances and economic growth in China and Korea using time series data from 1980 to 2009. Cointegration tests have confirmed the existence of significant positive long run relationship between the two variables in Korea, but significant negative relationship in China. Error correction model has confirmed a significant positive short run relationship of workers' remittances and economic growth in Korea, but in China it was insignificant. Unidirectional causality from workers'

remittances to economic growth in both countries were confirmed using Causality analysis.

The researchers in [12] investigate the causal link between remittances and economic growth in Bangladesh, India, and Sri Lanka. Time series data over a period of 25 year were used to run Granger causality test under a VAR framework. Econometric tests such as unit root test, cointegration and causality were used in the analysis. It was found that remittances lead to economic growth in Bangladesh, while in India no causal relationship was identified. However, in Sri Lanka, a two-way directional causal relationship was found, which meant remittances promoted economic growth, and economic growth promoted remittances.

[13] investigates the relationship between workers' remittances and economic growth using the data from top 11 remittances recipient developing countries in the 2009 list of top remittance recipient countries in the world: Bangladesh, Dominican Republic, El Salvador, Gambia, Guatemala, Honduras, Jamaica, Lesotho, Philippines, Senegal and Sri Lanka. Pooled mean group (PMG) approach and panel cointegration techniques were used on panel data from 1985 to 2009. Though a positive long run relationship between remittances and GDP was observed, the magnitude of the remittance-GDP coefficient is small.

[14] uses panel data of 113 countries from 1970 to 1998 to study the role of remittances in development and economic growth. They hypothesis that because remittances are made under asymmetric information and economic uncertainty, there is a serious problem of moral hazard. The conclusion of the study is that remittances have a negative effect on economic growth in the long run, and that remittances do not seem to be an important source of capital for economic development. The results indicate that there is a severe moral hazard problem indeed.

[15] studies whether workers' remittances promote economic growth using data of 84 countries for the period 1970-2004. Growth regressions are estimated using five-year panels for two different sets: all countries, and emerging economies only. They conclude that, at best, workers' remittances have no impact on economic growth.

[16] studies the impact of migrant remittances on economic growth in South Asia using panel data for the period 1970-2008. The countries studied include India, Sri Lanka, Pakistan, Bangladesh, Nepal and the Maldives. Ordinary Least Squares and General Method of Moments (GMM) are used in the analysis. The study concludes that migrant remittances have a significant positive effect on economic growth, when education and financial sector development are comparatively high.

[17] uses data from 99 developing countries for the period 1975-2003 to study the impact of remittances on financial sector development. The effect of remittances on bank deposits, as well as on bank credit to the private sector are studied specifically. Fixed effects and Random effects regressions as well as GMM are used in the analysis. The study concludes that remittances have significant positive effect on bank deposits and credit to GDP, and that remittances promote financial development in developing countries.

[18] studies the importance and impact of remittances on the Indian economy. Time series data for the period 1975-2011 are used in the study. The tests have been done with the use of Johansen's cointegration techniques and Granger's causality analysis. It concludes that remittances play a significant role in the economic growth of India.

[2] studies the impact of workers' remittances on economic growth in Pakistan. Time series data from 1991 to 2012 are used to develop a regression model. Total factor productivity is the factor through which impact of workers' remittances is assumed to act. The conclusion is that there is a significant positive relationship between workers' remittances and economic growth in Pakistan.

Accordingly, many studies have been conducted concerning the relationship and impact of workers' remittances (or remittances in general) on various economic variables such as economic growth, poverty alleviation, financial development and investment.

While the focus of this study is the relationship between workers' remittances and economic growth, workers' remittances is seen to impact several other important areas of the economy of a country.

However, when comparing the previous studies in the area concerned, consistency of the results is lacking. Some conclude that there is a positive relationship between workers' remittances, while

others conclude a negative relationship. A separate set of research conclude there is no relationship between the two variables.

Due to these contradictory results, and the absence of a specific growth model which incorporates remittances, this study has been undertaken. It aims to find out the relationship between the two concerned variables, giving complete focus to Sri Lanka.

III. METHODOLOGY

The current study follows the study conducted by [10], to investigate the interaction between remittances and financial development and its impact on growth, with certain adjustments ratified later in the discussion. The same study has been used as a basis by other scholars such as in [9] conducting research in the same area.

To investigate the significance of the relationship between workers' remittances and economic growth in Sri Lanka, the conceptual framework (**Error! Reference source not found.**) in the appendix is used by the author.

B. Variables

According to **Error! Reference source not found.**, workers remittances is the independent variable, while economic growth is the independent variable. Workers' remittances are measured by the share of workers' remittances out of GDP. The data is extracted from various issues of the Annual reports of Central bank of Sri Lanka. Economic growth is measured by the growth of real GDP per capita in constant (2010) dollars, for which data was extracted from the World development indicators, World Bank. Several control variables are included in the study, as it is expected that those variables will have a significant relationship with the dependent variable, but they are not of primary interest in the current study. The control variables included are, investment measured by the share of gross fixed capital formation out of GDP, fiscal performance measured by the budget deficit as a share of GDP, openness to trade measured by the sum of exports and imports as a share of GDP, population growth measured by the log difference of population, and initial level of GDP per capita measured by GDP per capita in constant (2010) dollars lagged by one year. All data for control variables except initial level of GDP per capita were extracted from various

issues of the Annual reports of Central bank of Sri Lanka. Data for initial level of GDP per capita was extracted from the World development indicators, World Bank.

To measure the economic growth, growth of real GDP per capita in constant dollars is used as it has been accounted for possible fluctuations due to inflation, and hence is more reliable. It is the most commonly used measurement by scholars such as [9], and [10] in similar studies to measure economic growth. When considering the measurement of workers' remittances, workers' remittances as a share of GDP, or remittances in general as a share of GDP, has been used by many scholars who conducted research on this area such as [10], [15], and [19]. Rather than using remittance flows directly, considering it as a share of GDP increases comparability with other variables. To measure the variable investment, gross fixed capital formation as a share of GDP is used which increases comparability and is also used in the study by [10]. Similarly, the measurements used for variables fiscal performance, and openness increase comparability to other variables, and are used in similar studies such as those by [9], and [20]. To measure population growth, log difference of population is taken, as done by [10]. The one-year lagged value of GDP per capita have been used in the model of [10]. This variable is also included in other researches concerned with economic growth such as [21], where it has proved to be of significance. Hence, the current study also includes the one-year lagged value of GDP per capita as a variable.

There are certain variables used by [10], that are absent in the current study. They are Inflation, and Human capital. The foremost reason for dropping these variables is that the time series data span on a limited period, which is only 31 years. Hence including too many regressors might complicate the model. Further, there is no single specific measure for human capital. [10] has used the average years of secondary schooling of total population to measure human capital as a proxy for human capital. Due to the absence of reliable time series data on average years of secondary schooling in the studied context, scholars [9] who based on the model used by [10], have excluded this variable. This is also the case in the current study. Average years of secondary schooling of total population, or at

least school enrolment rates are not available in the Sri Lankan context for the whole of the considered period. As for inflation, it is excluded because [9] has found it to be rarely significant, and when included in the model of the current study, it is highly insignificant and brings down the reliability of the model.

C. The model

Based on the conceptual framework (**Error! Reference source not found.**), the estimation equation used in the study is as follows:

$$GDPPC_t = \beta_0 + \beta_1 WR_t + \beta_2 GFCF_t \\ + \beta_3 BD_t + \beta_4 POPN_t \\ + \beta_5 TRD_t + \beta_6 GDPPC_{(t-1)} \\ + \varepsilon_t$$

(1)

Where $GDPPC_t$ is the GDP per capita in constant (2010) dollars, β_0 is the intercept, β_i is the coefficient of the respective variable (i=1,2,3,4,5,6), WR_t is the workers' remittances as a share of GDP, $GFCF_t$ is the gross fixed capital formation as a share of GDP, BD_t is the fiscal deficit as a share of GDP, $POPN_t$ is the log difference of population, TRD_t is the sum of exports and imports as a share of GDP, $GDPPC_{(t-1)}$ is the previous year GDP per capita, and ε_t is the error term

The variables $GDPPC_t$, WR_t, $GFCF_t$, TRD_t, and $GDPPC_{(t-1)}$ are in the form of logarithms. This is consistent with the methods used by scholars such as [10], [9], [20], and [21] and many more. They will be differenced to achieve stationary series.

The above model (1) will be applied to data for Sri Lanka, spanning from 1985 to 2015, which is a 31-year period. This period is considered because time series data for all the concerned variables are available only for this period. As mentioned, all data are extracted from secondary sources. The reasons for using secondary data are the availability of data for measuring the variables of concern for a considerable period from official and reliable national and international sources. The mentioned sources have been used due to the high reliability, and due to the fact that other scholars have also used the same sources in their studies.

The gathered data will be entered into an excel sheet to be analyzed using the E-views software, given the fact that the data are all time series.

IV. ANALYSIS

A. AuDescriptove statistics

The descriptive statistics of the variables of concern after being transformed for the estimation of the model is depicted in **Error! Reference source not found.**. The first difference of log transformed variables give the percentage change of a variable, hence approximately the growth rate. According to the table, the approximate mean growth rate of GDPPC is 4% during the concerned period. It has reached a maximum of approximately 9% and reached a minimum of -2% during the period. As for the main variable of concern, workers' remittances have an approximate average growth rate of 2% during the period. It has once reached a maximum of approximately 14% and has reached a minimum of -7.6%. The approximate average growth rates of population are 0.9%, while trade has grown at an average of -0.9% during the period. The average fiscal deficit during the period was 8% of GDP.

The correlations between the concerned variables before transformation are given in **Error! Reference source not found.** According to the table, GDP per capita has a strong positive correlation with the variable of concern: workers' remittances, and control variables: budget deficit, one-year lagged GDP per capita, and investment. It has strong negative correlations with trade as a share of GDP, and population growth. Workers remittances has strong positive correlations with budget deficit, and one-year lagged GDP per capita. It has strong negative correlations with population growth, and a moderate negative correlation with trade as a share of GDP.

The bivariate correlations between the transformed variables are depicted in Table 3. According to the table, the growth of GDPPC has a weak negative correlation with the variable of interest: growth of workers' remittances. Growth of workers' remittances is positively correlated with fiscal deficit and growth of investment, and negatively correlated with all other variables. However, none of the correlations are strong. The growth of GDPPC has a positive correlation with fiscal deficit, growth of trade as a share of GDP, growth of investment and growth of one-year lagged GDPPC. These are consistent with the findings of [10]. Growth of GDPPC has a

negative correlation with the population growth, which is opposite to that identified by [10]

B. Diagnostic tests

To test Stationarity, following the works of [10], [21] and many more, all the variables except BD/GDP have been taken in logarithms. Hence, the stationarity of the log transformed variables have been tested for stationarity using Augmented Dickey-Fuller (ADF) test. According to Table 4. LGDPPC, LWR, POPN, LTRD, LGFCF, and LGDPPC$_{(t-1)}$ are stationary at the first difference. That is, they are integrated of order 1: I (1). BD is stationary at level.

When testing for multicollinearity, nce the variables are transformed, the variable of interest and control variables do not have a strong linear correlation between each other, except for a moderate correlation between population growth and budget deficit, between population growth and growth of one-year lagged GDPPC, and between budget deficit and growth of one-year lagged GDPPC. When considering the standard error of the regression model depicted in Table 9, it is a low value, which is 0.0133. This does not raise any concern regarding multicollinearity. Variance inflation factors are used to test for multicollinearity (Table 5) The uncentered Variance inflation factors (VIF) of DWR, the variable of concern, is 1.25. Hence, the standard error is inflated only by 1.25 times than if there were no collinearity in workers' remittances with any of the control variables. This is also very near to 1, which indicates there is no problem of collinearity. The multicollinearity between the rest of the control variables is not expected to affect the concerned variable. When considering the uncentered (VIF), control variables POPN, and BD seem to have a collinearity problem. That is because they are higher than 10, the rule of thumb followed by many scholars, given by Marquardt (1970). However, it is important to ensure that there is no omitted variable problem. Therefore, none of the two variables can be removed from the model.

To test for heteroscedasticity, the White's test for heteroscedasticity has been used. According to Table 6, the probability (p-value) of the test statistic exceeding the critical value of the Chi-square test is 0.36, which is well above an α of 5%. There is no heteroscedasticity in the regression model developed.

To test for autocorrelation, the Breush-Godfrey Serial correlation LM test has been used. According to Table7, the probability (p-value) of the test statistic exceeding the critical value of the Chi-square test is 0.84, which is well above an α of 5%. Hence, there is autocorrelation of the disturbance terms in the regression model developed.

According to Table 10, the probability (p-value) of the test statistic exceeding the critical value of the Chi-square test is 0.5567, which is well above an α of 0.05. Hence normality of residuals is ensured. But the Jarque-Bera test is said to be most suitable for large sample sizes. To ensure the normality of residuals, given the small sample, several other steps have been taken. According to Table 10, the mean of the disturbance terms is zero. Given the mean of zero and homoscedasticity, it can be concluded that the residuals, or disturbance terms are distributed normally. The QQ plot of residuals against expected normal distribution values is given in Figure 2. The residuals do not show a significant pattern around the straight line. Hence it can be concluded that the residuals are at least approximately normally distributed.

C. Time series analysis

After conducting the diagnostic tests, and tending to possible problems, the regression was run on E-views. The regression results are depicted in Table 9. The log difference of GDP per capita was regressed on the variable of interest: log difference of workers' remittances, and control variables: log difference of population, log difference of trade as a share of GDP, log difference of gross fixed capital formation as a share of GDP, log difference of one-year lagged GDP per capita, and budget deficit.

When considering the adjusted R^2 value, it can be stated that the independent variable and control variables together explains approximately 63% of the variation in the dependent variable, economic growth. It could have been improved by including other control variables which affect economic growth. However, given the limited sample, introducing more control variables will make the model too complex, and may distort the regression results. The Durbin Watson statistic of the model is 2.09, which is consistent with the fact that there is no autocorrelation in the model.

According to the output Table 9, the probability of the F statistic exceeding the critical value is 0.00. The p-value is zero, which is less than a significance level of 5%. It indicates that the model is significant as a whole. At least one independent variable is significant. The coefficients are not all equal to zero when considered together. The individual coefficients are then checked for significance at 5% significance level. If the p-value of the respective t-statistic is less than 5%, the null hypothesis which follows (hypothesis 1) is to be rejected.

Hypothesis 1: The independent/control variable has a significant impact on the dependent variable

H_0: $\beta_i = 0$ (where i=0, 1, 2, 3, 4, 5)[3]

H_1: $\beta_i \neq 0$

For example, to test whether the independent variable has a significant relationship with economic growth, the following hypothesis are tested (hypothesis 2).

Hypothesis 2: The independent variable workers' remittances has a significant relationship with the dependent variable economic growth

H_0: $\beta_1 = 0$

H_1: $\beta_1 \neq 0$

As per Table 9 the p-value of the coefficient of the independent variable exceeds the significance level. Hence the null hypothesis is not rejected. This means that the coefficient is not significantly different from zero, indicating that there is no significant relationship between growth of workers' remittances and economic growth.

The independent variable, workers' remittance has a negative relationship with economic growth when the control variables are held constant, according to the findings of the current study. It is consistent with the findings of [14], and [15]. Workers' remittances as a share of GDP has been taken in the log difference form to develop the regression model. If the growth of workers' remittances as a share of GDP is increased by 1%, it will lead to a -9.38% impact on the increase in economic growth. However, this relationship is found to be insignificant. This is consistent with the findings of [7], who also found that remittances have negative but statistically insignificant direct impact on economic growth. This could be due to the fact that most of the remittances are spent for consumption, and repayment of loans, rather than saving or investment. Most Sri Lankans go for foreign employment when their debt burden is unbearable, or when they find no other employment opportunity that would pay them enough to maintain a family.

Population growth has a significant negative relationship with economic growth. This is consistent with the findings of [9], but contrasts with the findings of [10]. The result might be because Sri Lanka is still a developing country, and the growth of population means healthcare, education and other services should be expanded to facilitate the increasing number of people. This might be a burden on a developing country like Sri Lanka with limited resources.

Investment growth proxied by gross fixed capital formation has a significant positive relationship with economic growth. This is consistent with the findings of [9], and [10]. This is a phenomenon stated in theory as well. Investment is an important component of Aggregate demand. On the other hand, according to the accelerator theory the rate of the change of economic growth affects investment.

Other control variables are not significant at 5% significance level.

The growth of trade has a positive relationship with economic growth, but it is insignificant, which is consistent with findings of [9]. Though [10] has found trade openness has a negative relationship with economic growth, they also have found it to be insignificant.

The budget deficit is found to have a positive relationship with economic growth. However, it is not significant at 5% significance level. [10] have also found budget deficit to have positive relationship with economic growth. However, they have found the relationship to be significant. It might be insignificant in the Sri Lankan context as much of the government expenditure is recurrent, not capital expenditure.

Similar to the findings of [9[, and [10], the one-year lagged GDP per capita has a negative relationship with economic growth. This is said to be evidence of a convergence process, where given the determinants of the steady state are held constant, poor economies tend to grow faster than the rich ones [7].

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[3] As described in equation (1)

V. CONCLUSION

The study was conducted by the author to identify whether there is a significant relationship between workers' remittances and economic growth, in the Sri Lankan context, using time series data of 31 years, from 1985 to 2015.

According to the results of the statistical tests analysed in chapter 4, it was identified that workers' remittances does not have significant relationship with economic growth. Even if there was, the relationship would be negative, implying that an increase in workers' remittances would adversely impact economic growth.

As stated by [15], 'remittances have contributed little to economic growth in remittance-receiving economies and may have even retarded growth in some'. They also state that when the growth equations are well specified, and remittance properly measured, a negative relationship between remittances and growth is often found.

The insignificant relationship could be due to several reasons. A foremost reason would be that most of the time, remittances are consumed or used to pay back debts rather than saving or investment. Sri Lankans tend to go for foreign employment due to their financial difficulties and remit back money for consumption purposes of the family members they left behind. The largest investment most of these people would typically do is to build a house. Other than that, the recipients of remittances often tend to depend on the remittance receipts and refrain from actively participating in any economic activity leading to a moral hazard problem as identified by [14].

Workers' remittances are highly regarded as a source of foreign exchange. It enables the reduction of poverty as proved by [7], and [11]. However, the impact of remittances on economic growth could be negligible because they are not channeled in official methods and used mainly for consumption.

As seen through this study, it is important to understand that the highly regarded workers' remittance inflows could be detrimental to economic growth in Sri Lanka, though it facilitates poverty reduction in many instances. Hence it is better not to have high expectations regarding the growth impact of workers' remittances, and better not depend on remittance flows much as a source of economic growth.

Further investigations with regard to the relationship, and impact of workers' remittances on economic growth would add much light in understanding the role of workers' remittances on economic growth in Sri Lanka. A regression model with different control variables which fit the analysis better than the current model could be employed. In addition to that, the impact of workers' remittances on economic growth through other variables such as investment or savings can be studied in the Sri Lankan context as done by [7], in developing Asian countries and the Pacific. This might provide evidence that though there is a direct impact of workers' remittances on economic growth, or not, there are other ways through which the remittance flows can be directed as to facilitate economic growth. Extending the period under study is also another option for further studies since the current data set is limited to 31 data points. Other than that, the role of workers' remittances on the development of human, and physical capital, and other important economic variables can be studied in the Sri Lankan context.

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Using an Algorithm to Optimize the Utility of Container Inventory through Virtual Container Yard (VCY)

Hansa Edirisinghe
Faculty of Graduate Studies and Research
Sri Lanka Institute of Information Technology
Malabe, Sri Lanka
hansaku.mu@gmal.com

Lalith Edisrisinghe
Faculty of Management Humanities and Social Sciences
CINEC Campus
Malabe, Sri Lanka
lalith.edirisinghe@cinec.edu

Abstract—The virtual container yard is an innovative tool that reduces the cost of empty reposition cost of container shipping lines. This concept is underpinning the container interchange between carriers. This paper evaluates the feasibility of introducing an algorithm to optimize the virtual container yard. A combination of qualitative, quantitative approach has been applied and dimension reduction factor analysis was used to analyze data. The container shipping lines may reduce the cost of container reposition by 15-20 percent. Through the virtual container yard. This study reveals key factors relevant to software application that may directly influence the new container management tool namely, virtual container yard as the concept needs a computer platform to operate it in the commercial context.

Keywords—Virtual container yard, inventory, management

I. INTRODUCTION

One of the most striking developments in the global economy since World War II has been the tremendous growth in international trade [1]. Shipping is a business that grew up with the world economy, exploring and exploiting the ebb and flow of trade [2]. From 1981 to 2009, global transport of containerized cargo increased approximately 3.3 times faster than the world's GDP [3]. World's very first all-container ship "Gateway city" was found in 1950 [4] and containerization was commercially implemented in the US in the mid-1950s [1] and is the driver of the twentieth century economic globalization and world container port throughput increased by an estimated 3.8 per cent to 601.8 million 20-foot equivalent units (TEUs) in 2012 [5].

Containerization was not just about ships but a new way of organizing transport [2] has made a significant change globally in the system of freight transport. However, container fleet size and the complexity of the container shipping network [6] have increased dramatically bringing more challenges to the operation of the container shipping system. Cross-border transportation is an engine to promote the foreign trade [7]. The system, that proved its potential as an increasingly efficient and swift method of transport, led to greatly reduced transport costs, and supported a vast increase in international trade.

Container inventory imbalance causes a substantial cost to carriers amounting to twenty two percent in the overall cost structure of containers. The most popular mechanism to overcome this problem is the repositioning of empty containers from the idle location to other locations where they are in demand. Also, there is no commonly accepted standard system to minimize the idle time of empty containers at storage. The virtual container yard (VCY) is a novel strategy underpinning the container interchange between carriers that could substantially reduce this ever-increasing container empty repositioning cost. And it ensures maintaining a balanced container inventory in a port through interchange between carriers. The VCY became a popular topic in the literature in the current decade as the alternative methods such as foldable containers did not prove expected results. This paper considers the operationalization of the VCY through the context of computing and information communication technology (ICT).

Although bigger Container Ships (CS) were built to derive benefits of the scale of economies carriers

found it always did not benefit given the derived demand factor inherent in the shipping industry. Economies of scale are pushing towards the largest container possible as it implies for inland carriers little additional costs [8]. Operators have not reaped the benefits of savings on slot costs [9]. In the past CSL operated weekly services independently; each CSL had their own ships plying between identical ports but they only load/discharge containers owned by them (except those who carried SOC[4]). However, economies of scale cannot be a panacea per se. Carriers must find some way to return to profitability [9]. In order to obtain the economies of scale advantage CSL later used to form consortia and share the ship space[5] adopting collaborative approach. Cooperation between the carriers is highly desirable [9]. Unlike the old liner system which focused on individual routes, today competition is global and companies develop alliances [2] and have sought extensive cooperation with others through formation of strategic shipping alliances [10]. Accordingly, CSL presently share ships space with competitors. In addition to sharing of vessel space, these alliances gradually extended the collaboration to other areas such as, service rationalization, operating expense sharing, equipment[6] interchange, and joint service contracts.

Although container interchange is not yet a popular mechanism, shipping lines used to interchange their ship space (slots) since last three decades. When CSL realized that they should collaborate to fill their ships they formed strategic alliances, but it took considerable time to form shipping alliances and exchange slots. Slot exchange became a buzz word in the container shipping industry years later after the economic benefits it offered were realized and understood. However, according to industry sources CSL do not pool their containers and interchange even if the contract agreements provide provision for same. The researcher learned some rare instances of exchange of containers between CSL when their exporters erroneously stuffed cargo in partners' containers. But such interchanges were done as a corrective measure for that particular situation only. There is no regular practice of interchanging containers between carriers to reduce empty repositioning requirements. Ultimate result is that

they never opt to strike a balance between the container inventories even within the active consortiums (alliances). Therefore, it is quite obvious that the behavioral patterns of CSL with respect to these two phenomenon (i.e. sharing ship space; and pooling containers) are not the same. The primary objective of Collaboration is to work with each other to do a task and to achieve shared goals. Inter-competitor cooperation is different from other types of inter-firm cooperation. [11]. Liner shipping competitors are companies with similar products and customers. Therefore, it is difficult for competitors to cooperate especially from the marketing perspectives and find the right balance between sharing knowledge and resources. Inter-firm cooperation is a source of competitive advantage. [12]. Obviously, they will be more cautious about the resultant visibility that generate through collaboration and any threats on preserving competitive advantage. There is often a general suspiciousness related to inter- competitor cooperation. It took sometimes to form alliances in sharing ship space too but it became a reality having realized it economic benefits. [13] in their study "Empty container repositioning in liner shipping" proposed external container sharing as a strategic option. It refers to pooling container fleets among different ocean carriers.

However, since the container exchange is perceived as a complicated mechanism the decision to exchange containers needs a serious evaluation of its pros and cons in every individual case. This obviously involves many decision parameters. Therefore, the authors believe that ICT could bridge this industry gap and facilitate most effective and economical decision to exchange containers. Accordingly, his paper discusses the possibility of deriving a VCY solution through an algorithm.

II. LITERATURE SURVEY

The increased attention by the researchers in the recent past shows the ever-increasing impact of container imbalance to the world. For example, only 14 publications were evident during 1972-2005 (33 years) compared to 50 publications during 2006-2011 (5 years) as revealed by [14]. Although the issue of empty container repositioning first attracted attention in the mid 90's, interest in this problem seems to have grown even further in the last five years. Considering the last five years as the

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[4] SOC – Shipper Owned Containers
[5] The "Product" component in container shipping comprises 'ship space' and 'containers'

[6] The words equipments and Containers are used interchangeably

pre- and post-global crisis period, the repositioning issue has gained even greater importance as various problems have been encountered in supplying empty containers. The literature review has revealed that 62 of the studies since 1972 have dealt with repositioning empty containers. 31 of such studies have appeared in journals, 22 of them seem to have published in conference proceedings, but the sources of 7 of them have not been reached.

In the modelling-oriented analyses of the 62 studies published in various journals and conference and/or congress proceedings, two distinct methods approaches have been adopted. The studies analysed have been categorized either as mathematical modelling or heuristic products. 50 of those studies analysing the problem through mathematical modelling seem to have used such modelling technics as numerical experiments, mathematical programming, genetic algorithms, regression analysis, simulation, integer programming, dynamic programming, statistics, linear programming, optimization programming, game theory and deterministic modelling. In the 12 heuristic studies, the methods used have been case study and literature review, and 1 of such studies seems to have preferred to use reverse logistics theory [14].

The research papers referred in [14] has been further analysed in order to ascertain the core issue that has been focused in those studies and summarised under five catagories. It is noted from table: 2.6 that majority of work (18 studies) is been done with respect to Empty Container Repositioning. This study, in contrast, focuses on minimizing of Empty Container Repositioning. It attempts to avoid as much as possible the necessity of repositioning. Only 9 papers were written on Empty Container Allocation while 05 on Empty Container Distribution. 12 papers have covered various aspects of Empty Container Management which is somewhat relevant to this study. There are 4 researches done on Empty Container Reuse which reflects the similar approach of this study because the researcher accepts the fact that it is rather unrealistic to totally eliminate the imbalance therefore "reuse" will directly reduce the need for repositioning. There is only one paper concerning Foldable Containers referred in [14] which again represent a way of reducing the cost of repositioning but not reducing the need for trepositioning.

The concepts being developed for collapsible or foldable containers might represent a potential solution to minimizing both regional and international movements. The potential cost savings of operating collapsible containers extends beyond the lowering of marine and surface transport costs: since several empty containers can be folded and handled in one package, incremental break-down and assembly costs can be off-set with the efficient use of space (at terminals and aboard ships) and reduced trucking, handling, and storage costs. [15] . Use of foldable containers is another solution to reduce the repositioning cost as it occupies lesser space. However it does not make any impact on reducing the number of units that needs repositioning, except the fact that number of slots that occupy the same number of units have been reduced. [16]. To fold a container a three-person team with a forklift is required. This process takes approximately 15 minutes and handling productivity is from four to six containers per hour. The Fallpac is a 20 ft container which combines dismountable and collapsible features. To fold and unfold the container, two people and a forklift are required. According to the Swedish manufacturer, the box can be folded within 10 minutes. There have been many improvements in design features of Fallpac containers, including a prototype of a fully automated version (Hanh, 2003). Purchasing cost and the transportation cost affect the use of foldable containers [16] . Flexible destination ports policy is another application in practice. It only specifies the direction of the MTY flows, whereas ports of destinations are not determined in advance and MTYs are unloaded from vessels as needed [17]. The effectiveness of this method is only limited to the respectives line's service routes, container inventory and fleet size. In contrast collaboration between CSL may directly reduce the number of containers that needs repositioning. Therefore, it would significantly impove the effectiveness of other solutions too thus may be supplimentary to each other through its synery effect.

III. RESEARCH MEHODOLOGY

This study is an extension to the previous research "Selection of an Algorithm to Operationalize the Virtual Container Yard conducted by same authors [18]. The survey was conducted in Sri Lanka. Sixteen out of "Top 20" CSL that carry approximately 75 percent of global

container capacity [19] have their representation in Sri Lanka. Therefore, the sample is expected to be reflective of the general view of the global shipping industry. Both qualitative and quantitative methods have been used to collect data. The questionnaire of the opinion survey was distributed to one hundred and twenty shipping companies registered under the Ceylon Association of Ships' Agents (CASA) that comprises a membership 135 and the Sri Lanka Association of Vessel Operators with 14 members. According to industry experts, the major decisions with respect to containers are usually taken in consultation with chief executive, operation manager, and container controller (three strata). Every agent usually has one employee from each stratum. It was learnt that each stratum influences the decision with respect to empty containers (MTY) differently. Edirisinghe, et al. (2015) recommends the suitable sample stratum for CSL that comprises chief executives, operations managers, and container controllers could be 0.20, 0.50, and 0.30 respectively. Therefore, weights were allocated to each job category as follows and a weighted random sample was drawn from each job category.

TABLE I.   RESPONDENT DEMOGRAPHY

Job category	Percentage	Sample drawn
Chief Executives	20	40
Operations Managers	50	100
Container controllers	30	60
Total	100	200

In this paper, a questionnaire with five-point rating scale was designed to measure the carriers' perception. The questionnaire was created as follows. The demography section consists four questions based on container stock position and its impact namely, (i) frequency of container inventory monitoring, (ii) empty container Volume of the respondent in TEUs, (iii) type of imbalance that is faced by carrier, (iv) cost of empty container as a percentage of total freight earnings has an impact of container exchange. Psychometric scales are used widely in the social science and educational research. There were fourteen questions designed in the Likert scale as it was considered Likert scale questions are more suitable to measure human attitude. In this study, a questionnaire was distributed to shipping liner agents in Sri Lanka. By using the survey instrument, the shipping personnel could express their opinions and views concerning their perception about e-based applications to

reduce their costs incurred on empty container reposition. Questionnaire was sent by email and by post to 200 sample respondents.

TABLE II.   DETAILS OF CONSTRUCTS AND VARIABLES

Construct/ Variable	Dimensions/Variables	Items	Code
Purchase Motivation	End user (QAE)	User Qualities Software Requirements Scalability Compatibility Unrecognized Needs	QAE1 QAE2 QAE3 QAE4 QAE5
	Software product (QAS)	System Qualities Run-Time Qualities Design Qualities Security Elements Agility Exit Strategy Credibility	QAS1 QAS2 QAS3 QAS4 QAS5 QAS6 QAS7
Performance	PN	Features Fit Futures Flexibility Functionality User Friendliness Ease of Use	PN1 PN2 PN3 PN4 PN5 PN6 PN7
Investment cost	IC	Funds availability Price of software Associated Expenses	IC1 IC2 IC3

IV.   DATA ANALYSIS AND DISCUSSIONS

The data was collected from eighty-eight respondents in the manner illustrated in Fig. 02. Researchers were unable to collect data from forty-eight respondents. However, the respondents' demography of each job category of this study shows a similarity to the recommendation of previous literature.
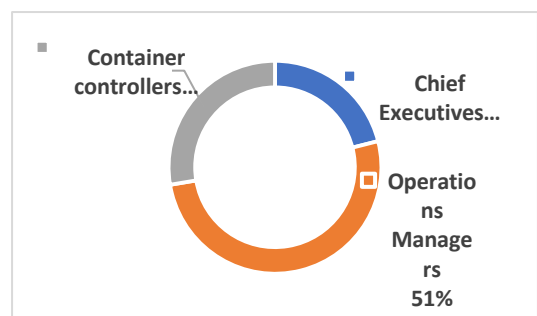

Fig. 02: Analysis of respondents

Since container inventory management plays a key role in liner shipping operation a cross section of senior management involved in the decision-

making process is included. Therefore, interviews have been conducted with two chief executives, four operations managers and two container controllers.

Well planned, accurately forecasted, realistically allocated, and effectively managed container flows ensure that material and goods are globally supplied on time, in a cost-efficient way [20]. Therefore, CSL closely monitor their container movements. However, most of shipping agents do not wish to reveal container data with third parties. It is believed that principals (the shipping line's head office) are responsible for these analyses and they consider such information when determine freight rates for each location. Apart from this reason the shipping agents are generally not allowed to discuss any finance related matters with external parties according to the service agreements.

A. Reliability test

The internal consistency of the variables can be determined through reliability test. Since the survey questionnaire consisted Likert-type scale-based questions, a reliability test was conducted to determine each factor among categorized variables. If the internal consistency is high, those items can be used to create the variables. Based on the value, decisions are taken about the acceptability of the variables, if Cronbach's alpha less than 0.5 it is unacceptable.

TABLE III.   CRONBACH'S ALPHA

	Cronbach's Alpha	N of Items
QAS	0.51	7
QAE	0.42	5
IC	0.81	3
PN	0.85	7

The Cronbach's alpha value recorded in this research for QAS; IC; and PN were considered acceptable to proceed with the model. However, QAE and QAS reflect poor values 0.42 and 0.51 respectively. However, since these factors are important as per industry sources it was decided to retain the variables.

B. Sampling adiquacy

Then the KMO and Bartlett's Test was conducted for the data obtained. The KMO measures the sampling adequacy which should be greater than 0.5 for a satisfactory factor analysis to proceed. Accordingly, the KMO and Bartlett's test was exercised.

TABLE IV.   SAMPLING ADEQUACY

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.909
Bartlett's Test of Sphericity	Approx. Chi-Square	2092.682
	df	253
	Sig.	.000

In this research, the value of KMO measure of sampling adequacy recorded at 0.91, confirming to the recommended value standards. Previous research "Selection of an Algorithm to Operationalize the Virtual Container Yard" identified conducted by same authors [18].

TABLE V.   VARIABLE CODES AND LABELS

Variable	Code	Label
Software Requirements	QAE2	Qualifiers
Unrecognized Needs	QAE5	
System Qualities	QAS1	
Design Qualities	QAS3	
Security Elements	QAS4	
Features	PN1	
Futures	PN3	
Flexibility	PN4	
Functionality	PN5	
User Friendliness	PN6	
Ease of Use	PN7	
Price of software	IC2	
Associated Expenses	IC3	
Agility	QAS5	Access
Credibility	QAS7	
Fit	PN2	
Funds availability	IC1	
Exit Strategy	QAS6	Utility
Scalability	QAE3	
Run-Time Qualities	QAS2	Quality

C. Model summary interpretation

TABLE VI. MODEL SUMMARY

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.657[a]	.432	.417	.39190	
2	.655[b]	.429	.417	.39177	
3	.651[c]	.423	.416	.39232	
4	.644[d]	.415	.411	.39390	1.937

a. Predictors: (Constant), QAS2, Access, Utility, qualifiers

b. Predictors: (Constant), Access, Utility, qualifiers

c. Predictors: (Constant), Utility, qualifiers

d. Predictors: (Constant), qualifiers

e. Dependent Variable: Accept

Adjusted R-square is 41.1%, it can be concluded that 41.1% of the acceptance is covered by the model.
Durbin-Watson test statistic value is 1.937, data is not autocorrelated.

TABLE VII. ANNOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17.186	4	4.296	27.974	.000[b]
	Residual	22.577	147	.154		
	Total	39.763	151			
2	Regression	17.047	3	5.682	37.023	.000[c]
	Residual	22.716	148	.153		
	Total	39.763	151			
3	Regression	16.830	2	8.415	54.675	.000[d]
	Residual	22.933	149	.154		
	Total	39.763	151			
4 n	Regression	16.489	1	16.489	106.273	.000[e]
	Residual	23.274	150	.155		
	Total	39.763	151			

a. Dependent Variable: Accept
b. Predictors: (Constant), QAS2, Access, Utility, qualifiers
c. Predictors: (Constant), Access, Utility, qualifiers
d. Predictors: (Constant), Utility, qualifiers
e. Predictors: (Constant), qualifiers

This study reiterates findings of previous literature that factors relevant to software requirements, availability of specific hardware or operating system requires that need to run the software and is flexible regarding operating systems, underlying databases, and hardware platforms play important role in developing an algorithm for VCY. There is a risk in a software due to the problems arising from failure to consider some important aspect of the architecture necessary for successful system construction and it is real concern in this software too given the complex nature of shipping business. The consistency and coherence of the overall design, the ability of the system to undergo changes with a degree of ease, and the capability for components and subsystems to be suitable for use in other applications and in other scenarios play a major role in selection. Given the trend that container market is going the user needs to consider whether this product going to give necessary visibility towards future. It is a concern that whether this product will provide the flexibility that the changes my company foresee doing in future, and different needs or working practices. Functionality is another key issue. The service provider needs take the time to outline end user's needs and consider all the options are covered in the functionality. The investment in this software or even subscription should follow thereafter. A pilot program should be ideal. User Friendliness was considered a key factor.

V. CONCLUSIONS

In model diagnostic test it has been revealed that error terms are not normally distributed with zero mean. That is a violation of regression assumptions. This has been identified in the reliability analysis of the questionnaire. Also, the existence of pertaining literature on this subject was poor making further limitations in this study.
Authors suggest qualitative further research o identify the factors influencing acceptability of a software in VCY.

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A Principal Component Approach for Measuring Investor Sentiment

Samadhi Weeraratne
Faculty of Business
NSBM Green University Town
Homagama, Sri Lanka
samadhi.w@nsbm.lk

Abstract— **Main objective of this study is to understand the sentiment effect in Sri Lankan market while developing an aggregate investor sentiment index. Even with a rich literature on the subject matter, it was understood that empirical findings relevant to Sri Lankan market are minimum. Given this context, current study attempts to test the sentiment effect over a sample period of 96 months, based on all the listed entities at Colombo Stock Exchange. The results suggest existence of sentiment at a marginal level. Upon a comprehensive analysis of number of different sentiment indicators, the study suggests four measures based on extant literature and expert advice. This paper develops a comprehensive index to measure the sentiment of the Colombo stock exchange. The index is a linear combination of four sentiment proxies whose weights are obtained via the principal component method. The study promotes sentiment-based trading rules, which are known to be profitable. The results in this paper provide useful information for investors, business-cycle researchers and academics.**

Keywords— Investor sentiment, Principal Component Analysis, Asset pricing

I. INTRODUCTION

Traditional asset pricing theories stand upon two basic assumptions; all investors are rational investors and the financial markets are informationally efficient [1][2]. Thereby, according to the traditional theory, in a market with a set of rational investors, the asset price demonstrates fair value of all expected future earnings [3]. It is long been understood that, the traditional asset pricing model has performed poor in predicting asset prices [4][5][6]. Especially, during the periods of market bubbles and crashes conventional theory has found less convincing. As a result, a new avenue of asset pricing emerged based on behavioral finance theories. Under behavioral finance theories scholars attempted to understand how human psychology, emotions and behavioral biasness induce investor

decision making process. These studies are led with the intention of filling existing loopholes in the conventional finance theories. The notion of behavioral finance is grounded by two alternative assumptions namely; existence of irrational investors and limits to arbitrage [7]. Market mispricing is a result of speculative demand driven by varying levels of investor confidence and emotion. On the other hand, arbitrage will be costly and limited in a market with noise traders (irrational investors), because noise traders will act in accordance to their sentiment (cognitive and affection biases) which is difficult to rationalize. This will ultimately result asset prices to move away from their fundamentals.

Delong et al. [7]formally established the role of investor sentiment in financial markets based on the Noise trader risk theory. The mainstream theory argues that rational investors seek mispriced assets continuously to take advantage of arbitrage opportunities. Consequently, removing asset mispricing from the market, resulting the market prices to be equal to the present value of expected future cash flows of the asset. In contrary, sentiment-based models claim that while several investors play rationally, several other investors may not act rationally due to their inherent behavioral biasness. These noise traders are driven by their own biased expectations about the market. Given the situation, even rational investor now will not be able to take advantage of arbitrage opportunities and the asset prices will continue to deviate from their intrinsic values. According to Delong et al. [7] noise traders base their decisions on their individual sentiment.

Investor sentiment is defined as the "propensity to speculate" [8]. Brown and Cliff [9] in a different note elaborated investor sentiment as the speculator's bias. He further described sentiment as excessive optimism or pessimism. By laying the ground for sentiment studies Lee et al. [10], Finter

et al. [11], Carhart [12], Fisher and Statman [13] has contributed to the literature immensely. Even though investor sentiment is considered as one of the hot and upcoming topics in the area of behavioral finance, there is a serious gap in the existing body of knowledge due to lack of studies. Most of the sentiment studies were done specially based on US stock market [8], [9], [14]. This may be due to the vibrant nature of the market. There are less studies on frontier or South Asian markets. Most importantly, as per the authors knowledge none based on the Sri Lankan market. CSE, well known as a frontier market functions at a different dimension than those of developed markets. In addition, CSE once rated as one of the promising markets in the world by Financial Times and Bloomberg, which further proves the increasing importance of CSE as a stock market. Therefore, this study focuses at the Sri Lankan stock market with the purpose of adding to the limited number of studies on investor sentiment.

As mentioned above, sentiment studies on these small markets are limited and the existing knowledge is mainly based on the studies of developed markets. These markets are different to each other in terms of the size, activities, risk exposure and behavior. Hence, some of the variables used in developed markets may be impractical in emerging markets [15]. For example, closed end fund discount, first day IPO return and number of IPOs [8], [14] put/call ratio, change in margin borrowing position [9] dividend premium [10] will not be applicable to Sri Lankan stock market due to its inactive nature. Accordingly, this study will be significant in terms of investigating the applicability of existing sentiment proxies to the selected market. Furthermore, it attempts to introduce several new proxies to measure investor sentiment. Thirdly, current study seeks to reconfirm the pertinence of CAPM for Sri Lankan market incorporating the sentiment impact. Finally, this paper will be addressing the existing literature gap in sentiment studies with regard to Sri Lankan market as well as frontier markets.

The rest of the paper is organized as follows; section two gives an overview about the existing literature and section 3 elaborates the data and methodology adopted for the study. Section 4 and 5 are devoted to the discussion of results and conclusion respectively.

II. LITERATURE REVIEW

As stated by Baker and Wurgler [8] starting from the Great Crash (1929), Tronic boom (1960s), Nifty fifty bubble (1970s), Internet bubble (2000), Sub-prime crisis (2007) till the most recent Global financial crisis (2008-2009), markets have experienced number of market anomalies, that have challenged the classical finance theory. De Long et al. [7] through his alternative asset pricing model, investigated the behavior of not-fully-rational investors, well-known as noise traders. There are number of studies carried out to test the existence of sentiment effect in financial markets. For instance, Fisher and Statman [13] tested the Wall street for sentiment effect based on three different investor groups and reported a statistically significant sentiment effect. Lee et al. [16] by employing a GARCH model suggested that sentiment is a significant factor in explaining equity excess returns and conditional volatility in New York stock exchange. Subsequent studies by Lee, et al. [17], Cook et al. [18], Chang et al. [19] reported findings in favor of the existence of investor sentiment in most developed markets.

An extensive study carried out by Chang et al. [19] based on 38 developed and developing equity markets concluded the predictive power of sentiment proxies on stock market returns. Moreover, it stated that this predictability tends to last for at least 2 years. Findings of Chuang, Ouyang and Lo [20] provided further evidence not only about the existence of sentiment, but also about it's significant impact on the market price formation. Moreover, they say that investors tend to adjust their opinions based on the latest market information and make decisions based on their current information, while extrapolating their past experience to predict the future. Finter et al. [11] explicated a market sentiment index which explained the return spread between stocks subject to sentiment and the stocks which are not. Adding to the same, it is understood, stocks that are difficult to arbitrate and value are more sensitive to market sentiment [11].

In an eagle's view point the empirical findings provide a general concession about the investor sentiment effect on stock market returns; i.e. prevalence of sentiment in the market, and the importance of considering the same in asset pricing. Yet, an in-depth study would highlight the fact that, even though there is a sentiment effect in most markets, the perspective needs to be different specially based on the nature of the market under study. A recent study on G7 countries postulated a

significant and non-linear sentiment effect on stock returns, which changed with the different market conditions [21]. Somewhat, similar results were revealed based on Corredor et al.[22], where it concluded that sentiment effect was not uniform across countries and confirmed the role of country-specific factors in the impact of investor sentiment on stock prices.

A. Investor Sentiment in Emerging and Frontier markets

Aitken [23] suggested that institutional investors' sentiment for emerging markets plays an important role in overshooting asset prices. He discovered the fact that the total return autocorrelation of emerging stock markets increases sharply as institutional investors began to invest heavily in these markets. Contrary, Greece, a market recently downgraded from been a developed market to an emerging market, signposted negative results for the existence of sentiment in the market. Doukas and Milonas [24] reported investor sentiment as not a source of systematic risk and their findings were valid across portfolios of various sizes and mutual funds. Istanbul stock exchange was only successful in the turnover ratio as a sentiment proxy and all other proxies failed to capture the sentiment effectively [25]. Grigaliuniene and Cibulskiene [26]investigated the impact of Scandinavian market sentiment and reported a negative correlation between market sentiment and stock returns. Chuang et al. [20] tested the same hypothesis as Lee and Swaminathan [27], i.e. higher the trading volume, more optimistic is the investors (bullish sentiment) and lower the trading volume, more pessimistic is the investors (bearish sentiment) using change in trading volume as the sentiment proxy. Findings concluded that, change in trading volume can reflect the investor expectations to a certain degree in Taiwan stock market and thereby can be used as a sentiment proxy. Finally concluded the notion of sentiment of Taiwan stock market has a significant effect in determining stock prices [20].

A different study focusing on the Taiwan market consider the direct and indirect effects of sensitive factors on Taiwan stock market returns. Their findings suggested that extreme sentiment indicators play an important role in determining changes in market returns [20]. Dash and Mahakud

[28] evaluates the pricing implication of aggregate market sentiment risk and investigated the impact of investor sentiment on the cross section of stock returns of Indian non-financial companies. Findings suggested that stocks are difficult to value, and arbitrage and their characteristics are significantly affected by sentiment risks. Anusakumar et al. [29] conducted a sentiment study based on 13 Asian markets, with the purpose of understanding whether local and global sentiment affected the stock price of these selected countries. Their findings show that there is a sentiment effect in the market. The results are vigorous for the company size, transaction volume, sample period, alternative proxies. Evidence found the presence of sentiment, specially within individual investors in Karachi stock exchange [30]. Liston et al. [31] investigated the Dow Jones Islamic stock index and discovered that the current bullish change in emotion is decreasing the conditional future volatility.

Jiang and Li [32] based on a sample of 293 IPOs, examined the pre-market and after-market sentiment in Hong Kong. The finding was, institutional investors play an important role in reallocating stocks in the secondary market and underwriters consider investors' sentiment when pricing IPOs before and during the after-market period. Dash [33] re-visited the issue investor sentiment as a conditioning information variable and tested a new asset pricing model. Study revealed favorable results towards the new five factor asset pricing model suggested by Dash [33]. The Indian stock market shows a significant impact of investor sentiment on stock market volatility. Further research shows that the pessimism of noise traders makes the market volatile [34]. Malaysian capital market gives a significant role for the investor sentiment [15]. Motivated by Baker and Wurglur [8], Gunathilaka et al. [15] constructed a sentiment index which consist of six proxy variables, tested the pricing implication of size, liquidity and BM ranked portfolios and concluded that small and illiquid stocks are exposed more to sentiment risk.

B. Measuring Investor Sentiment

Investor sentiment measure is two forms; bottom-up/explicit and top-down/implicit approach. Both these approaches are tested and validated extensively throughout the empirical

studies and have identified their own pros and cons. Bottom-up approach is about the mass psychology of the investors over time, using cognitive biases of individual investor psychology such as; overconfidence, representativeness, conservatism, frame dependence and mental accounting [14][35]. Diversely, top-down approach focuses on aggregate sentiment and traces its effect to market returns and individual stocks [14] while measuring investor sentiment implicitly. It believes that the true investor characteristics are too complex to describe through some realized biases [14] and overall market variables can better define changes in investor sentiment.

Baker and Wurgler [8] constructed a sentiment index based on six implied sentiment proxies; Closed-End Fund Discount (CEFD), Turnover (TURN), Number of IPOs (NIPO), First-day IPO return (RIPO), Premium for dividend paying stocks (PDPD) and Equity share in new issues (S). Following Baker and Wurgler [8], [14], Dash [33] built an index with 12 market related implied sentiment proxies ; turnover volatility ratio (TVR), share turnover velocity (STV), advance decline ratio (ADR), change in margin borrowing (CMB), the put- call ratio (PCR), fund flow (FF), cash to total assets (CTA), buy-sell imbalance ratio (BSIR), price earnings high-low difference (PEhld) and three of the existing measures proposed by Baker and Wurglur [14]. Relative Strength Index (RSI), Phycological Line Index (PLI) are few other proxies used in the existing literature [36][37]. Gunathilaka et al. [15] attempted to study the sentiment of the Malaysian market based on a sentiment index constructed with six sentiment proxies namely; advance decline ratio (ADR), turnover (TR), dividend premium (DivP), first day return on initial public offering (RIPO), change in margin finance position (CMF) and change in open interest (COI).

III. METHODOLOGY

A. Data

The study spans from January 2010 till December 2017 for 96 months. Current study employs a top-down approach to analyze the sentiment effect as bottom-up approach is much appropriate for markets dominated by individual and retail investors [34]. Hence, Sri Lanka is mostly dominated by institutional investors, top-

down approach is chosen for the study. Top-down approach, also known as implicit approach, uses implied sentiment proxies for the measurement of investor sentiment and tends to generalize the finding based on the overall market data. Therein, this study will take the entire market (population) as the sample of study. Accordingly, the study sample is all the companies listed in Colombo Stock Exchange. There are 296 companies listed under 20 business sectors as of 31st December 2017. However, the sample size may slightly vary throughout the 96 months, due to new listings and de-listings of companies. Research is mainly based on secondary market data and all the data series are obtained on a monthly basis, as of the last trading day of each month. Market related information for implicit sentiment proxies are extracted mainly from the data libraries of Colombo Stock Exchange, Securities and Exchange Commission of Sri Lanka and Bloomberg. Macroeconomic data series are obtained via the official websites and data repositories of Central Bank of Sri Lanka. Secondly, the asset pricing study is also undertaken for the same time span, on a monthly basis for the information extracted from Colombo Stock Exchange.

B. Variable Description

The existing studies have established several different measures of investor sentiment. However, literature does not provide evidence regarding the exact number of sentiment proxies needed to construct an index [34] or for that matter, the specify proxies to be used for an index [8]. Given this background, current study has selected three sentiment proxies based on the literature and one possible measure based on the expert advice. Each of these will be measuring four different aspects of the market namely; market liquidity, market trend and momentum, investor confidence over the market and foreign investor sentiment. Each of these variables are further elaborated in Table I.

As CAPM suggests, excess stock returns primarily depend on the market excess return component [1]. Certain portion of the remaining unexplained excess return can be explained via several other factors, such as firm size [38], book to market value [38], liquidity premium [39] or market sentiment [15]. Hence as shown in figure 1. an aggregate sentiment index is constructed based

on the implied sentiment proxies, upon which excess returns are determined. Alternative hypothesis for each of the identified implied sentiment proxies are as follows;

H1: Turnover ratio is positively associated with investors' sentiment

H2: Advance to Decline ratio is positively associated with investors' sentiment

H3: New accounts opened is positively associated with investors' sentiment

H4: Foreign Investor sentiment is negatively associated with local investors' sentiment
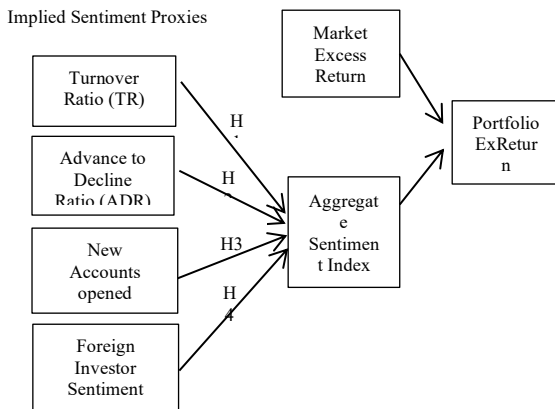

Figure I Conceptual Framework

TABLE I. VARIABLE DESCRIPTION

Variable	Description
Turnover Ratio (TR)	Measure the level of market liquidity $TR = \dfrac{Value\ of\ shares\ traded\ (Rs.)}{Market\ Capitalization\ (Rs.)}$
Advance to Decline Ratio (ADR)	Measures the depth and breadth of the market $ADR = \dfrac{Number\ of\ Advancing\ stocks\ _t}{Number\ of\ Declining\ stocks_t}$
New Accounts Opened (NACC)	Measures the investors' confidence on the market's current situation $\dfrac{New\ Accounts\ opened\ (No.)_t}{Moving\ Average\ Number\ of\ New\ Accounts\ for\ previous\ 5\ months}$
Foreign Investor Sentiment (FIS)	Foreign investors' trading bahaviour compared to the domestic investors $FIS = \dfrac{Foreign\ Equity\ Trade\ Count}{Domestic\ Equity\ Trade\ Count}$
Market Excess Return	Difference between return of the market portfolio and the risk-free interest rate.
Portfolio Excess Return	Difference between portfolio returns and risk-free interest rate.

C. Model Specifications

Construction of the investor sentiment index closely follows the index construction approach of Baker and Wurgler [8], [14], Finter et al. [11], Dash and Mahakud [28], Dash [33], Sadaqat and Butt [40]. Current study uses principal component analysis (PCA) and develop an alternative sentiment index to isolate the common component of the selected proxy measures. Sentiment indicators are partially driven by economic fundamentals [14]. Accordingly, a sentiment proxy contains two main components; rational component, which is driven by the rationally developed economic reflection and the irrational component, i.e. the remaining total sentiment which is not explained via the economic conditions [14]. Accordingly, each sentiment proxy will be regressed separately with a set of macroeconomic variables following the below model;

$$SP_{jt} = \beta_j + \beta_1 EXR_t + \beta_2 AWPLR_t + \beta_4 FIP_t + \beta_5 TS_t + e_t$$

Where, SP_{jt} is the jth sentiment proxy at time t, regressed against exchange rate (EXR), average weighted prime lending rate (AWPLR), growth in factory industrial production index (FIPG) and term spread (TS). The residual, e_t is accounted for the cleaned / orthogonalized proxy measure.

However, even after adjusting for business cycle fluctuations these proxies may still contain an idiosyncratic/ non-sentiment-related components [8]. Therefore, principal component analysis is used to isolate the common sentiment component. As per the extant literature and expert advice expected relationship between investor sentiment and the proxy measures can be formulated as follows;

$$SI_t = TR_t + ADR_t + NACC_t - FIS_t$$

The sentiment index is tested by incorporating the SI to an asset pricing model. Where, $R_{it} - R_{ft}$, is the difference between the return of the ith asset at time t and the risk-free rate (Excess portfolio return). R_{mt} is the return of the market portfolio at time t where $R_{mt} - R_{ft}$ is the excess market return. SI_t refers to the developed aggregate sentiment index at time t. $\propto_i$ is the intercept β_i and γ_i are the coefficients of excess market return and SI. e_{it} is the error term for asset i at time t.

$$R_{it} - R_{ft} = \propto_i + \beta_i(R_{mt} - R_{ft}) + \gamma_i SI_t + e_{it}$$

As the next step three equally weighted portfolios are constructed based on the illiquidity factor [41], where Portfolio 3 represents the least liquid shares (most illiquid), whereas Portfolio 1 consist of shares with highest liquidity [15]. All the stocks are ranked based on the illiquidity ratio where, ILQ_{it} refer to the illiquidity ratio of firm i at month t. R_{idt} is the return of firm i on day d in month t. Vol_{idt} refers to the rupee trading volume of firm i on day d in month t. D_{it} denotes, number of days traded by firm i on month t. The monthly portfolio returns are then calculated for each of the portfolios.

$$ILQ_{it} = \frac{1}{D_{it}} \sum_{d=1}^{idt} \frac{|R_{idt}|}{Vol_{idt}}$$

$$R_{idt} = \frac{P_d - P_{d-1}}{P_{d-1}}$$

IV. ANALYSIS AND DISCUSSION

A. Descriptive Statistics

Table II summarizes the descriptive statistics of the adjusted sentiment proxy measures and three asset portfolios. The macro adjusted sentiment proxies depict a zero mean as the residual series are normally distributed. Asset portfolios are namely; P1, P2 and P3. Where P1 consists of most liquid companies and P3 consists of least liquid companies. Within the sample period there are 241 to 296 listed companies in the Colombo Stock Exchange. Hence, one portfolio consists of approximately 95 companies on average. As per the analysis of portfolios it is understood that, the mean portfolio returns differ among the three portfolios noticeably. Whereby highest liquid portfolio showing a much larger return compared to the least liquid portfolio.

B. Aggregate Sentiment Index

It should be noted that the specified model is suggested considering the cross-correlation among variables (Refer Table III), while ensuring that the final index captures market liquidity, momentum effect, investors' confidence and foreign investor trading bahaviour. Orthogonalized series demonstrate somewhat lessened correlation

between and among the other variables. Hence, it is evident that for the major part, the macroeconomic impact on these measures are removed via the orthogonalized process.

TABLE II. DESCRIPTIVE STATISTICS

	ADR$^\perp$	TR$^\perp$	NACC$^\perp$	FIS$^\perp$
Mean	0.000	0.000	0.000	0.000
Median	-0.519	-0.001	-0.033	-0.001
Maximum	6.262	0.013	1.135	0.021
Minimum	-2.885	-0.010	-0.645	-0.021
Std. Dev.	1.792	0.005	0.372	0.009
	P1	**P2**	**P3**	**MEXRT**
Mean	1.193	-0.468	0.218	0.001
Median	0.260	-0.750	-1.170	-0.610
Maximum	31.520	19.500	24.020	23.080
Minimum	-17.740	-18.280	-20.280	-11.860
Std. Dev.	8.040	6.991	8.172	5.277

TABLE III. CORRELATION MATRIX

Panel A	**ADR**	**TR**	**NACC**	**FIS**
ADR	1.000			
TR	0.176	1.000		
NACC	-0.004	0.307	1.000	
FIS	-0.169	-0.481	-0.192	1.000
Panel B	**ADR$^\perp$**	**TR$^\perp$**	**NACC$^\perp$**	**FIS$^\perp$**
ADR$^\perp$	1.000			
TR $^\perp$	0.246	1.000		
NACC$^\perp$	0.059	0.214	1.000	
FIS $^\perp$	-0.173	0.014	-0.131	1.000

According to Table IV, first principal component with an Eigenvalue of 1.4 explains 35% of the total variation in macro adjusted sentiment proxies. On the other hand, the first principal component results the expected relationship of all four sentiment proxies. However, the second principal component is observed with an inversion of the expected relationship in ADR and FIS. Hence, the sentiment index is defined restricted to

the factor loading of first principal component as follows;

$$SI_{1_t} = 0.566 TR_t + 0.557 ADR_t +$$
$$0.486 NACC\!\!\perp_t - 0.365 FSI\!\!\perp_t$$

C. Test of Sentiment Index

As per the Tabel V, CAPM is satisfactorily working for the current sample, where almost 83% to 68% of the portfolio excess returns are explained by the market excess return factor. Secondly, the sentiment index is incorporated to the CAPM framework. It is expected to have a higher explanatory power with the sentiment index. The asset pricing is conducted as an Ordinary Least Square regression, with a non-zero intercept. CAPM validity is checked with reference to the significance of the explanatory variable (Excess market return), the adjusted R^2 and the overall model fit (F statistic). Based on the findings, predictor variable (portfolio excess return) is explained via the excess market returns at a significant level under all the assets portfolios.

Asset pricing based on the proposed sentiment index has been able to explain the portfolio excess returns more than the CAPM model individually, however at a marginal level. Both the proposed index is significant at all portfolios at 1% and 10% significance levels. The resulting adjusted R^2 is marginally greater than the model excluding the sentiment index. The F statistic does not provide enough evidence towards the overall model fit. In addition, the regression is conducted with a non-zero intercept. The intercept is significant at neither including or excluding the sentiment index.

D. Findings and Discussion

Principal component analysis resulted the expected relationships between the sentiment proxy measures and the sentiment effect of the Sri Lankan market. Therein, the theoretical background can be validated. Besides, the new proxy introduced via this study seams to operate with the expected direction. Secondly, the pricing implication of the proposed model is evaluated to further validate the findings. To evaluate the validity of the results, this study compares

significance of the beta coefficient, intercept and adjusted R^2. Beta factor is statistically significant for all three portfolios and depicts a positive correlation between market risk and average returns. The intercept found to be significant only in P1. In overall, intercepts are not statistically significant.

TABLE IV.   PRINCIPLE COMPONENT ANALYSIS

Variable	PC 1	PC 2	PC 3	PC 4
TR$\perp$	0.566	0.544	0.113	-0.608
ADR$\perp$	0.556	-0.113	0.626	0.533
NACC$\perp$	0.485	0.114	-0.761	0.413
FIS$\perp$	-0.365	0.823	0.118	0.418
EigenV	1.416	1.015	0.939	0.628
Propotion	0.354	0.253	0.235	0.157

These results disagree with the results of Samarakoon [42], who concluded a strong negative relation between beta and market return and partially in line with the findings of Abeysekara and Nimal [43]. However, the current study employs a liquidity as the portfolio construction factor, whereas Abeysekara and Nimal [43] used size-BM and size-momentum portfolios with Carhart four factor model. As per the findings, CAPM is explaining approximately 68% to 83% of the average returns via market risk.

An important second finding is the increasing explanatory power of the traditional asset pricing model, at portfolios with higher degree of liquidity. As it is clearly signifying that the adjusted R^2 is least with P3, comparatively a lesser figure compared to that of least liquid portfolio. The results conclude that, when the portfolio is illiquid explanatory power of the traditional model is less compared to when the portfolio is liquid. These findings comply with the empirical literature [15]. As per the results all four sentiment proxies generated the expected relationship via the principal component analysis. Newly introduced proxy measure based on the foreign trading bahaviour (FIS) found to be effective in capturing the sentiment effect in Sri Lanka.

V.   CONCLUSION

The proposed index provide evidence on the existence of sentiment effect. However, the model suggests a marginal effect of sentiment. In addition,

the model is not strong enough to capture the sentiment in full scale or to quantify the amount of the sentiment effect in our market. This may be due to the large role played by the institutional investor in our market, where sentiment is prone to play a

TABLE I.   SUMMARY RESULTS

	Highest Liquid		Lowest Liquid
Portfolio	**1**	**2**	**3**
$R_{it} - R_{ft} = \alpha_i + \beta_i(R_{mt} - R_{ft}) + e_{it}$			
α_i	1.192	-0.469	0.217
p value	0.001*	0.149	0.649
β_i	1.395	1.185	1.280
p value	0.000*	0.000*	0.000*
Adjusted R^2	0.837	0.798	0.680
F-Statistic	483.866	372.165	200.393
p value	0.000	0.000	0.000
$R_{it} - R_{ft} = \alpha_i + \beta_i(R_{mt} - R_{ft}) + \gamma_i SI\_1$			
α_i	1.188	-0.473	0.213
p value	0.000*	0.132	0.650
β_i	1.224	1.045	1.139
p value	0.000*	0.000*	0.000*
γ_i	1.181	0.965	0.966
p value	0.001*	0.006*	0.063***
Adjusted R^2	0.854	0.812	0.688
F-Statistic	275.491	204.104	104.706
p value	0.000	0.000	0.000

Significance level 1%, 5% and 10% are denoted with *, **, *** respectively.

role with mostly retail investors.

Another possibility would be the setting-off of sentiment effect of retail investors against the institutional investors trading bahaviour, provided institutions are not driven by their sentiments. In overall, since the study incorporates sentiment proxies at an aggregate level, it is justifiable to conclude lessen effect due to possible set-offs among and between the variables used.

Findings of the study are found to be consistent with prevailing literature. In a nutshell, Sri Lankan market has a sentiment effect, where major part of the asset prices can be read by CAPM fundamentals.

However, if incorporated with the proposed sentiment index, excess returns can be read at a higher proportion than only with fundamentals. Investors can use these findings to decide their investment strategies. Moreover, investors can be cautious when investing in liquid stock, because the statistics suggests that sentiment effect is present within the liquid region.

Furthermore, these findings are suggestive that Sri Lanka, known as a frontier market works in a similar pattern to emerging markets. Hence, policymakers can take the emerging markets as a model when developing policies and structures for frontier markets. Finally, this study will address the empirical gap in sentiment studies relevant to Sri Lanka, and in overall a frontier market. Henceforth, the study will provide directional guide for further sentiment related studies in Sri Lanka. One major limitation is nonexistence of proven sentiment measures for a frontier market, and on the other hand data unavailability restrain the possibility to come up with new sentiment measures.

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Supporting and Refuting Whorf: An Analysis of Selected Evidences of the Sapir-Whorf Hypothesis

P.W.B.Jinandi Chathurya
Faculty of Business
National School of Business Management
Homagama, Sri Lanka
jinadi.c@nsbm.

Abstract—**The significant role language occupies in human lives has led to the question whether language is merely a tool for expressing human thoughts or does it actually shape human thoughts. Over the years many scholars have attempted to find answers for this question. One such influential study led to Sapir-Whorf hypothesis. This paper seeks to answer the question why the Sapir-Whorf Hypothesis, also known as linguistic relativity proposal, still popular in academia even after numerous criticisms against it. The paper incorporates the methodology of a textual analysis of study books and scholarly work based on the topic. Further the paper discusses Whorf's writings and a selection of studies that support and refute the Sapir-Whorf hypothesis. This study is an attempt to shed light on this heavily discussed area of human language and to add in to the existing knowledge on the subject.**

Keywords— language, Sapir-Whorf Hypothesis, linguistic relativity, cognition, human thought

I. INTRODUCTION

Throughout human history people have searched the answers for the question whether the language shapes the way people think. For a long time it was considered at best untestable and more often simply wrong. Language is a uniquely human gift, central to our experience of being human. Humans have an amazing collection of languages to communicate with each other, each differing from the next in innumerable ways. Over the last century scholars have tried to find answers for the questions; do the languages we speak shape the way we see the world, the way we think, and the way we live our lives? Providing an answer to all these questions a theory came into existence, often

associated with 20th century scholars, linguistic anthropologists Eric Sapir and Benjamin Whorf, the *Sapir-Whorf hypothesis*. The Sapir-Whorf hypothesis, also known as the linguistic relativity hypothesis, refers to the proposal that the particular language one speaks influences the way one thinks about reality. Sapir and Whorf challenged the widely accepted notion that the way an individual perceive the world is simply a relationship between your sensory systems and objective reality. They stated that people around the world speak different languages which are consisting of different grammar, syntax and lexicon. This difference influences the conceptual system that they bring to every single experience they go through. Linguistic relativity stands in close relation to semiotic-level concerns with the general relation of language and thought, and to discourse-level concerns with how patterns of language use in cultural context can affect human thought. Benjamin Lee Whorf studied Hopi; a Native American language spoken in northeastern Arizona. Based on his studies, Whorf claimed that speakers of Hopi and speakers of English see the world differently because of differences in their languages.

Many researchers and scholars carried out studies that led to the conclusion that while language has a vital role in human cognition it does not play a dominant role in shaping human thoughts. Despite these varying viewpoints Sapir-Whorf hypothesis still sparks debates and call for further researches on the subject. This paper addresses the evidences for and against the notion of Whorfian/ relativistic effects on cognition by

referring to the writings of Benjamin Lee Whorf, who is credited with developing the hypothesis. It is hoped that this textual analysis that line up various studies that supports and refute the hypothesis will help put the Sapir-Whorf Hypothesis in perspective and evaluate its tenets against current trends in psycholinguistic research. The second objective of the paper is to assets the reasons for the constant studies carried out in line with the Sapir-Whorf hypothesis despite the controversy surrounding the hypothesis.

Benjamin Whorf raised the long-standing questions such as does language shape thought? Do the differences in the lexicon or grammar have nonlinguistic consequences, such that people who talk differently also think differently?

Answering these questions the theory claims that thinking takes place in a language and that 'the greatest light upon it […] is thrown by the study of language' [1] and aroused intense interest and attention as well as controversy and criticism. Whorf had no background in psychology and gained recognition in academia primarily as an expert on Maya hieroglyphs and Indian languages but advanced the view that linguistic diversity sparked off cognitive differences in speakers of different languages as a function of continued use of the patterns of their native language for expression. Although many scholars consider the notion of habitual thought to be the cornerstone of Whorf's hypothesis, it did not receive much attention in his writing. In fact, his collected works contain only one article devoted to the subject with only one specific explanation of what the term meant to its author [2]. It states:

By 'habitual thought' and 'thought world' I mean more than simply language, i.e. than the linguistic patterns themselves. I include all the analogical and suggestive value of the patterns […], and all the give-and-take between language and the culture as a whole, where in is a vast amount that is not linguistic yet shows the shaping influence of language[2].

This suggests that Whorf viewed thought as the linguistic and non-linguistic content of the mind. However there is no mention of frequency of occurrence that could account for the habitual nature of thought. Leading to the detriment of his

theory, Whorf was often inconsistent and imprecise.

II.   METHADOLOGY

This paper is a textual analysis of selected studies done in relation to the Sapir-Whorf hypothesis. The paper focuses on the writings of Benjamin Lee Whorf referring to linguistic relativity and how the selected studies have either supported or refuted the theories put forth by Whorf stating that the language one speaks effects way that person thinks and the way he or she perceive the world.

There have been numerous studies done on the subject matter, but this paper looks into few selected studies which were influential in supporting or rejecting the hypothesis. The studies are selected on their influence on the hypothesis and their popularity. The Selected studies spread over decades, from early 1950's to 2008. This is mainly to provide a sound statement on the way the Whorf hypothesis continues to create waves in the academia for decades. Further this paper extensively analyzes the studies to search reason the popularity Sapir-Whorf hypothesis holds in the academia despite being criticized for decades.

III.   LITERATURE REVIEW

Sapir-Whorf hypothesis, also known as linguistic relativity theory, is a popular study area among linguists, anthropologists and psychologists alike. Ever since the theory was put forth there had been many criticisms against it while there were studies that stood in line with the hypothesis supporting the claims.

Many studies that done on to find to what extent the language one speaks influence his or her thoughts resulted in supporting the Whorf's ideas. Many of these studies are done on the terms of colors within English vocabulary. Lants and Stefflre as well as Lucy and Shweder performed such studies concluding results in favor of the Whorf hypothesis [3, 4].

One of the first scholars to argue against the hypothesis was Eric Lenenberg. In the article, *A Study in Language and Cognition*, Lenenberg argues that languages are meant to represent events in the world not to determine how they are being expressed [5]. Further Lenenberg claims that Whorf's study on Hopi tribe does not prove what Whorf intended it to prove stating that Whorf's

descriptions of Hopi speakers' temporal terms are translation of the English Language therefore it is not providing a sound argument.

Among the influential studies that posed arguments against the Whorfian hypothesis is *Categorization of Natural Objects,* a paper published by Dr. Eleanor Rosch. As a result of an experimental study she carried out with the Dani tribe in Papua New Guinea, she claimed that language has a minor role in shaping human thoughts let alone determine them [6].

Another argument that came up against the hypothesis was brought forward by Steven Pinker in his book *The Language Instinct.* He not only claims that Whorfian hypothesis is unreasonable he refute any truth in the hypothesis [7]. Relating to a concept introduced by George Orwell in his famous novel, dystopian fantasy, *1984*, Pinker claims that language does not determine human thoughts. However many scholars have stated that Pinker's rebuttals are not strong enough to refute the Whorf hypothesis entirely. One such statement was made by Daniel Casasanto in his article, *Who's Afraid of the Big Bad Whorf,* states that Pinker raises a confusion rather than presenting a sound argument against the Whorf hypothesis [8].

This paper is heavily influenced by the above mentioned studies. The paper discusses and analysis the findings of selected studies, including the above studies, in order to explore the longevity of the Whorf hypothesis despite numerous criticisms over the last few decades.

IV. DISCUSSION

Whorf's ideas on the influence of language in shaping thoughts have driven disagreement among linguists, anthropologists, and psychologists alike. "Admitting any sympathy for, or even curiosity about, this possibility was tantamount to declaring oneself to be either a simpleton or a lunatic."[9]. However it has also been stated also that the language-and-thought question is dismissed as unimportant, yet in the same breath it is stated that language provides us with most of our concepts [9].

Whorfian theory was widely embraced in the 1950s and 1960s, drawing experimental support from Brown and Lenneberg's studies, which showed a positive relation between the codability of English color terms and people's ability to retain and recognize a given color from a collection of colors [5]. The idea was that color terms influence the way people partition the color space, and accordingly their perception of color. Other studies done on the same subject matter, on color within English, such as Lantz and Stefflre also supports the hypothesis [3]. In support for the Whorf hypothesis Lucy and Shweder performed a color memory test. Children with language to describe different color hues found it easier to recognize the shades. When a language has terms for different shades of color, the perception of that shade is affected. Lucy and Shweder found that color recognition memory was directly affected by the words used to describe them, proving that language does affect thought in some way, but not to the extreme extent that Whorf suggested [4].

However Eric Lenneberg criticized Whorf's examples from an objectivist view of language stating that languages are principally meant to represent events in the real world and that even though languages express these ideas in various ways, the meanings of such expressions and the thoughts of the speaker are equivalent. He further argued that Whorf's English descriptions of a Hopi speaker's view of time were in fact translations of the Hopi concept into English, therefore disproving linguistic relativity [10]. However Whorf's concern was how the habitual use of language influences habitual behavior of humans, rather than translatability of the language. Whorf's point was that while English speakers may be able to understand how a Hopi speaker thinks, they do not think in that way.

Dr. Eleanor Rosch published an influential paper, *Categorization of Natural Objects*, presenting an opposing statement to the Whorfian hypothesis. As a result of field experiments carried out with the Dani tribe of Papua New Guinea, she concluded that when categorizing an everyday object people rely less on abstract definitions of categories than on a comparison of the certain object with what they think to be the object best representing a prototype. She examined that Dani tribe lacks words for all the English colors as their language contains only two color terms dividing all colors into either light or bright category. Rosch explained that the Dani tribe could still categorize objects by colors for which they had no words. She further argued that basic objects have a psychological import that transcends cultural differences and shape show such objects

are mentally represented. Thereby she concluded that people in different cultures tend to categorize objects by using prototypes and language has a very little role to play in this process. The perception of color-and which colors are considered focal-is determined by the biology of human color perception and not by the language learned [6].

The long-standing majority view on the Whorfian hypothesis is summarized in Steven Pinker's bestselling book *The Language Instinct*. Pinker poses a question inspired by George Orwell's dystopian novel *1984*, in which the government seeks to ideologically condition the citizens by making them nameless in the prescribed language, Newspeak. The protagonist of *1984,* Winston Smith describes Newspeak as follows:

[T]he whole aim of Newspeak is to narrow the range of thought? In the end we shall make thought-crime literally impossible, because there will be no words in which to express it. Every concept that can ever be needed will be expressed by exactly one word, with meaning rigidly defined and all its subsidiary meanings rubbed out and forgotten…the process will still be continuing long after you and I are dead. Every year fewer and fewer words, and the range of consciousness always a little smaller [11].

Leading along the Orwellian perspective Pinker questions, does human thought really dependent on language? Do people literally think in the language they speak? In response to these, he claims:

[T]he famous Sapir-Whorf hypothesis of linguistic determinism, stating that people's thoughts are determined by the categories made available by their language, and its weaker version, linguistic relativity, that differences among languages cause differences in the thoughts of their speakers [...] is wrong, all wrong [7].

In his book Pinker not only denounced radical linguistic determinism but also linguistic relativity. Pinker's arguments have long been in the discussion of the Sapir-Whorf hypothesis. However many researches seem to suggest that Pinker's views about the hypothesis is not strong enough to refute the hypothesis entirely. Casasanto points out that Pinker illustrates a confusion that is rampant in relationships between language and thought.

Orwell and Whorf raised two distinct questions: Do we think in language? and does language shape thought? It is possible that language can shape the way people think even if they do not think in language… Evidence in favor of Orwell's idea would also support Whorf's, but evidence against the idea that people think in language does not count against the possibility that language shapes thought [8].

Casasanto further claims that although Orwellian concept and Whorf hypothesis are closely related, they are not related they way Pinker argues. Casasanto states that evidence in favor of Orwell's idea would also support Whorf's, but evidence against the idea that people think in language does not count against the possibility that language shapes human thought. Casasanto's views on the Whorf hypothesis more likely occupy a neutral ground in support to the Whorf hypothesis [8]. Nevertheless he strongly states that regardless of numerous criticisms Whorfian effects can have profound implications for the study of mental representation.

V. CONCLUSION

Sapir and Whorf hypothesized that language and thought are closely related, making statements ranging from the idea that language determines thought, to the idea that language has some bearing on thought, but that connection cannot be determined. Many examples are given from linguists to demonstrate whether they support or reject the hypothesis, with most linguists accepting a weak version of the Sapir-Whorf hypothesis. There have been no significant rebuttals or proofs of the Sapir-Whorf hypothesis, and the original is highly vague, leaving a lot of room for interpretation. This vagueness of the original Sapir-Whorf hypothesis means that no satisfactory conclusions can be drawn, and while some critics, such as Pinker thinks that the hypothesis is no more than a myth, scholars such as Lucy and Shweder support the hypothesis through their studies.

In conclusion it is also worth noting that with the rapid technological advancement researchers are now studying the language-cognition interface in ways that were unimaginable to Sapir, Whorf and their contemporaries. Regardless of the technological support in psycholinguistic studies, Sapir-Whorf hypothesis

still contributes to the discourse. Among all these debates there can be no doubt that, despite many criticisms, the Sapir-Whorf Hypothesis continues to fascinate the academic community, inspiring further research into the unsolved mysteries of the human thoughts and language.

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A Study on Viewers' Responses to Television Commercials In Sri Lanka

Dinusha Weerasekera
Faculty of Business
NSBM Green University Town
Pitipana, Sri Lanka
dinusha.s@nsbm.lk

Chirani Punchihewa
Mindshare
Group M
Colombo, Sri Lanka
Chirani.punchihewa@mindshareworld.com

Jayamali Dissanayake
Marketing Department
Rechard Pieris
Nawinna,Sri Lanka
jayamaliusjp@gmail.com

Abstract—**Advertisements, as a part of communication strategies for marketing, are used to draw consumers' attention and influence their decision to purchase the products and services. Television advertisements are the most authoritative, influential and persuasive advertising medium when compared with other media. Television advertisements tend to use well known presenters, persuasive messages and audio-visual effects in perfect combination for lively display of products and services. Viewers have a variety of responses to TV commercials and such responses are reviewed through this article. In spite of the rise of big data and the ease in which online experiments and surveys are conducted, there is a need for qualitative advertising research. This study focuses on the role of qualitative analyses in revealing how viewers respond to advertisements. In-depth interviews and observations were the main tools which have been used to collect data from 15 participants to produce richer and clearer understanding of consumer behavior in response to advertising. However, this study used thematic analysis to analyses the data and noted four themes: experiencing the newness, recommendation of products, responding to personal related issues and avoiding of advertisements. Finally, the research concludes with practical implications like using crawler advertisements and product placing to target the correct target audience.**

Keywords— television commercials, viewers, viewers' responses

I. Introduction

Customer Value is the level of satisfaction of your customer towards your business. Organizations create value towards the customer by using different tools, Product attributes or characteristics, price perception, distribution channels. But, companies must do more than just create customer value. They must also use promotion to clearly and persuasively communicate that value. The company will carefully coordinate these promotion elements to deliver a clear, consistent and compelling message about the organization and its product.

A company's total promotion mix- also called its marketing communication mix- consists of the specific blend of advertising public relations, personal reselling, sales promotion and direct marketing tool that company uses to persuasively communicate customer value and build customer relationships.

In here advertising can reach masses of geographically dispersed buyers at a low cost per exposure, and it enables the seller to repeat a message man time. Beyond its reach, large scale advertising says something positive about the seller's size, popularity and success. Because of advertising's public nature, consumers tend to dramatize its products through the artful use of visuals, print, sound and color. On the one hand, advertising can be used to build up a long-term image for a product. On the other hand, advertising can trigger quick sales.

Advertising also has shortcoming. Although it reaches many people quickly, advertising is impersonal and cannot be as directly persuasive as can company salespeople. For the most part, advertising can carry only a one-way communication with the audience, and the audience does not feel that it has to pay attention or respond. In addition, advertising can be very costly. Although some advertising methods, such as newspaper and radio advertising can be done on smaller budgets, other forms such as network TV advertising, requiring very large budgets.

According to the Nielsen Lanka, Television continues to be the major advertising medium which is 70% share in Sri Lanka AD spend landscape.

However as per the studies shows that recall memory is low in high clutter context. According to Zhao (1997) ads in a commercial break compete for audience's attention & memory (as cited in [1]) thus numerous researches, who find that crumpet clutter causes less audience attention to the commercial while increasing viewer confusion.

According to Creamer [2] an average consumer is known to be exposed to 254 to 5000 commercial messages a day. In here from clutter viewpoint, this amount exceeds the information processing ability of most consumers. According to Brown & Rothschild [3] found that it can negatively affect attention, recall & persuasion.

The brand memory is directly related to other outcomes of marketing communication such as brand knowledge, likeability, trust, attitude and purchase intention, both recall and recognition tests have been widely used to assess the cognitive aspect of advertising effectiveness in the advertising industry [4]

Basis of past researchers' television advertisements enable customers to decide upon products & services and they play a major role in providing relevant information. Many scholars have studied consumer responses & different contracts which can be used for measuring consumer responses to television advertising. But deep studies are limited in that area and Sri Lanka context has limited number of television advertising responses researches. One of the imported reasons of doing this research is to get deep insights of viewers' responses to television commercials.

Research question and objective are as below,

Research Question

What are the responses of the viewers' to television commercials in Sri Lanka?

Research Objective

The main objective of this study is to explore viewers' responses for television commercials in Sri Lanka.

II. LITERATURE REVIEW

A. Television Advertising

In the history, the television medium seems as the most striking and important place to advertise. Vinod and Ruchi [5] states, as the number of TV sets increases, the number of channels / program options available to Sri Lankan viewers has increased dramatically but there has been a growing disconnection.

The reasons for higher response rate among females for products is because of the higher numbers of advertisements are targeted at them [6]. While buying cosmetics, toiletries, stationary, gifts and cards, the girls use information from the TV advertisements. It was also found that girls have positive attitude towards TV commercials [7]

According to North and Kotze [8] television advertisements can be used as in various ways to educate and communicate the children. There is a significant variation in the amount of teenagers' influence in the purchase decision for their own use and for their family [9]. All the products used by a customer are not necessarily those of advertisements they liked. The action lies not only from the attractiveness of the advertisements, but also the interest of the target [10]

Ehrenberg and Barnard [11], tried to put forward Awareness-Trial- Reinforcement model of consumer response to advertising and according to him established brands advertise in order to have the repeat buyers. In answer to how ad works, one model that applies to certain advertising categories is "Advertising offers a stimulus to a potential user of a product, which it is hoped will produce the response of an increased predisposition to buy the advertised brand."

B. Cognitive responses of advertising

Attention is the key component for advertising. According to Anderson, he identified attention as set of activities which provides information to become available for central information processing activities. (as cited in [12]) Attention as a consequence serves to channel some information to be processed by central cognitive functions, whereas other information is excluded. The percentage remembrance of an advertisement is poor when it doesn't get enough attention.

Kahneman [13] argued that "the main function of the term 'attention' is to provide a label for some of the internal mechanism that determine the significance of stimuli and thereby make it impossible to predict behavior by stimulus considerations alone". Kahneman also stressed that attention helps a person to categorize and recognize stimuli. Thus, attention to an adverbial popular music could result in successful categorization and recognition of other advertising effects.

C. Evaluative responses

Several studies examined the effects of advertising on consumers' evaluative responses. More specifically, the following evaluative responses were investigated: ad attitude and brand attitude, perceived value of the ad, and ad credibility.

Six studies in five articles found positive effects on creative media advertising (Dahlén & Edenius,[14]). Eelen, Rauwers, Wottric, Voorved and Noort [15] found that direct positive effect of creative media is on to the ad attitude not to the brand attitude.

Kumar and Raju [16] investigated that advertising engage in the role of influencing attitudinal behavior of both males and females for the advertisements. Singh and Sony [17] studied the impact of advertisement on the brand preferences of aerated drinks among 150 respondents. The study founded that the advertisement impacts the consumer choices of brands, and the product brand affects the buying behavior of the consumers regardless the price of products. Moreover study shows that brand and celebrity endorsement are the two main factors which were recalled by respondents.

Fiske's [18] study shows an affective reaction to stereotypes. Exclusive involvement of TV commercials under affective involvement may observe different view of the underlying conditions of cognitive involvement.

D. Behavioral responses of Advertising

This reviews that creative media advertising led to promising positive behavioral outcomes. Most of the studies found out that purchase intention and word of mouth intention as main behavioral intentions. Two recent studies have stated that actual word-of-mouth (Eelen & Seiler, [15]) According to Hutter and Hoffmann shop visits and sales, are positive outcomes of creative media advertising (as cited in [19].

Hutter [20] founded out that there is no difference between conventional and creative media advertising in developing purchase intention in consumers mind. Still, Wottrich and Voorveld [15] demonstrated that effects on intentions were mediated. It was found that creative media advertising indirectly affects that purchase intention, but brand evaluation mediates the creative media in order to have a positive effect towards the purchase intention. The reviewed studies show evidence that creative media choice leads to higher word-of-mouth (WOM) intentions [[15], [20]]. Most importantly, Hutter [20] founded that exposure to a creative medium positively affects real shopping and purchase behavior not only to the purchase intention. Creative outdoor advertisements increase the number of individuals enters in to the shoe store and it increases the actual sales figures

Katke [21] a case study to find out the spending practices on children health and family spending as a result of advertising. This reveals that advertisements can change the direct behavior of people, when children are showing an aggressive behavior it affects the family budget. The study has revealed the positive co relationship between time spent with television but the unfavorable effect on children and family.

Bishnoi and Sharma [22] this study aimed to find the background of the consumer and how television advertising influences the buying behavior. In this study it investigates both urban and rural teenagers and in conclusion it found out that rural teenagers are more towards the television advertisements. The urban teenagers watch useful advertisements. Advertisements influence on male purchase behavior than female consumers.

Hemamalini and Kuruppu [23] in their research concentrated to study teenagers analyze the relationship between message and celebrity in reference to the purchasing and it was concluded that purchase appeal is due to the advertisements with a positive impact on customer attention.

Rai [24] in his conceptual study focused on examining the influence of advertisements on attitude formation and consumer buying behavior.

It reveals that purchase of consumer durables are motivated through advertisements. If the advertisements are based on quality and price consumers tend to do the purchase. Advertisements which cover product evaluation and brand recognition influence the purchase attitude and behavior.

E. Advertising avoidance

Advertising avoidance is defined as, "all actions by media users that differentially reduce their exposure to ad content" and can occur by cognitive, Behavioral and mechanical means" (Speck & Elliott [25]) Advertising avoidance, or the decision to participate or not in a brand conversation, is considered a form of consumer empowerment (Schultz, [26])). Technological enhancement resulted in mechanical avoidance and online environment has shifted their power from marketers to consumers (Denegri-Knott, Zwick & Schroeder [27]). New technologies support to avoid the advertisements using remote controls, TiVo and Internet blocking systems. Rather than rely on television commercials consumers prefer online information platforms.

According to Speck & Elliott, [25] the decision to avoid advertising is predicted by a number of key factors. It consists demographic characteristics of the consumer, media-related variables, perceptions towards the advertising and communication problems such as noise and clutter. In their definitive 1997 study of advertising avoidance, Speck and Elliott found Consumers suffered from television commercials than print media due to unbelievable and annoying situations. Younger people are more towards to avoid television commercials because they believe advertisements are annoying and disruptive. Not only television commercials but also the radio advertisements are avoided by switching from channel to channel. This concludes that age matters for the television commercial avoidance. And generally, advertisements are avoid by the youngers and males [[28] [29]] Rojas-Mendez, Davies and Madran [30] they explored consumer demographic factors in advertising avoidance across the United Kingdom, Chile and Turkey. There was advertisement avoidance in UK and mechanical avoidance in Turkey, but nothing significant in Chile. Females avoid advertising in terms of behavior and males use mechanical means. As age education was also an determinant of avoiding advertisements, when education level increases people tend to avoid advertisements. The impact of advertising avoidance was also tested by Bellman, Schweda, Bellman and Varan [31], they found that cognitive avoidance and ignoring the advertisements as common forms of advertisements avoidance. If consumers experienced the advertisement before, even partial exposures like fast-forwarding can increase recall. As well prior exposure can increase the advertisement avoidance.

III. METHODOLOGY

To identify the viewers' responses to television commercials, this study was undertaken in order to identify what are the actions or responses of viewers on television commercials.

This is a qualitative research study which employees 15 respondents representing different areas who make the purchase decisions in households to identify the responses to television commercials. Main focus is for the urban areas which represent the largest television viewership in Sri Lanka.

Purposeful sampling method was used to select the respondents who watch television very frequently and engage in purchase decisions in family. Participants were interviewed individually on a face to face basis. Thematic analysis was used to analyze the data.

IV. FINDINGS

It was possible to identify main themes and sub themes of behaviors of television advertisements viewers. First the researcher identified the theme of "Experiencing the newness" and under that main theme researcher was able to identify two sub themes such as, experiencing the newness (Fast foods) and experiencing the newness (Beauty care products). Moreover, the researcher was capable enough to identify another main theme which "Recommender" is and in this theme, it was discussed how viewers recommend products after they watching TV commercials. Researcher has identified another theme as "Responding to personal relevant issues". Finally, it discussed the theme "Avoidance". Although Like-wise under main findings it has been discussed four major themes and two sub themes for the first identified theme.

More than half the participants who contributed this study have getting experience from products

after watching TV commercials. This theme has been divided in two parts namely desired to have new experiences from FMCG products and Desired to have new experiences from cosmetics.

A. Experiencing the newness

a) Experiencing the newness (FMCG)

Under this theme it talks about how viewers attending to get experience from new products. Although viewers watch TV commercials, in here they see the new products therefore they have to give the idea of it's a new product and they will hope that product give them a new experience. Therefore, they try to get it. As an example of desired to have new experience from foods Mss. Anjalee from Kandy said this,

"No normally I don't buy products as so but that "Munchee Kome" [Biscuits brand in SriLanka] we don't eat normally so (I) bought that."

According to the story of Anjalee she revealed that she likes to have the new experience on a new biscuit because she had not experienced this type of biscuit earlier. In order to this experience shared by her it shows how the television advertisements have been paved the way to experience new things.

Accordingly, majority of participant's responses revealed that participants have tend to have fast foods like biscuits, chocolates, noodles etc as viewed as the television advertisements. Actually they have done the actual purchase as a trial as the initial action and then they have tended to use it frequently. But some respondents revealed that they have use the new product as the new experience by doing only experiential purchase.

b) Experiencing the newness (Cosmetics)

As per the behavioral experience mentioned above this theme also move towards to trial experience. Nowadays there have been a drastic tend towards cosmetic industry. According to Handy, he revealed that he has tended towards to purchase a product due to the television advertisement. As per his story he clearly mentioned about the experience purchasing.

"By seeing the Ads (I) have bought products. (I) ask from Nalaka [pharmacy owner], as it was shown on TV (I) wanted that hair dye. (I) applied. But it's useless." As per the story of Handy he clearly mentioned that he has purchased the hair dye in order to color his hair when he gets old. So,

this show even though he does not need that product in this moment he tends to have it now in order to experience that product.

Further, Handy says that, "When (I) start watching TV (I) use to keep a book and a pen.all the medical products (I) list down and (I) bring them from the pharmacy nearby. (I) buy whenever (I) see medical products Ads on TV".

Finally, this theme reveals that television commercials on new cosmetic products have been placed a positive connection with the customer actual purchasing. Mainly the participants revealed that they have tended to buy these products just to experience the new product of the market.

B. Recommender

The recommender adopts as the main theme for further research. The researcher has got the statement of Mrs. Priyanthi from Matara district. She says that,

Re.; "Haven't you asked anyone to buy a product by seeing a TV commercial?"
In.; "Yes, yes (I) have told my children to buy Munchee Tikiri Marie (Biscuit brand in Sri Lanka) and it is good since it is advertising on TV to buy Muchee super Cream Cracker (Biscuit brand in Sri Lanka)."

According to the statement of Mrs. Priyanthi she proposed to buy some especial branded products for her family members. Because she believes that the products which appear in TV advertisement are good. Mrs. Priyanthi plays the recommender role in front her family members. According to her statement she has a positive attitude towards the TV advertisement. Therefore, she gives a push to buy some products for her family members.

Nalika, 20 years old student lives in Kandy shared her experience on recommendation. "Yes, I do, I recommend shampoo to my friends. In these days I saw a shampoo which is made out of an Ayurveda mix and I recommended that to my friends by saying it is good". According to all above respondents' viewpoints, it shows that individuals have been act as recommenders.

C. Responding to personal related issues

As per the research finding next major theme which was found is the responding to personal

relevant issues. When people are spending time with some problem related to their personal issues they do feel really sorry about themselves. So, according to the findings it shows that they are responding quickly to the television advertisements in these situations. If the television advertisement brings up a product as solution for their problem, they tend to purchase it without any delay.

Siliyawathi 67 year's old lady lives in Matara district, according to her story she clearly mentioned about her headache for a longer period of time. So, in a television advertisement she saw a solution for her headache. She has responded like this, "Once (I) saw a Ayurwedhic oil for headache, (I) went and ask from pharmacy, (I) went and ask from pharmacy. It was not there. (I) got information and (I) got number." As per the story of Siliyawathi, she said that when the advertisement displayed on the television she has asked it from the nearest shop but when it was not available in that shop she has phoned and ask about the available shops of that medicine. This shows hoe respondents have reacted for the television commercials which are displayed for the personal related issues.

According to another example which was said by Supun in Colombo district revealed a similar idea as other participants for the personal related issues. "Will think, something would have told. And if [I] have the same problem, [I] would have bought." According to the story of Supun, he revealed that if there is an issue which related to him and similar issue placed in the advertisement with a proper solution for it he is responding to it and he tends to buy that product immediately.

D. Advertisement Avoidance

Thousands of television commercials are appearing to the viewers daily. Another big theme which was identified by the researcher was the avoidance or by passing the television commercials. There are so many responds on ad avoidance

According to the Kusumawathi's story she revealed that if there are advertisements, she is engaging in another household activity or if not, she said about turning up channels till advertisements are over. Another respondent Nalika who lives in Kandy, shared her experience like this, "[I] don't watch advertisement in an interesting way. Sometime [I] do my homework or something with phone to miss that time". In this example also she has revealed about the advertisement avoidance. As

she is a student she engaged in some school or class activity when there are advertisements.

Another example is from Anjalee she revealed her experience like this, "When the advertisements are running (I) would silent the TV and would do same thing on phone". In here she has mentioned that she is silencing the television when there are advertisements. So, it shows how respondents deal with the advertisements.

According to the all findings it shows that advertisements are avoiding by the television viewers. So, it depicts the advertisement avoidance behavior.

From the findings of the researcher it shows how viewers' respond to the television commercials in a meaningful way.

V. DISCUSSION

In order to explore the remedies for the objective's researcher founded out four key findings. Findings respectively are experiencing new products, recommendation, responding to personal related issues and advertisement avoidance.

Psychology and the behavioral sciences have the primary look of studying and following human behavioral patterns while all the other areas are paying attention to concept and practice. Human behavior is very much considered in advertisements because they want to influence human behavior through persuasion.

As per the first theme experiencing new products, one respondent mentioned that she uses products which are shown as advertisements. In a previous study it has mentioned that when buying cosmetics, toiletries, stationary, gifts and cards, the girls use information from the TV advertisements. It was also found that girls had positive attitude towards TV commercials [7].

Recommendation, two recent studies have investigated actual word-of-mouth [15] and shop visits and sales [20] and found positive outcomes of creative media advertising. As per the findings it shows that people act as recommenders by seeing an advertisement and they are recommending products for the people who seek products as solutions.

Responding to personal relevant issues, third theme identified from the findings. According to a study it states that purchase of consumer durables is motivated through advertisements and study revealed that advertisement motivates consumers

to materialize the purchase [24]. As per the findings it mentioned that the respondents are willing to make the purchases for the personal related issues they have.

Final theme discussed is about advertisement avoidance, as per the findings it shows that most of the respondents tend to avoid the advertisements and engage in another activity. In a previous study it has been discussed about how viewers avoiding TV commercials. According to Speck & Elliott [25] in their study he has defined advertising avoidance as "all actions made by media users that differently reduce that exposure to ad content". Finally Speck & Elliott [25] has discussed the advertising avoidance is highest in TV compared to other media forms like radio, social media etc.

VI. CONCLUSION

The viewers' responses on television commercials have been challenged since organizations incure a huge amount of cost for advertising. The contribution of prior research in advertising is limited when it considers about Sri Lankan context.

In this study it explores the viewers' responses in four themes. Such as Experiencing newness, recommendation, responding to personal related issues and advertising avoidance.

In conclusion these recommendations can be made, as a solution for the advertisement avoidance management can made the decision of placing crawler advertisements within the program itself. So, it paves the way to get the attention of viewers' for the advertisement at the time they are viewing the program. Second theme is the experiencing new products; managers can introduce face book pages to share the experience of the respondents who have experience the new products and these comments can lead to have lifetime users of the newly generated products. Final theme is responding to personal related issues, as managerial implications researcher is recommending to place personal related products in line with programs which talk about the personal related issues.

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Depression Care

Lakshana Vadivalagan
School of Computing and Engineering
Informatics Institute of Technology
Colombo, Sri Lanka
Lakshana.2014010@iit.ac.lk

Shyani Siriwardene
School of Computing and Engineering
Informatics Institute of Technology
Colombo, Sri Lanka
shyani.s@iit.ac.lk

Abstract—**Non-communicable diseases are increasing dramatically globally. Depression, considered a common non-communicable disease, affects 300 million people worldwide and is one of the reasons for the increase in suicide rates. Although records indicate that one out of eight people suffer from mental illness in Sri Lanka, only 40% are noted to be receiving treatment. Some reasons for this could be cultural and behavioural patterns of Sri Lankan people and also the non-availability of resources.**

There is a general lack of awareness in Sri Lanka for patients with depression and their family members. It is difficult for employed individuals who care for patients diagnosed with depression to find a trusted caregiver, monitor the patient and obtain required information on depression. This situation is exacerbated as Sri Lanka's care industry is not yet fully developed, in comparison with developed countries.

This research - "Depression Care" focuses on addressing some aspects of this problem by assisting in locating caregivers for employed individuals and also monitoring the person with depression when employees are at work. Research indicates that depression could also result from loneliness. The recommended solution, "Depression Care" also offers a Chatbot as one of the means of addressing this problem. Quantitative and qualitative research was conducted for this paper and the recommended solution was developed as a mobile application using Flutter framework and Dart language. "Depression Care" is useful for working individuals, especially in urban areas, who also care for patients suffering from depression, and places importance on identifying suitable caregivers and monitoring such patients.

Keywords—Depression, working people, Employees, Depression patient, Caregiver, Trusted, Non-Communicable Disease.

I. INTRODUCTION

Globally, non - communicable diseases are increasing dramatically.. Therefore, an increasing population needs long-term care. The number of patients seeking care for mental disorders has increased over the past few years (1). Depression is determined in daily activities by sadness and loss of interest. Depression can be considered as mild, moderate or severe (2) and is treated as a common illness. Globally, three hundred million people are affected by depression. One of the reasons for the increase in the risk of suicide is depression. Suicide is the second leading cause of death to date (3). Depression is increasing in Sri Lanka and globally. The number of women with depression is greater than men. In Sri Lanka, over 800,000 people are recorded to have depression. One out of eight people in Sri Lanka suffer mental illness, but only 40% are receiving treatment. As a result of increasing depression, problems arise that affect the economy through increased health costs for the government, low productivity, and employee absenteeism (4).

The highest number of patients with depression is in the 55-74 age range. The reason why older people are isolated and face issues relating to lack of communication is because their loved ones are busy with their own professional and personal commitments (5). Labor force participation rate in Sri Lanka in 2017 was 53.6% (6). In keeping with Sri Lankan norms and behavioral patterns, generally depression patients, elders and children are cared for by family members. Due to the lack of time of family members who have professional commitments, loved ones are taken care of by family caregivers or hired professional caregivers who may not be very reliable. Someone who is weak, disabled or ill and needs help requires constant assistance and care.

One of the main problems faced by families is the lack of trustworthy caregivers in Sri Lanka for varying forms of illnesses and diseases. Currently, working people face these problems as around 65%

of their parents and elders suffer from depression in Sri Lanka (7).

Appropriate guidance, study material, and training are not available for caregivers.

Adequate guidance and training for caregivers in Sri Lanka is also not available, according to various studies, and especially compared with other developed and also developing countries.

Caregivers face emotional physical and mention problems themselves. Caring for patients with specific illnesses is a long-term responsibility. Therefore, the caregiver is responsible for the health of the patient. They themselves face emotional problems caring for difficult patients, while trying to control and manage their own emotions. They also face physical and mental pressure from patients.

Working people face difficulties in ascertaining the capabilities of the hired caregiver.

When a caregiver is hired, very often the capabilities and abilities of the caregiver is difficult to ascertain, in terms of caring for patients suffering from specific conditions. There are specific requirements when caring for patients with depression, such as patient handling techniques. Caregivers must be able to manage the patient with depression. The language barrier could also be a problem when managing patients.

Lack of trust in certain caregivers due to the increase of abuse

Abuse of the elderly and children is increasing. Some abuse occurs when patients are alone with their caregivers, which leads to a general lack in trust and reluctance to leave patients in the care of hired caregivers.

Dissatisfaction and unwillingness of patients, to be cared for by unknown caregivers.

Patients with depression are generally happy to be looked after by their family and loved ones. It has been the Sri Lankan cultural norm that patients and elders are cared for by their own family members. Increasingly, as family members are engaged in their professions, the caregiving is handed over to non-family members, who the patients are not happy or comfortable with.

The focus of this research is to provide a platform in the form of a mobile application, which will bring together caregivers and working people and guardians, who are in need of caregivers. The system is designed and developed for working people and guardian of patients who are diagnosed with moderate Level 3 depression. The research focuses on the problems faced by working people who find it difficult to focus on their professional commitments at their workplaces, while caring for their loved ones suffering from depression., The proposed solution does not address issues faced by caregivers of elders and children with emotional, physical and mental needs.

II. LITERATURE REVIEW

A. Depression and Its Impact on People

The establishment of the major disorders at the end of the 19th century was the main psychiatric nosology. The term depression in earlier days was wide and included all forms of insanity. Depression as a disease was interrelated with the humoral causation theory, specifically with black bile, as the term suggests. (8).

Depression is a common mental disorder, characterized by persistent sadness and a loss of interest in activities that a person normally enjoys, accompanied by an inability to perform daily activities for at least two weeks at a time. Moreover, people with depression usually have several habits of the following: a loss of energy; a change in appetite; more or less sleeping patterns; anxiety; reduced concentration; indecisiveness; restlessness; feelings of worthlessness, guilt, or hopelessness; and thoughts of self-harm or suicide (9).

Non-communicable diseases are dramatically increasing globally. Therefore, the need for long-term care is also increasing . The number of patients seeking help with mental disorders has increased in recent years. (10). Depression is determined in daily activities by sadness and loss of interest and can be regarded as mild, moderate or severe.

Depression is a common disease affecting more than 300 million people worldwide, increasing the risk of suicide. Suicide is the second most important cause of death. In Sri Lanka and globally, depression is increasing. More women are diagnosed with depressions, than men. In Sri Lanka, over 800,000 people are said to have depression.

One out of eight people in Sri Lanka suffer from mental illness, but only 40% are getting the treatment. As a result of increasing depression, problems arise that affect the economy through increased health costs for the government, low productivity, and employee absenteeism. (11).

Depression has a different impact on older people than on younger people and often occurs along with medical conditions and disabilities in the elderly. It is also linked with the isolation.

B. Types of Depressions

There are many different types of depression, such as major depressive order. Symptoms of major depressive order are: the person feels depressed most of the time, along with other symptoms such as trouble getting to sleep or feeling sleepy during the day, loss of interest or pleasure in activities, feelings restless and agitated, trouble concentrating or making decisions, weight loss or gain, being tired and lacking energy, feeling worthless or guilty and having thoughts of suicide.

As a result of increasing depression, problems arise that affect the economy through increased health costs for the government, low productivity, and employee absenteeism . Other types of depression are manic depression and bipolar disorder. These arespecific types of depression illustrated by mood episodes ranging from high-energy extremes with mood up to low depressive periods. Psychotic depression is another type illustrated by similar major depressive order symptoms as well as psychotic symptoms such as hallucinations, delusions, paranoia. Women also suffer from depression that occurs after childbirth. (12).

C. Reasons for Depression

There are a number of reasons for depression occurring in people : some people have major illnesses that co-exist with depression, the death or loss of loved ones, a family history of depression, personal problems including social isolation from social groups and family, certain medication that can cause depression, abuse including physical, sexual or emotional abuses, loneliness for no reason and feel overwhelmed with depression. Another reason is a person's stressful life, that can include heavy workloads and personal day-to-day management of work (13).

D. Caregving

Caregiving for the patient with depression helps the patient with daily routines. The main goal of home care is to keep the patient safe and comfortable, while reducing the sense of isolation. Care services include helping to prepare meals according to patient needs, reminders of medication, companionship and friendship (14).

E. Caregiving

Caregiving is defined as the provision of assistance to someone who is ill, disabled or in need of daily assistance. The person who is diagnosed with the disease or is in need of help needs physical, mental, social and psychological attention. Caregiving is stressful in general; caring for an older parent is especially stressful. For both service providers and caregivers, care provision is complex. Service providers report lack of communication, coordination and care continuity as some of the issues they face (15).

F. The Need for and Importance of Caregiving for Depression Patients

A caregiver's support for a patient with depression is essential. Helping with daily routines includes daily routine structure with more patient sense of control, goal setting for a specific recovery time processes, skill building including enabling a patient to work independently to some extent, and medication management including keeping track of medicines. Support for patients with depression is important once their hospitalization therapies have been completed as patients with depression face possible lapses and face risk of suicide (16)

G. Problem Faced by People Caring for Loved Ones

Work takes over the lives of people in today's fast-paced global environment and maintaining a balance between family and work is difficult, resulting in family conflicts because of long hours and excessive workload. In the global workplace, the percentage of active employed women has risen rapidly. Besides the many positive effects of women working, such as the productivity of the nation, the wealth and consumption power of families and financially independent women, there is some negative effects in the form of pressure on family time including taking caring of family members. Cultural impacts differ from one country to another as people focus on career success over quality of life. Work and family should ideally be complementary to each other, not conflicting with each other (17).

Loneliness and boredom became problems for the isolated family members needing care. This has often been diagnosed in elderly parent with depression. Although the main priority of family members is to take care of their elderly parents, if a caregiver is hired, the aging parent is not satisfied. The reason for this is the lack of communication and

satisfaction that they would normally obtain from a family member. There's a gap between the hired caregiver and patient with depression (18). The proposed solution resulting from this research will aim to reduce the gap between caregiver and patient with depression.

H. Caregiving in Sri Lanka

Compared to developed countries, Sri Lanka is not very advanced in the care industry. Care for elderly people who have diagnosed communicable and non-communicable diseases in Sri Lanka remains the responsibility of their adult children, but migration patterns, increasingly common dual-earning households, and a shift from the extended family structure to a nuclear family structure all contribute to reducing caregiver's availability although, in general, Asian countries boasts a strong family support system. Caring for elderly family members is increasingly becoming difficult and addressing this problem has now become a pressing need.

III. QUANTITIVE ANALYST

Sixty questionnaires were distributed among those who have had or are experiencing the care of their loved ones with depression. This consisted of both females and males between the ages of 20 to 60. The following information was gathered from the respondents.

A. Long working hours resulting in reduced time spent with loved ones

36.6 % of respondents indicated that they spend more than nine hours at their work places. This clearly demonstrates that there is a pressing need for carers who are either hired or non-family members to care for loved ones of employed people.

B. Lack of extended family to assist with care giving.

Most families consisted of three to four family members. Although historically and culturally, Sri Lankan families cared for their elders, drawing in extended family members. Modernization is key factor for the lack of extended family. In general, in urban areas in Sri Lanka, most families are small.

C. Working people face many problems when they hire a caregiver

70.7% of the respondents indicated that they planned to or were hiring caregivers. However, their

requirements were often not met by the caregivers and they found it difficult to find suitable caregivers through available channels.

IV. DISCUSSION

The focus of the project is to provide a platform in the form of a mobile application, which will connect caregivers, working people / guardians who are in need of caregivers. The system is designed and developed for working people / guardians of the patients who are diagnosed with moderate depression level 3 and attempts to address the problems they face in the caregiving process. For guardians, the following features are available in the solution: the ability to look for and hire trusted caregivers through the mobile application, the provision of a daily check list of activities to be completed for the depression patient, providing depression patients with a chatbot to reduce loneliness, the ability to track the location of the caregiver via GPS, and the ability to check the patient through the camera in the mobile application. For caregivers, features such as availability of caregiver activity scheduling, the patient's medical details, information on caregiving techniques and relevant hospitals and doctors' details will be provided though the mobile application.

The proposed solution, Depression Care, is a working prototype, developed in response to the problems highlighted through the research. Initially, implementation of the system is proposed for urban areas in Sri Lanka, addressing problems faced by the working community, who also need to care for their elders suffering from depression. It is hoped that this system will contribute to reducing the stress involved with providing care to depression patients. Partnerships can be encouraged through the solution, with caregiving and home care service providers in Sri Lanka. Depression Care is a new entrant to the market. To increase career opportunity of caregivers, trainings and workshops for caregivers could be conducted. An option of selecting and publicizing the best caregiver each week via the system's mobile app and other social media platform, is an additional option. This would assist in encouraging a better quality of service among caregivers, while acknowledging their hard work.

The solution, Depression Care, could be promoted through advertisements in locations such as hospitals and via digital marketing methods, thereby gaining more customers. Future enhancements of Depression Care will involve the

inclusion of Sinhala and Tamil languages to the application, adding IOT devices to Depression Care to enhance the accuracy of the services and aid in tracking and monitoring of the caring process and expanding the scope of the solution to include more generalized elderly care. It could also be further extended to include childcare and adding a payment gateway to the system.

The depression care system was implemented after continuously observing the difficulties faced by working people when taking care of their aged family members who have non-communicable diseases. While caregiving services are available through service providers in Sri Lanka, they do not always meet the requirements of the customer and do not provide a means of monitoring patients when alone with the caregiver.

The project aims to develop a solution to cover the all problems mentioned above, going forward The platform is designed for working people, depression patients and caregivers, working together on one platform. Despite some barriers faced when developing this solution, the project provides a starting point to achieving its aim. Key stakeholders who evaluated the proposed solution, found it helpful and were encouraged by it. The solution will have continuous improvements and it is hoped that it will become an invaluable solution for the key stakeholders of the project in Sri Lanka.

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A Study on Investigating the Writing Errors of ESL Sinhalese Learners

Gayanthi Mendis
Faculty of Business
NSBM Green University Town
Homagama, Sri Lanka
gayanthi.m@nsbm.lk

Abstract—**This study investigated errors committed by first year undergraduates whose first language is Sinhala. The study examined the corpus of 60 papers written by 30 participants. Through the study, the types of errors in written English were identified and classified into various categories. The most common errors committed by the participants were subject verb agreement, the use of coordinating conjunction 'and', collective nouns, indefinite pronouns and relative pronouns. The study is important to educators and study material developers who should become aware of the kind of errors that their target learners make, so that they are in a better position to put appropriate intervention strategies into place. For learners, error analysis is important as it shows the areas of difficulty in their writing. The limitations and some pedagogical implications for future study are included at the end of this research paper.**

Keywords—*error analysis, English as a second language, first language, language acquisition, language learning, grammatical errors, frequency of occurrence, subject verb agreement, indefinite pronoun, collective nouns and relative pronoun.*

I. INTRODUCTION

For many years, there have been many studies in the process of the first language acquisition and second language learning. Findings about first language acquisition have been adapted to second language learning and it has been concluded that second language acquisition occurs in a similar way that children learning their native mother tongues since making plenty of mistakes is a natural section of language acquisition process. They lack great deal of information about rules to follow in their second language production. As they got feedback from adults, they learn how to produce grammatically and semantically acceptable sentences in their native language. What a second language learner does in operating on the target language is not different from that of a child acquiring his first language.

It is inevitable that all learners make mistakes and commit errors. Mostly they use phrases consisting agreement rules in their expressions, both spoken and written, incorrectly. However, the process can be impeded through realizing the errors and operating on them according to the feedbacks given. Identifying the steps through proper analysis that learners follow to acquire their second language would be helpful for the researcher and language teachers realise the mistakes and errors of language learners in constructing the new language system.

1. What are the types of writing errors the ESL Sinhalese learners make in their writings in English?

2. How frequent do these errors occur in their English L2 written work?

There are internal and external factors that influence a learner's performance in a second language. Unlike previous studies which have paid more attention to diverse areas in error analysis, very little attention has been paid to the errors that are made due to lack of understanding of the parts of English language. The findings can contribute to eliminate the errors learners make since the teachers can also be made aware of the

types and patterns of errors in relation to number distinction which would encourage them to come up with new strategies for teaching. Further it's a clearly known fact that errors in writing can contribute to a smaller number of pass rates in examinations and even less growth in both academic and professional fields. This is really an alarming situation and everyone should pay attention to this grave problem. Having realized this big issue, this study explores the main reasons that caused the learners to make errors in writing in English language.

II. LITERATURE REVIEW

English is one of the mandatory subjects a student has to pass during various stages in tertiary education. English is considered as an international language which is essential to be learnt by students. The importance of English Language is highly discussed with relevance to each and every subject. Based on the previous error analysis done, it can be identified that there are many issues and difficulties which can affect the errors learners make in relation to the writing errors in English language. The present study deals with the errors committed by first year undergraduates of an institute providing tertiary education in Sri Lanka. It tries to explore the weak areas of students 'language use in written form. It draws light on the importance of doing an error analysis-by analyzing the errors done in written English. It provides various strategies to the language teachers for using in language classrooms. This study would analyze different categories of errors pertaining to the written form committed by the first-year students. It would focus on the frequency of the errors and would also make the students aware about the mistakes that they made in the process of language learning and would explore the underlying processes that are involved in language learning. The focus of this study is to identify the errors that learners make when applying agreement rules pertaining to writing and the frequency of the types of errors they make.

This chapter focuses on the theoretical framework in relation to error analysis. It discusses the theories presented by various scholars such as Skinner, Corder, Chomsky and Ellis. It also discusses the studies that have been done on error analysis based on Sri Lankan context.

In the past, the field of error analysis was highly influenced by the behaviorist learning theory of language, and the learner's errors were considered the result of the existence and interference of the rules of the first language. It was considered that language learning is a process of habit formation and once the habits of one language are being formed, they put resistance in learning the rules of the second and foreign language.

A. Behaviorist Approach

One of the earliest scientific explanations of language acquisition was provided by Skinner. As one of the pioneers of behaviorism, he accounted for language development by means of environmental influence. Skinner argued that children learn language based on behaviorist reinforcement principles by associating words with meanings [1]. Correct utterances are positively reinforced when the child realizes the communicative value of words and phrases.

B. Universal Grammar

However, Skinner's approach was soon heavily criticized by Noam Chomsky. In the spirit of cognitive revolution in the 1950's, Chomsky argued that children will never acquire the tools needed for processing an infinite number of sentences if the language acquisition mechanism was dependent on language input alone.

Consequently, he proposed the theory of Universal Grammar: an idea of innate, biological grammatical categories, such as a noun category and a verb category that facilitate the entire language development in children and overall language processing in adults [8]. Universal Grammar is considered to contain all the grammatical information needed to combine these categories, e.g. noun and verb, into phrases.

C. Contrastive Analysis

The contrastive analysis was formed for understanding the errors committed by the learners in the light of the rules of both languages. On the basis of similarities of the rules of two languages, when there was a positive and constructive effect on the learning, it was considered the positive transfer, and on the basis of difference of rules, when there was resistance in language learning, it was considered the negative transfer [5].

Teachers and linguists focused on contrastively analyzing two languages. And the errors of the learners were taken into account based on contrastive analysis of languages. However, the contrastive analysis could not define all the causes of the errors and it was realized that the process is not as simple as elaborated by contrastive analysis, rather there are various underlying processes that are working behind the language learning. Language learning is a very complicated and complex phenomenon and error analysis is basically the linguistic analysis.

D. Evolution of Error Analysis

It was realized that the errors are not only the result of the interference of the mother tongue rather many other universal and underlying structures are responsible for the errors of the learners. The cognition of the learner and many other factors are responsible for the errors and mistakes of the learners. According to linguist Corder [4], the following are the steps in any typical error analysis research:

1. Collecting samples of learner language

2. Identifying the errors

3. Describing the errors

4. Explaining the errors

5. Evaluating/ Correcting the errors

Corder distinguished two kinds of elicitation which are known as clinical and experimental elicitation. Clinical elicitation involves getting the informant to produce data of any sort, for example by means of general interview or writing a composition. Experimental elicitation involves the use of special instrument to elicit data containing the linguistic features such as a series of pictures which had been designed to elicit specific features.

Later on, Chomsky's nativist theory gave the new direction to the study of error analysis and language learning. According to that theory, language learning is not simply the process of habit formation rather there is a universal grammar and learners have the capacity of learning any language rules. This theory proposed that there are many cognitive processes that are involved in language learning. In this perspective, Corder points out that some of the learning techniques and strategies that are being used by the second and foreign language learners are the same as the learners of the first language used during the process of first language acquisition [2].

This is a brief overview of the area of error analysis. Now, the current study would take into account of all these reasons and causes of error analysis in relation to number distinction and would analyze the errors made by the first-year undergraduates in National Institute of Business Management, Kurunegala. This study attempts to throw light on the significance of identifying errors pertaining to number distinction that would be helpful in teaching and learning a second or a foreign language.

III. METHODOLOGY

This empirical study was conducted at National Institute of Business Management, Kurunegala with the sample of 30 students (both males and females). The researcher conducted two tests to gauge the levels of proficiency of English of the students and the errors that students make in producing their L2 in written form.

Then the researcher has done a quantitative analysis in each essay tracing errors they have done in their writing. The papers were analysed separately and then they were compared and contrasted to see the similarities and differences

of errors they had made. The main purpose of the research is to examine the reason as to identify

> Write a paragraph on one of the following topics in the space given below. (50-60 words)
>
> - Facebook and younger generation
>
> - Peace in Sri Lanka
>
> - Education – is it necessary?
>
> - Tele dramas in Sri Lanka

the types of errors they make and the most common errors the learners make out of them.

This chapter is mainly devoted to outline the research design and methodology applied in this study. The main aim of the study is to identify the writing errors the undergraduates make in relation to number distinction. Moreover, it is designed to identify the demands of the writing population, to address their language needs and requirements. And then the analysis is done in order to recognize their requirements. Finally, the researcher addresses them in a logical manner.

Total target population of this study was first year students following a management degree program at National Institute of Business Management, Kurunegala. The age range of the research sample was from 20 to 22. Among the thirty participants, 19 were females and 11 were boys and they all were from diverse social backgrounds ranging from Kurunegala to Anuradhapura.

A. Test Paper 01

The section 01 consisted of a multiple-choice question set and also a written task. The multiple-choice question set consists of ten questions where the participants had to select the correct answer by underlining it from the choices of answers provided. The multiple-choice question set was created with the intention of measuring

the participants' understanding of the diverse aspects of grammar knowledge in English language.

The section 02 of the test paper 01 was a writing task where the participants had to write paragraph containing 50-60 words. The task provided in the paper is mentioned below.

B. Test Paper 02

Based on the findings of the Test paper 01, the Test paper 02 was developed. The second test paper was provided to the participants to identify the frequency of the errors they make in English language in written form. The paper consisted of three sections and it has been described below.

The section 01 of the paper consisted of 13 multiple choice questions which have been created based on the rules that are available in English language in the written form of L2.

Multiple choice questions are often called fixed choice, selected response or multiple-choice items because they are not always questions, and students are required to select the correct answer from the options provided to them.

Section 02 of the paper consisted of an essay question that required students to write answers to statements or questions. To complete a successful essay task, one needs to be able to recall relevant information and to organize it in a clear way, generating a thesis and building to a conclusion.

The focus of this task provided in the paper was to identify the errors the learners make in writing their L2 and how often these errors are made by them.

Section 03 of the paper was a picture ddescription task that allowed the participants to describe a given picture with the use of their imagination. The focus of this task provided in the paper was to identify the errors the learners make when they produce language in writing and how often these errors are made by them.

IV. ANALYSIS AND FINDINGS

The participants were provided two test papers: the first paper was provided with the intention of identifying the error types students commit due to the violation of agreement rules and the second paper was provided to identify the frequency of the errors that occur in L2 writing of the study participants.

The proficiency test paper consisted of two sections: It included a set of multiple-choice questions and paragraph writing. The results of the test paper 01 aided to find out the most commonly made error types. Accordingly, it was noted that the area where the participants have made the highest number of errors is subject verb agreement, the use of coordinating conjunction 'and', collective nouns, indefinite pronouns and relative pronouns.

The test paper II consisted of three types of questions such as multiple-choice questions, picture description and essay writing. By analyzing the performance of participants, it was noted that in relation to the use of different types of nouns according to the agreement rules the knowledge of the participants was quite poor. Moreover it was clearly understandable that the participants' understanding in the use of nouns was varied. For instance, in the section where multiple choice questions were provided, it was noted that 93% of the participants were able to choose the correct answer which indicates that majority of them have a fairly good knowledge on the use of plural nouns as a title where the verb is conjugated in the singular form. Nevertheless, only 16% was able to identify the correct use of relative pronouns and only 7% was able to select the appropriate form of the verb in relation to the agreement of collective nouns. Further in the sections where the learners had to produce language, in the essay writing section, majority of the errors, which is 58% were based on the use of nouns whereas in the section where they had to describe a picture, 24 % of the errors were made based on the use of nouns. Further it was important to note that all the errors made in relation to the use of nouns have been made based on the use of indefinite pronouns. Further as a whole, 76% of the errors have been made in relation to the subject verb agreement errors in the picture description section and 32% of the errors in the essay section have been made due to subject verb agreement errors as well.

In contrast, their awareness in the usage of the conjunction 'and 'was better since 90% of the participants were capable choosing the correct answer and further there were not any noticeable errors with the use of the conjunction 'and 'in relation to subject verb agreement in question no.2 and 3 where they had to produce language in written form.

C. Limitations

This study has several limitations that can be addressed in future research. Although the present sample is sufficient for exploratory research, future research should aim for a large sample size. Because the findings of the research are limited to that particular area when it comes to small sample size.

Also the research was conducted basically based on students' perception. Therefore, it cannot be identified the way that teachers' perception regarding the particular research problem. Therefore, it can be suggested that future research should analyze the teachers' perception regarding above problem.

Furthermore, this study was based on one particular institution and it target group was taken from only one discipline and it will bring limited information to the reader and further research should pay more attention to have a larger sample size and it will be highly beneficial if the sample consists of learners from diverse disciplines.

Except these unavoidable limitations, other issues were attempted to be resolved with the expectation of deriving solid and accurate conclusion based on the sample.

V. CONCLUSION

In second language teaching and learning, errors tend to be viewed negatively. Errors are usually considered to be a sign of inadequacy of the

teaching and learning. However, it is now generally accepted that error making is a necessary section of learning and language teachers should use the errors with a view of improving teaching.

This study identified errors in the participants ' written work, but did not stipulate reasons why these errors were made. My first recommendation is that this study be extended to investigating the origin of certain error patterns found in L2 written work.

This study also did not look into the areas that discuss the strategies the learners use to acquire and learn L2. Thus, in order to learn more about L2 writers' usage of language I would recommend that further research be conducted in this area

Finally, I concede that research of this nature is on-going and therefore no definite conclusions can be made because teaching and learning are both complex processes. While the results of the present study have given an insight into what types of errors are made by different participants and their frequency of occurrence, the findings can only be considered as suggestive and I am hopeful that the findings would benefit both the learners and the world of academia.

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The Impact of Firm Attributes on Selecting the Auditor: Evidence from Sri Lanka

D.M.K.T Dissanayake

Faculty of Business

NSBM Green University Town

Homagama, Sri Lanka

Kasun@nsbm.lk

Abstract— This study examines the effects of firm attributes on choice of auditor among companies incorporated in Sri Lanka. As the regulatory environment mandate, all incorporated entities are required to appoint independent auditors to audit the financial statements of the company. This offers an exclusive opportunity to examine the differentiation in demand for auditors when there are two types of potential auditors in place of selection for the organisations based on the audit quality; which is either a "big three firm" (PWC, KPMG or EY) or a non-big three. Therefore, researcher will emphasis to accomplish the objectives of assessing the status quo of organisational attributes and identify the relationship between organisational attributes and auditor choice among companies in Sri Lanka. This paper takes a quantitative approach into consideration with stratified sample of data obtained from companies incorporated and operating under the companies act no.7 of 2007. Custom-built binary logistic regression model examines the influence of organisational attributes such as profitability, company's age, complexity, leverage, operating industry against auditor choice proxy into two choices reliant on audit quality (Big three Vs Non-big three auditors).

Correlation analysis indicate significant correlation between auditor choice and several organisational attributes. Whereas the binary logistic regression model results show that organisation complexity has a positive relationship with the choice of big three auditor being appointed. While leverage of the company has a negative relationship with engaging a big three firm. Overall, three of the organisation characteristics were found consistent to the developed hypotheses in the research design. Given the importance of audit, this study delivers insights regarding determinants of choice of auditor which is an important matter to the regulators, enforcement agencies and investors. The findings imply different organisational attributes have different effects on auditor choice; some structures strengthen it while others weaken it. The diverging relationship between the organisational factors and audit choice raises the question of its significance to the appointment regardless of the mandatory requirements. The research extends the literature by extending the determinants of the choice of auditor in an emerging market where there is mandatory audit requirement. The work is based on empirical data obtained directly from company financial statements. Thus, utilizes the audited financial statements and make objective analysis of auditor choice dynamics to highlights the important role played by organisational characteristics in shaping demand for audit quality.

Keywords—Auditor choice, Audit quality, Big three firm, Firm attributes

I. INTRODUCTION

External auditor's monitoring role played on behalf of investors or shareholders form a vital component of the corporate governance framework, as they attest to the reliability of accounting information provided by administration [1]. A survey conducted by the Institute of Certified Financial Analysts (ICFA) reveals that 72 per cent of respondents considered the auditor's report to be a valuable part of their analysis; together with financial reports, it was used in investment decision making [1]. However, external audits only provide valuable information about an entities' financial statements when they are of an adequate quality [1]. The objectives of conducting the research were to assess the status quo of selected firm attributes in Sri Lanka and to identify the relationship between firm attributes and auditor choice of selected companies in Sri Lanka. Accordingly the primary research question was whether there is a

relationship between auditor choice and firm attributes of profitability, firm's age, complexity, leverage, and industry category. Five hypotheses will be developed that examine the influence of firm attributes (Profitability, Firm' age, Complexity, Leverage and Industry) on auditor choice. Where the literature identifies certain company characteristics that may impact the choice of auditor. These include its size, complexity, leverage, profitability, industry classification [2]. This paper is based on data collected from 100 public limited companies registered under Colombo stock exchange. These companies belong to five sectors.Time span of the study was 2014 - 2018. Descriptive statistics, correlation analysis and regressions models were used to analyse data.

II. LITRETURE REVIEW

Considering large amount of studies already focused on auditor choice, it is defined for firms with a statutory audit requirement will be making the decision of choosing the auditor considering the audit quality [3]. On the other hand, vindicate the fact that audit quality is unobservable, and therefore, perceptions can differ from reality [4]. In accordance to the findings documented by Francis [5] in his research the key wave of auditor-differentiation research focused on the dichotomy between large and small firms as a basis for differential auditor choice. As he states as per DeAngelo's debates on the fact that accounting firm size is a proxy for quality (measured in terms of auditor independence) because no single client is important to a large auditor and the auditor has a greater reputation to lose their entire clientele if they misreport. Another study found [6] a positive correlation concerning certain changes in client firm agency costs (e.g. managerial ownership and leverage) and client movement to a higher quality auditor. Francis [5] have evidence that more profitable firms engage higher quality auditors and that some loss-making firms are less likely to engage with larger auditors as they prefer the smaller practicing firms to be their choice of auditor. Penno & simon in 1986 [7] found firm size and age also to be relevant factors inducing the choice of auditors in a company. Thus a study done by Ettredge, Lim and Kwon [8] further reveal the importance of economic factors in deciding the auditor as classical focus is exclusively on objective, economic determinants of auditor choice, such as debt ratio and financial distress.

Besides, the firm's leverage displaying the financial distress will cause to diminish the opportunity of appointing a reputable firm since it acts as a barrier to present favorable financial statements by minimizing losses via incompliance to regulations [9].

Sri Lankan auditing practices developed in line with accounting practices. Incorporated entities' financial statements must be audited by members of ICASL that hold practicing certificates. The Sri Lanka Accounting and Auditing Standards Act requires auditors to certify in their audit report that the audit has been conducted in accordance with Sri Lankan Auditing Standards.

III. METHODOLOGY

Literature provided appropriate foundation on the auditor selection process which mainly governed by audit firm and firm characteristics. Throughout history scholars have given prominence to determine the association between such factors and tested using empirical data.

Accordingly, the author developed following conceptual framework.

Author's source
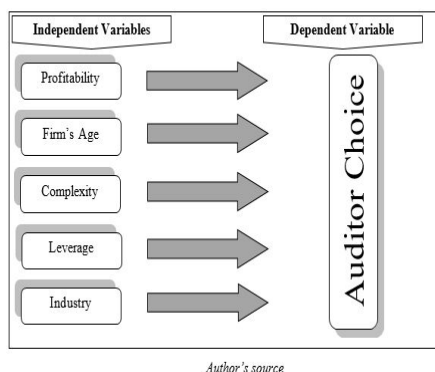
Fig. 1.   Conceptual Framework of the Research

The study based on five independent variables and one dependent variable which is "Auditor Choice". First of all, descriptive statistics embodied with mean, median, maximum, minimum and etc. for the identified variables are performed to apprehend the first objective. The researcher used binary logistic regression model to assess the effect of a company choosing the auditor based on firm attributes;

$$AUDIT_i = \beta_0 + \beta_1 ROE_i + \beta_2 AGE_i + \beta_3 COMPLX_i + \beta_4 LEV_i + \beta_5 INDUSTRY_i + \varepsilon_i$$

TABLE I.   OPERATIONALIZATION

Variable	Acronym	Measurement
Dependent Variable		
Auditor Choice	*AUDIT*	Dummy variable that represents auditor choice. It is equal to one (1) if a Big 3 firm audit the company's financial statements, zero (0) if a Non-Big 3 audit firm audits the company's financial statements
Independent Variables		
Profitability	*ROE*	Ratio of net income divided by equity holders' funds
Firm's Age	*AGE*	Natural algorithm of number of years since incorporation
Complexity	*COMPLX*	The number of consolidated subsidiaries, associates and joint ventures
Leverage	*LEV*	The ratio of total debt to total assets
Industry	*INDUSTY*	A categorical variable depending on the firm's operating industry as per the model applied by the researcher

Author's source

IV.   ANALYSIS AND DISCUSSION

a.   *Descriptive Statistics*

TABLE II.   AUDITOR CHOICE COMPOSITION

Auditor Choice	Observation	As a %
Big 3	102	78
Non-Big 3	28	22
	130	100

Source: Developed by Author

Table 2 presents the distribution of auditor choice. Among 130 incorporated companies, 102 firms (78 per cent) used the services of a Big 3 auditor, compared to 28 firms which engage with Non-Big 3 auditors. This demarcate the prominence of auditor demand for the Big 3 firms in the selected sample. Reminding you the fact that major composition for such monopolised outcome are due to the fact that most listed entities will employ the reputed firms to provide them with external assurance to their financials to improve stakeholder satisfaction.

Table 3 exhibit the facts of auditor selection based on the industry. According to the observations, industries such as Investments and Banking & Finance entities only engaged with a big three auditor. Hotel and Travels and Manufacturing

sectors could be identified as market segments with auditor selection visible at a normal distribution level with entities have a mix perception on to the auditor choice.

b.   *Spearman's Rank Correlation*

TABLE III.   CORRELATION COEFFICIENT MATRIX

Industry	Big 3		Non-Big 3		Total Sample	
	N		*N*		*N*	
Banking and Finance	25		0		25	
Investments	11		0		11	
Manufacturing	24		14		38	
Hotel and Travels	30		8		38	
Real Estate	12		6		18	
Total	102		28		130	

** Correlation is significant at 1% and * at the 5%
Source: Developed by Author

Spearman's correlation shows that there is no significant correlation between auditor choice , that is choosing a big 3 firm (*AUDIT*) and no. of years that a client organisation operating in the industry (*AGE*) .It is found that there is a significant positive correlation between auditor choice and complexity of the organisation which is being audited (*COMPLX*). However, the choice of auditor selection and organisation operating industry (*INDUSTRY*) suggests no significant correlation. Auditor choice and the organisation leverage (*LEV*) indicate a significant negative correlation. The final variable of company profitability in terms of return on equity (*ROE*) and choice of auditor has a significant positive spearman correlation as observed through the outcomes illustrated in the above given table.

According to the binary logistic regression results this model can explain 36% of variation of auditor choice. It is identified that there is significant positive relationship between complexity of the organisation and choice of the big three auditor. On the other hand, there is a significant negative relationship between leverage of a firm and selecting a big 3 auditor.

TABLE IV: BINARY LOGISTIC REGRESSION RESULTS

Variable	Hypothesis	Expected Sign	Coefficient	Std. Error	p-value
Constant			6.323	1.656	
Firm Attributes					
ROE	*H1*	+	0.183	0.315	0.562
AGE	*H2*	+	0.015	0.015	0.338
COMPLX	*H3*	+	0.273	0.133	0.041*
LEV	*H4*	-	-4.889	1.375	0.000**
INDUSTRY	*H5*	+/-	-1.056	0.290	0.610
Adjusted R²	*0.36*				

** Correlation is significant at 1% and * at the 5%
Source: Developed by Author

V. CONCLUSION

The assessment of the existing theoretical and empirical literature demonstrates the influence of many factors on auditor choice. Therefore this study examined the firm attributes effect on choice of auditor in Sri Lanka. It is argued that firms with sophisticated, firm strength (implied by their higher profitability, extreme complexity, longer period of operations etc.) are more likely to require management to hire high-quality audit companies to facilitate monitoring activities. In contrast, firms with low firm strength (implied by higher leverage or low earnings etc.).

The descriptive statistics analysis of the evaluated sample provided the required assessment on the status quo of firm attributes while the spearman's rank correlation and binary logistic regression model identified the relationship between firm attributes and auditor choice between the companies in Sri Lankan context.
Results indicate 75 percent of the firms have selected higher audit quality through appointing Big 3 auditors while the rest assures to employ Non-Big 3 category of auditors.

Correlation analysis indicate significant correlation between auditor choice and several firm attributes. Whereas the binary logistic regression model results show that firm complexity has a positive relationship with the choice of big three auditor being appointed. While leverage of the company has a negative relationship with engaging a big three firm. Overall, three of the firm characteristics were found consistent to the developed hypotheses in the research design.

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Enhancing Biomass Production of Microalgae Using Cement Flue Gas

H.A.T.S Gunasena,
Department of Agricultural
Engineering
Faculty of Agriculture
University of Ruhuna
Matara, Sri Lanka
thilina703@gmail.com

C.P. Rupasinghe,
Department of Agricultural
Engineering,
Faculty of Agriculture,
University of Ruhuna, Matara,
Sri Lanka
chintha@ageng.ruh.ac.lk

D.M.K.G. Dissanayaka
Siam City Cement Lanka Ltd,
Palavi, Puttlam, Sri Lanka

Abstract—**Emission of Carbon dioxide (CO2) from cement industry is a critical issue which leads to air pollution. Biological remediation of CO2 using microalgae is one of the most cost-effective methods for industrial CO2 reduction and gets the higher biomass yield. The potential of microalgal photosynthesis for the production of biomass is widely recognized due to their more efficient utilization of sunlight energy as compared with higher plants. Micro-algae have received considerable interest as a potential feedstock for producing sustainable transport fuels. The study was mainly focussed to identify the most effective algae from marine algae (Nannochloropsis sp.) and fresh water algae (Chlorella sp. and Spirulina sp.). Guillard and Ryther's modified F2 media was selected as growing medium for microalgae cultivation.**

Cement flue gas was bubbled to growing media as treatment and atmospheric air was bubbled as control. Completely randomize design (CRD) was used with three replicates. Dry weight of biomass of algae species, Carbon dioxide (CO2) percentage and Oxygen (O2) percentage of input and output air from medium and pH variation were observed. The highest dry weight of biomass was observed in marine algae Nannochloropsis (2.75 g/l) and it was 78.6% higher compared to control. Nannochloropsis sp. absorbed highest amount of CO2 (12.41%) by media. There is a high potential to use cement flue gas as CO2 source for Nannochloropsis sp. to get higher biomass yield for biofuel production.

Keywords - Cement flue gas, Carbon dioxide, Biomass dry weight, Oxygen

I. INTRODUCTION

Global warming is a main environment issue in the world which accelerated by CO2 emission. Major ways of CO2 pollutions are from sectors of energy, traffic and transport, agriculture and land use, as well as industry [1]. When consider about other greenhouse gases Carbon dioxide have highest potential for global warming and it is the most abundant gas among all greenhouse gases.

When consider about other industrial activities cement production process emitted higher amount of CO2. There are two main sources for release CO2 from cement industry: lime stone calcination and combustion of fossil fuel. Normally when produce one ton of cement it produce 0.65-0.90 tons of CO2 it is depend on raw materials and process efficiency and the 90% of above emission goes to cement production process and remain 10% goes to raw material transportation and other activities [2]. According to the latest European pollutant emission register report published in 2004, the cement industry produced 193×10^6 t CO2 in the member states of the European Union and Norway [3].

The only way to reduce CO2 emissions from the calcination process is to use alternative raw materials, which do not contain carbonates in their mineral structure. However, till now no economically viable compound from which the produced cement is comparable with quality of the current Portland-based cements, have been found. Due to high CO2 content in the flue gases, the most effective way to reduce CO2 emissions from the cement manufacturing process is to capture CO2 from the flue gases and store it or utilized [4].

Algae efficiently use CO2 from atmosphere, and they are responsible for more than 50% of the total global carbon fixation [5]. Microalgae can utilize different types of CO2 such as atmospheric CO2, CO2 from soluble carbonate and CO2 emission

from industrial activities. Algae considered as third generation biofuel [6]. They can increase biomass rapidly than other plants and they can grow under some extreme environment conditions. They need less energy, space and very few nutrients to grow and easy to grow than other plants. Light and temperature are the two most important factors that affect algae biomass productivity.

It is very important to identify the suitable algal species which has a high growth rate and greater tolerance to harsh environmental conditions. Therefore this study was focused to identify most suitable algal species from selected species to grow with cement flue gas and concern the potential of reduction emitted CO2 by micro algae and produce higher biomass yield.

II.   METHODOLOGY

The study was conducted at sixth floor at pre heater of Siam City Cement Lanka, Puttalam cement plant during the three months period. Three algae species *Spirulina* sp., *Nannochloropsis* sp*. and Chlorella* sp. were cultivated in Guillard and Ryther's modified F2 medium. Algae were cultivated in 1.5 L PET bottle with culture medium. Complete Randomized Block Design (figure 1) with three replicates used for six treatments which are; T1-*Spirulina* sp. with cement flue gas , T2- *Chlorella* sp*.* with cement flue gas, T3-*Nanachioropsis* sp. with cement flue gas, T4- *Spirulina* sp. with atmosphere air, T5- *Chlorella* sp*.* with atmosphere air, T6-*Nanachioropsis* sp. with atmosphere air. Cement kiln flue gas was taken to experimental site from sixth floor of pre heater by galvanized iron tube. Each treatment was aerated within 24 hours by cement flue gas or atmospheric air using aquarium air pumps at the rate of 1L/minute per one bottle for 4 weeks.

TABLE 1: USED CEMENT FLUE GAS COMPOSITION

Gas	Amount
O_2	10.38 %
CO	815 ppm
NO	230 ppm
CO_2	8.86 %
NOx	235.6 ppm
NO_2	5.6 ppm

The composition of used flue gas was given in the table 1.

Dry matter content of algae of each treatment was estimated by gravimetric method. The CO2% and O2 of input and output air of each bottle was tested using flue gas analyzer (Model: testo 340). Atmospheric temperature and pH of the culture media were tested in three days intervals.

Figure 1. Experimental design

III.   RESULT AND DISCUSSION

Comparative observation of the composition of flue gas and atmospheric air (figure 2) showed CO2 in flue gas 88 times higher than atmospheric air and O2 of atmospheric air doubled compared to flue gas. The little amount of other greenhouse gases such as NO, CO, NOx and NO2 exist only in flue gas.
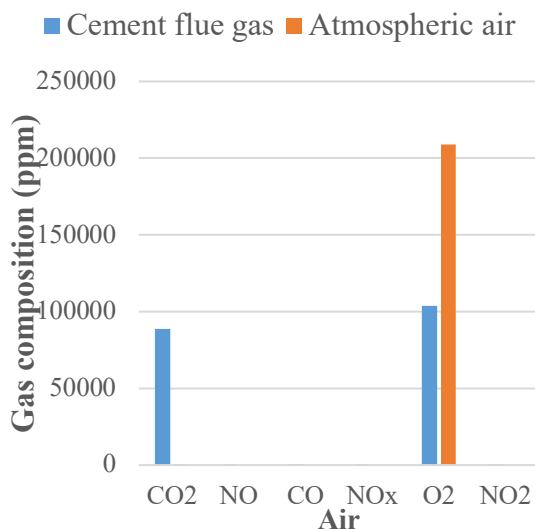
Figure 2: Compositions of flue gas and atmospheric air

The pH value of microalgae growing media with cement flue gas showed lower pH value compare to atmospheric air due to dissolving acidic gases (figure 3).

Highest dry matter content (figure 4) was observed in micro algae, *Nannochloropsis spp.* in flue gas aerated media which is 3.5 times higher value compared to earlier experiment in the same condition [7].
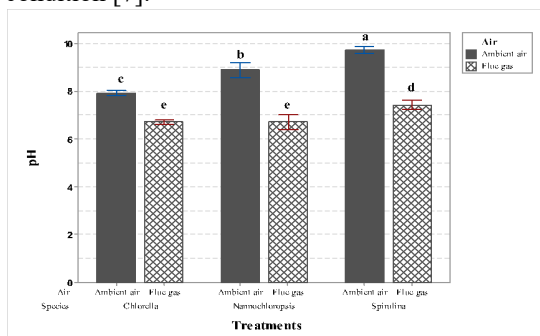

Figure 3. pH of the growth media

Dry matter yield of micro algae, Spirulina *spp* was higher in flue gas aerated media as higher concentration of CO2 with Nox supplied and these are nutrient supplements for algae growth. But comparatively micro algae, *Chorella spp* was not showing better performance in flue gas and it showed poor performance due to lower tolerance of pH of the media.
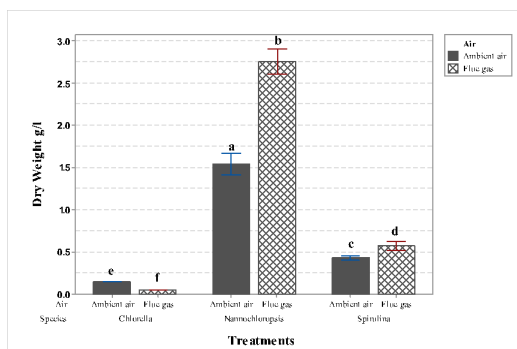
Figure 4. Dry matter content of harvested algae

The higher amount of O2 was released from the micro algae growth media treated with flue gas except *Chlorella spp. Nannachloropsis Spp* released highest amount of O2 compared to other treatments (Figure 5).
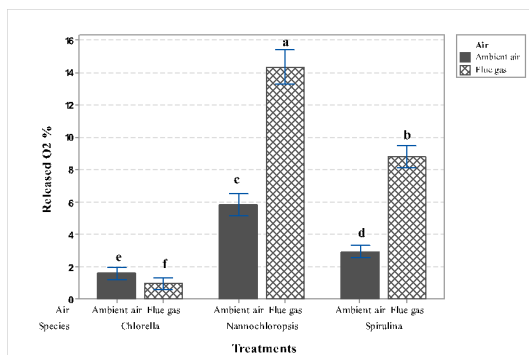
Figure 5. Released O2 from growth media

Highest CO2 from flue gas was absorbed by the growth media of *Nannchloropsis spp.*as growth performance of it was better compare to others (Figure 6).
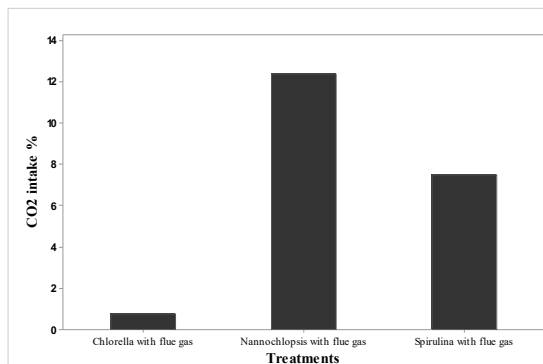
Figure 6. CO2 intake from flue gas

IV. CONCLUSION

Microalgae, Nannochlopsis *Sp*p. is suitable for removing CO2 from cement flue gas   and it was produced higher biomass yield which can be used as feedstock for biofuel.

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Construction Equipment Management through Selection, Maintenance and Replacement Practice

Janith Bogahawatta
Finite Lanka (Pvt) Ltd
janith.bogahawatta@finitelanka.com

Bhasuri Amarathunge
Faculty of Business
NSBM Green University Town
bhasuri@nsbm.lk

Abstract— **Effective equipment management is a critical success factor for any construction firm to sustain in the industry. In construction equipment management, the equipment selection, maintenance and replacement are the main key areas of attention. Conventional processes of equipment management and bias decisions of equipment managers often result significant losses in construction firms. Inefficient usage of consequential cost in equipment management seriously diminishes the effectiveness of selection, maintenance and replacement decisions of construction firms. It is found in the study that; majority of Sri Lankan construction firms acquire the construction equipment either from leases or loans. Frequency of equipment usage is identified as the main criterion considered when making the decision, whether to hire or buy equipment. It was generally identified that; companies have incorporated scheduled preventive maintenance policies and corrective maintenance policies in construction equipment maintenance. Periodic maintenance is found to be an important practice in equipment maintenance. In the event of equipment failures, it was found that location of the equipment and waiting for spares are the most significant causes for reported downtime. Delays of construction due to equipment breakdowns is the foremost reason to dispose construction equipment. Effective application of consequential costs like downtime costs of equipment management, would certainly improve the construction equipment management processes.**

Keywords—Construction Equipment Management, Selection, Maintenance, Replacement, Consequential Cost, Downtime

I. INTRODUCTION

Thousands of years ago mankind started using equipment to carry out their day today work efficiently and effectivey. People started using animals to ease their construction work until 19th century, because construction was an essential part in human lifestyle. But with the development of steam powered engine and internal combustion engines, construction became more abridged with mechanical construction equipment, replacing traditional methods that used animals and human [3]. Development of equipment made the construction industry what it is today by enabling mankind to undertake projects such as high-rise buildings, bridges, highways and irrigation structures, with few years of completion, which should have taken hundreds of years to complete without the presence of heavy construction equipment.

Construction industry in Sri Lanka had tremendously grown in the recent past and it had developed to a robust level in the national economy. In 2017, composition of GDP from construction industry was Rs.1040 billion when in 2013 it had only been Rs. 621 billion [4] showing an increase of more than Rs. 400 billion for 5 years' time. Management of construction equipment is critical when it comes to construction projects, as cost of equipment hold a major proportion in overall cost of construction. Therefore, proper management of construction equipment becomes utmost important for the sustainability of any construction project in any construction company. Yet, having identified the criticality and importance, no adequate attention

has been given by the researchers on the field of proper management of equipment especially when it comes to Sri Lankan context.

Though there are various studies conducted on equipment management over past 300 years, with the purpose of optimizing the construction profits directly and indirectly through equipment management, in many cases they have paid attention on minimizing equipment costs. It is emphasized the fact that all equipment decisions must be carried out carefully based on the fundamental purpose of facilitating the construction processes [5] either to minimize the costs or optimize the construction profits.

II. AIM

The main aim of this paper is to identify equipment management practices used by companies in the construction industry in Sri Lanka with respect to selection, maintenance and replacement policies adopted construction in organizations.

III. METHODOLOGY

Sixteen in-depth interviews had been conducted with sixteen participants purposively selected from 16 companies in construction industry. In addition to in-depth interviews, an online questionnaire was also circulated among participants to gather some of the specific data related to equipment management practices. Participants were selected purposively based on their capability to contribute to the research objective. The job positions of the participants are illustrated in Fig. 1. As secondary data sources, findings of past researchers, company reports, company records and other publications from various sources were referred.

Data collected from in depth interviews and questionnaire were analyzed manually through content analysis methods. Analyzed data was discussed based on the previous literature and recommendations were given with respect to selection, maintenance and replacement practices.

IV. FINDINGS

A. Equipment Selection and Assignment

Equipment selection is a crucial factor for the successful completion of any construction project, and it is a complicated process when it comes to financing the equipment acquisition. There are few financing options available for firm such as;

cash purchase, bank loans, leasing facilities and hiring equipment [2]. Most of companies (87.5% out of sample) were using leasing facilities in financing equipment acquisition as the top priority option. They also indicated that their most popular second option is financing through a bank loan. Only a minority of companies indicated that they use company reserves in financing. This had been a result of tax benefit that they can gain through debt financing. As most of companies in the sample were family owned or private limited companies, through payments of interest the companies have the potential to avoid tax. Hence, the benefits of tax avoidance have made the companies to prefer more for leasing and loan options.

When it comes to the decision whether to hire or purchase equipment, most of the companies mainly considered two factors; frequency of the usage and the cost of hiring of equipment. Also, it was found that, decisions of construction practitioners are highly influenced by brand loyalty. 'Past experiences on a certain brand' and 'customer service' were identified as major determinants of brand loyalty among decision makers. Some of them indicated 'country of origin' as an important determinant too. The major issue identified here was, the decision makers mostly tend to take acquisition decisions based on their intuition, hence processes had become more complicated.

When considering the personnel who possess the authority of acquiring equipment to a task/project, most of the companies mentioned that it is certainly with the managing director of the company. In some companies there was a distinct position called Equipment manager who was
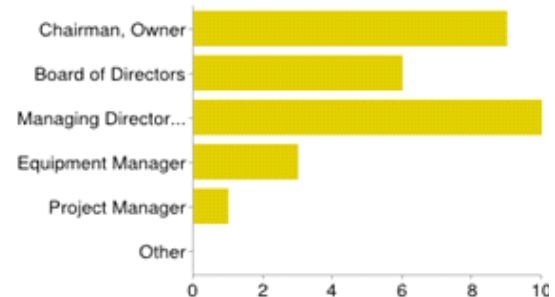

Fig. 1.   Authority of Acquisition

authorized to acquire the equipment (Fig. 2). It should be emphasized that, any person who is

assigned to carry out equipment acquisition should carefully consider all related factors regarding that decision well in advance.

Factors like; 'purchase price' and 'reputation of the equipment model' were identified as key factors affecting construction equipment acquisition decisions. Even though, in theory there are many systems developed for equipment assignment processes, it was unlikely they had been used practically in the decision making process [6].

B. Construction Equipment Cost Management

Total equipment costs generally consist of two components; ownership costs and operating costs. Except for the initial capital cost of buying a machine, ownership costs are fixed costs that are incurred each year, regardless of whether the equipment was operated or idled. But operating costs will be incurred only when the equipment is operated [2].

When we consider about the cost of owning equipment, the iinitial cost, interest cost, iinsurance expenses and taxes can be directly measured as sub components of it. But depreciation is considered an estimation for equipment wearing. It was revealed that less than half (44%) of the participants mentioned that they use reducing balance approach to depreciate equipment while, 31% used straight line method with 6.4% of the companies selected the both. Depreciation policy adopted for an equipment can be different based on the nature of equipment. Further, it had been noticed that, some of the participants did not know the exact depreciation policy of their company, and the puzzle about that is, those individuals that could be the personnel who make the acquisition, retiring and replacement decision. Ddepreciation is not tax deductible; hence it is recorded in the company accounts as an expense. Hence, it is recommended for managers to have a clear idea about depreciation and its policy of respective company they work.

Moreover, maintenance of proper records related to operating costs are important. All most all the companies have been maintaining records on fuel and lubricant handling. But only 56.3% companies have computerized their equipment records. But there were certain companies that did not maintain details regarding the operating hours, operator wages and repair details. Surprisingly, there were some (12% of the sample) companies

that did not track any of above-mentioned costs at all. But it is critically important to record those costs in order to find any theft, fraud or abuse of equipment.

C. Equipment Maintenance Practices

According to literature, there are three types of maintenance and it was analyzed how companies realistically use following methods in construction industry,
1. Planned preventive maintenance
2. Planned corrective maintenance
3.Unscheduled maintenance due to breakdowns
In theory scheduled maintenance is understood as a combination of 1 and 2 above.

In findings, 87.5% of the companies found to be using scheduled maintenance in their maintenance policy out of which majority had been given attention on preventive maintenance. Time duration between maintenance was found to be from 3 months to 6 months and periodic maintenance was rated as very important factor.

D. Failure of Equipment

Poor maintenance, abuse and misuse of equipment were some of the critical reasons for construction equipment failures and majority of the failures were related to breakdowns in engine [7].

Vorster & Sears (1987) had introduced a new method in equipment management using 'failure cost profiles.' They had pointed out consequential costs like failure costs plays a major role in retiring, replacement and reassigning of construction equipment. But failure cost consists downtime cost which often has not paid considerable attention by the practitioners. In analyzing causes for the downtime cost, it was found that 'location of the equipment' and 'waiting for spares' were playing a significant role. As most of the small to middle range construction companies, usually tend to outsource their repairing and maintenance of equipment, arriving time of the repair crew may vary with the distance of the construction site.

In Sri Lanka spare parts can be hard to find when it comes to uncommon equipment and the repairing of equipment will be stopped until specified spares are imported. 'Lack of repair personnel' and 'problems in communication problems' were also recognized as some other

issues. According to the findings, timely and proper maintenance at site and knowledge and experience of the operators are indicated as the important factors. Additionally, the 'availability of repair facilities' at construction sites was, identified as a significant factor to reduce downtime according to many literature [8].

E.   Equipment Replacement

When any equipment had been used overtime, it has the potential to break down, hence need to repair. But if the equipment usage time increases, repair cost may also increase significantly. Hence, there is a point of time in any equipment which it needs a replacement.

It is suggested in literature that there can be several factors that can influence on replacement practices such as revenue, maintenance costs, downtime cost, cost of capital, depreciation, past experience and reputation of brands [1]. Early studies had made attempts in developing policies for equipment replacement, using dynamic programming and functional equation technique to arrive at a more realistic and detailed decision making [9]. Over the last 80 years gradual development of quantitative models for equipment replacement and there were evidences for more realistic models developed using computers [10].

When making the decision, whether to keep or to replace a certain equipment with a more new and advanced equipment, decision maker should consider both current technology available and future technological advances [11]. The findings revealed some of the reasons where construction firms decide for replacement of equipment. Delays of construction due to breakdowns was the critical reason ranked by respondents at the top to make the decision of replacement. Also, they mentioned, loss of income due to equipment downtime, as another reason. Yet, it was noticed that companies in Sri Lanka, were more focused on scheduled delays of projects due to equipment downtime, rather than cost factors.

Many researchers have developed models and systems to determine the optimum time for the replacement because it is generally complicated to evaluate as so many factors should be considered concurrently. But according to findings of the study, in Sri Lanka most of construction companies just make their decisions only limited to few factors, such as high maintenance cost and repairs and when equipment becomes low productive. Therefore, lack of knowledge exiting among construction practitioners about modern and advanced methods of equipment management is a major issue faced by the construction industry in general.

V.   CONCLUSION

In summary, majority of construction firms were taken the option of leases and loans in financing acquisition of equipment. When equipment owning costs are considered, the depreciation is the only cost that cannot be determined. Surprisingly, decision makers in the top management were not directly aware about this depreciation cost. It was indicated that all companies keep fuel and lubricant records but literature suggests it is critically important to record and control other costs as well. It was identified that, companies have scheduled preventive and corrective maintenance policies. Repairing is anyhow will be done at the equipment breakdowns. Periodic maintenance, training and experience of equipment were recognized as critical factors in equipment maintenance. With respect to equipment failures, it was found that location of the equipment and waiting for spare parts are the most crucial causes for downtime. Delays of construction due to breakdowns was the main reason for disposing equipment. Equipment replacing decision of construction firms was taken buy top management generally by the intuition, but there can be exceptions. The mainly identified reason for equipment replacement, is delaying of construction work. Most of the companies limit their decision to several factors but it is recommended to use advanced models and computer technology to assist decision making process for the effective and efficient utilization of construction equipment.

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Exploring the Potential of an E-Service for Environmental Sustainability in Sri Lanka

Ishani Karunaratne
Faculty of Engineering
NSBM Green University Town
Homagama, Sri Lanka
ishani.k@nsbm.lk

Mohamed Sapraz
Faculty of Computing
NSBM Green University Town
Homagama, Sri Lanka
shafraz@nsbm.lk

Abstract— **During recent past, issues due to environmental degradation have come up in different parts of Sri Lanka due to various anthropogenic causes. Some of the recent environmental problems in the country have triggered the common citizens to proactively contribute to environmental sustainability. Social media has become a pragmatic force of communication during the past and 'Wilpattu' deforestation incident has been one such, which was criticized heavily, causing the responsible parties to collide with social media battles rather than take up the correct course of remedial action. Through the initial analyses conducted using available social media comments, it was evident that the general public was not made aware of the truth on time. Given the exploratory nature of this research, perceptions of several randomly selected individuals who are directly/ indirectly involved and not involved in the 'Wilpattu' incident have been interviewed to formulate several hypotheses and it is evident that, lack of effective communication of the environmental concern, quality of feedback, time delay and evidence of action taken up by responsible authorities were not transparent enough to the general public with concern to the 'Wilpattu' incident. In conclusion, it is proposed that an integrated e-service that can link the general public with the responsible authorities with positive and frequent feedbacks, is the clear solution for many if not all environmental related issues in Sri Lanka.**

Keywords—E-government, environmental sustainability, e-service collaborative model

I. INTRODUCTION

In defining sustainable development of a country, environmental sustainability plays a crucial role. Most of the resources that are being used daily are from natural resources hence, preserving the nature and environmental component has now become a need more than a necessity. For Sri Lanka, this has become an integral component as well as a major challenge due to rich biodiversity and the untouched rural beauty covered with acres of serene forests, fighting against the demand of growing population [1].

Out of the 17 Sustainable Development Goals set by the United Nations for 2030, five goals are directly related to environmental sustainability and Sri Lanka is also currently under the process of taking actions to achieve the expected outcomes of these goals. Environmental Sustainability is considered the dominant challenge at present and the inability to implement it has now lead to massive environmental shifts such as global warming, rising sea levels, dramatically expanding droughts, ocean acidification, and loss of biodiversity [2]. The rate of change of the global environmental conditions are now at an unprecedented level to which developing nations like Sri Lanka are still struggling to adapt. The 2004 Tsunami and 2017 Meethotamulla environmental disasters can be taken as examples that resulted in lack of effective information systems to forecast them and provide solutions with immediate effect. In the recent past, many people opposed the 'Wilpattu' deforestation and in numerous ways and they started to show their comments and opinions in different channels including much widely used social media platforms. The analysis of these social media posts can lead to a deeper and better understanding of the citizens' points of view regarding these specific environmental problems.

II. BACKGROUND STUDY

A. Current Status

In comparison with other South Asian countries, Sri Lanka probably makes a greater effort to conserve its environment. Nevertheless, limited commitment and dedication from both public and state have created serious environmental threats in recent years. Currently in the country some of the major environmental issues are deforestation, soil erosion and dam siltation, garbage and pollution, wildlife poaching, coastal degradation, mismanagement of land use, freshwater pollution, urban and industrial wastes, destruction of mangroves & air pollution [1]. The Ministry of Environment has drawn attention to key environmental concerns under seven broad categories such as urbanization, management of solid waste, biodiversity conservation, land degradation, freshwater and marine resources, abatement of air and noise pollution, and energy conservation [3]. Since Sri Lanka is in a transition from an agricultural to industrial economy, the country will face many production-related environmental issues in the future.

B. Role of ICT in Govenrment Sector

Since early 2000, successive Sri Lankan governments have recognized the power of ICTs for effective delivery of government services to the general public. In this sense, the first official level e-government push came through the Ministry of Higher Education and Information Technology Development in Colombo in early 2001[4]. Colombo was expected to implement this e-government initiative through the Council for Information Technology (CINTEC). One of the main aims of this e-government initiative was to set up an island-wide network (National Education Information Network) linking all educational institutions and related services [4]. This project was funded by a loan from the World Bank. In 2002, the Sri Lankan Government officially launched a large-scale project called e-Sri Lanka aimed at exploiting the power of ICT for national development covering all government services (ICTA, 2004). With this initiative, the ICTA (Information Communication Technology Agency) was also formed as the apex body of the Government of Sri Lanka for implementing the e-Sri Lanka project. ICTA has identified more than 20 e-services to be implemented under the e-government initiative in Sri Lanka. It also has identified some priority e-services such as e-

motoring, e-foreign employment, e-pension, and so forth, and several ongoing smaller projects. However, it appears that although the e-Sri Lanka initiative started in 2002, many projects were not launched until recently and progress is below expectation due to various reasons. But still ICTA has not formulated any initiatives towards one of the country's major challenge: environmental sustainability.

Some of the previous studies has proved that ICT has an important role in supporting information sharing and integration between government agencies and external stakeholders, including citizens, especially in developing countries [5]. Hence, Sri Lanka could well utilize the collaboration between different stakeholders in addressing environmental issues that prevail in the country. Creating an environment of collaboration can be considered as one of the main differences between electronic government and smart governance concepts. Governance can be defined as interaction and collaboration between different stakeholders in decision making processes [6]. As noted by Scholl and Scholl (2014), smart interaction with stakeholders is a broader field of interest in smart governance research that has emanated from traditional electronic government research. Smart governance means that various stakeholders are engaged in decision-making and public services [7]; it also means that new technologies – that is, social media, the internet, open data, citizen sensors, and serious games – are used to strengthen the collaboration between citizens and urban governments. From this perspective, one important element of governance is collaboration of both, across departments and with communities and making operations and services truly citizen centric [8].

In this paper, the researchers aim to analyze these citizens' views of "Wilpattu" deforestation that they posted in various social media. In addition, interviews will be conducted with the government officers at different levels, e.g, county, city and national levels to understand their aspects of coping up with the same problem. And finally, an integrated e-service collaboration model will be developed for understanding this environmental problem.

Research Question/s

a. What are the citizens' opinions in Social media platforms about 'Wilpattu' deforestation?

b. What are the government officers' points of view of this deforestation?

c. How can one propose an e-service for coping this problem?

Research Objective/s

a. Deepen the understanding of environmental problems through social media analysis and interviews with relevant people in Sri Lanka.

b. Propose an e- service collaboration model for coping this problem.

About the case- Wilpattu Deforestation

Among the existing forests in the country, in recent past 'Wilpattu' - forest located in the Northwest coast lowland dry zone of Sri Lanka has become controversial due to deforestation by different stakeholders. Wilpattu (Willu-pattu) means 'Land of Lakes' and the Wilpattu Forest Complex is a land area of 528,200 acres and is the largest remaining forested land in Sri Lanka[9].

The researchers' attempt is to analyze citizens' perception about 'Wilpattu' deforestation and how government responses in this regard. In recent past, this has become a controversial issue in the country. The phenomenon has been widely discussed by the general public and environmental sustainability focus groups. Citizens opposed through different initiatives (i.e. social media, TV, radio, etc.) and exhibited their concerns towards 'Wilpattu'- deforestation. Some protest the deforestation and urge government to take necessary actions.

III. METHODOLOGY

Information about the above case have been collected from 'twitter' and 'Facebook' social media platforms. As per the latest social Media statistics taken in the month of August 2019 in Sri Lanka, social media users percentage of Facebook is 82.73% and Twitter is 3.56% [10]. Citizens' comments on "Wilpattu" deforestation had been retrieved from 'Twitter' through a web crawler. In retrieving data following hash tags had been used related to the case is identified.

#wilpattu #Wilpattu #wilpaththu #Wilpaththu #wilpattu deforestation #wilpaththu deforestation #wilpattudeforestation #save wilpattu #Save wilpattu #savewilpattu #Savewilpattu #deforestation sri lanka #SriLanka deforestation

As results in total 170 tweets are retrieved for the analysis.

To retrieve data from Facebook accounts of 7 Facebook active users have been selected in this study. From 7 users 161 different posts and comments are identified for the analysis. Each user searched for the posts and comments using the keyword 'Wilpattu deforestation.' Altogether 331 twitter and Facebook comments are stored in an excel sheet for the further analysis.

A. Analyzing Data

The content analysis is used to analyze the collected data. The purpose of content analysis is to organize and elicit meaning from the data collected and to draw realistic conclusions from it [11]. The researcher must choose whether the analysis should be of a broad surface structure (a manifest analysis) or of a deep structure (a latent analysis). Four distinct main stages are described in this paper: the de-contextualization, the re-contextualization, the categorization, and the compilation. In analysis, the data collected through social media, researcher used manifest analysis and as coding system, researcher used inductive coding system. Another advantage of content analysis is to interpret the derived results in a quantifiable form.
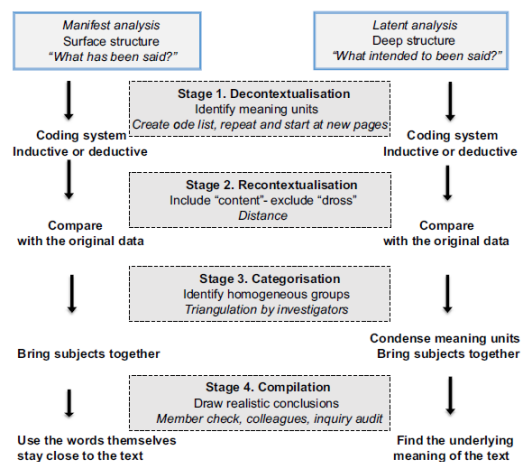

Figure 3:Data Analysis through content analysis [11]

IV. RESULTS AND ANALYSIS
Analysis of social media responses

From the 331 analyzed comments researcher has identified following four themes.

TABLE 3: RESULTS FROM SOCIAL MEDIA FACEBOOK & TWITTER COMMENTS

Theme No	Theme	No. of comments	Percentage
A	Public express their general concerns to stop deforestation	210	63%
B	Government should take necessary actions / responsible	70	21%
C	Problem is identified as a racial issue	29	9%
D	People invite others to gather and organize protests	22	7%

A.   Public express their general concerns to stop deforestation

Out of the total 331 comments analyzed 210 comments are general comments towards Wilpattu deforestation. People oppose and suggest their views towards deforestation. Some mention about 'citizen attitude' and 'responsibility of public'. In such comments it is clear that, people already are speculating the root causes of the problem and emphasize on the 'role of the public'. It is also evident that they understand that the solution will not arise until people act together along with the government's support.

"Controlling wildlife would be easier than controlling the wild attitude of those people who are destroying flora and fauna, not only in Sri Lanka but also in other parts of the world. It's not only Wilpattu, all other jungles and forests of Sri Lanka should be protected. The role of the public will be more important than that of a single man to succeed in issues like this."

It is a well-known fact that there had been some settlements at the borders of the Wilpattu prior to the civilian war. Many had left the war torn areas and had become refugees in their own country. It was these people that were given priority in settling down again near the Wilpattu borderlands. Hence, some consider the reason for deforestation as these resettlements of citizens after war. But the problem is that there is no proper planning and implementation in identifying the exact owners and providing them their own lands. Again, the improper involvement of government is hinted in here as it has become an environmental sensitive concern.

"We need to preserve the nature reserves, but same time the people should make their lives too. That is why better planning and implementation is a must, when dealing with these sensitive issues. it is sensitive, because it involves both nature and the people"

As mentioned earlier, the lack of information available to both public and the authorities were a huge concern in many of these comments. Some suggest possibility of using ICT technologies as monitoring systems in safeguarding forests as simple measurements.

"If you put these coordinates on the search bar of google maps (8.755515, 80.003008) you can see how much of the Wilpattu forest is gone."

When many of the people discuss about 'Wilpattu', there are many other forests in the country which needs the same attention in terms of sustainability. These comments have a fair share of core arguments that pin point unawareness of deforestation in the country and delay in getting correct information about them.

"Ritigala also deforested"

B.   Government should take necessary actions / responsible

A From the dataset 21% believes and blame for government for not taking proper actions in addressing this issue. Many of the comments in this category mention about parliamentarian from the area belonging to Wilpattu as the responsible officer in addition to other government officials. Citizens publicly comment about their voice against politicians and government actions towards this deforestation issue. These comments clearly reflect the bitterness of the citizens' past experiences in resolving similar issues. Since most of these comments are after the Wilpattu incident became a highlight, it is clear that the necessary steps were still not taken by the environmental authorities.

"Not only are the politicians, even the government officers spineless."

"Useless talking about Wilpattu. Nobody takes any actions. Administrators are afraid of those Culprits"

"Before accusing some people of encroaching into Wilpattu, the entire matter should go to the courts to get the matter cleared without any doubt. Some politicians cannot survive without such issues being raised to keep their jobs through cheap propaganda"

"Government hides other issues by highlighting this issue"

C. Problem is identified as a racial issue

Unfortunately, 9% of the dataset proves this problem has led to unrest among ethnic groups, and it brings misunderstanding and racism among people. Certain parties make the advantage of such national issues as part of their political agenda and money-making process. Again, this is clear evidence of what untreated national level environmental concern can do to this country. It became a humungous generator of heated arguments, rivalry and fights among different races in different parts of the country due to misleading information or lack of correct information about the Wilpattu in the first place.

"Hope everyone corporate to resolve the matter without making it into a religious dispute."

"It is artificial racism or simply money-making venture. Some pockets are being filled. If you check carefully, all races might be involved. While big fish are making billions, the small fish are making Rs. 1500 from a #Save Wilpattu T-shirt"

"Have to reiterate that Wilpattu deforestation is a NATIONAL issue. We are all in this together. Please don't infuse race or religion into it."

"Save Wilpattu is just pure racism-based propaganda"

D. People invite others to gather and organize protests

Place Another 7% comments were about inviting and gathering other citizens in organizing protests and gatherin b gnhg people in taking actions against wilpattu deforestation. Although the majority of the protests were on social media platforms, some were organized by different so called environmentalists and third parties who gain benefits from intragovernmental issues and racial issues.

"We will organize an island wide trade union action against wilpattu issue"

"Those who are against the deforestation of Wilpattu should get together, visit Wilpattu and see what we can do."

"So yeah let's get together for #savewilpattu"

"Someone good at this, please start organizing I will gladly commit myself for that"

E. Analysis of Interviews

Interviews of five different department officers had been conducted namely from Department of Forests Conservation, Wild Life Conservation Department, ICTA, Sri Lanka Army and Central Enviornmental Authority. All five of them were well aware of the reality of the Wilpattu incidence and had varied expressions towards the social media responses based on their professional points of view. *In all five interviews conducted, the interviewees agreed that it is government's as well as citizens' responsibility when it comes to environment.*

"Personally, I do not aware who is directly responsible. In my opinion there are no single body responsible for the issue. It is a blend of government, people and all the stakeholders"

"For this incident we cannot point out one single body. As a nation everyone is responsible. All the environment related authorities including wildlife, forest, central environment authority etc. But also, I believe mainly citizens of the country also has a responsibility in ensuring environmental sustainability."

And being a country that has a history of 30 years of war and what the people who lost their lands due to that went through, they all understood the reason behind the resettlements and deforestation of the questionable Wilpattu area.

"Before 30 years of war citizens have lived here it is their native place. But after war ends when they move back to their native place for resettlement their families have been expanded, they were in a need of more land space for living. This resettlement has caused the main problem for deforestation."

Also, it was very clear that as responsible government officers, they all agreed that the citizens' inputs and comments were helpful in raising awareness about the current environmental issues of the country so much so it was an eye opener for majority to look at the forests, flora and fauna in a much different way.

"Citizens of the country started to provide their opinions through many of the channels. We could see in social media platforms public started campaigns with the label 'Let's protect wilpattu'. Some of them even never have planted a tree in their entire life. But this problem was so attached to them and as result of that people started to love environment than earlier. What I feel is this made them more green conscious community."

TABLE 4: RESPONSE: CITIZENS' INPUTS AND COMMENTS BEING HELPFUL ADDRESSING ENVIRONMENTAL ISSUES

	Officer	Response: citizens' inputs and comments being helpful addressing environmental issues		
		Positive	Negative	Neutral
1	Department of Forests Conservation	✓		
2	Wild Life Conservation Department	✓		
3	ICTA	✓		
4	Sri Lanka Army	✓		
5	Central Environmental Authority	✓		

The Army officer who is actively involved in the replantation programme at Wilpattu pointed out that, their task of achieving 20,000 trees planted exceeded their expectations due to a few who really wanted to find solutions for the problem while many became just social media heroes. However, further emphazising on the fact that, the enviornmental authorities do not use ICT related technologies for enviornmental sustainability and that there could be an effective report- feedback communication

system developed based on ICT for future enviornment related activities.

TABLE 5: RESPONSE TOWARDS THE USAGE OF ICT RELATED TECHNOLOGIES IN ADDRESSING ENVIRONMENTAL SUSTAINABILITY; CURRENT STATUS

	Officer	Response towards the usage of ICT related technologies in addressing environmental sustainability; current status		
		Positive	Negative	Neutral
1	Department of Forests Conservation			✓
2	Wild Life Conservation Department		✓	
3	ICTA			✓
4	Sri Lanka Army		✓	
5	Central Environmental Authority		✓	

V. DISCUSSION

One of the main root causes behind the 'Wilpattu' case is the lack of proper communication between government vs. citizens and among the environmental-related government organizations. Social media is an ideal platform with high potential in reporting the problems. But it generates a large volume of unstructured data and government agencies don't have a mechanism to analyze, identify, respond and solve the reported issues.

Thus, it is a timely need to adapt an e-government platform for environmental sustainability with the following characteristics;

- Allow citizens to retrieve all the basic information about all the environmental-related government authorities (Scope, functions, responsibilities)

- Communication between government and citizen (Reporting issues, evidence, suggesting solutions, feedbacks)

- Inter-governmental communication (Communication among environmental-related government authorities)

- Citizen to citizen collaboration (Community groups involving in ground-level environmental sustainability initiatives)

Some of the already developed and tested theories and frameworks are adapted in proposing

the e-service platform for environmental sustainability. Habermas (1984) communicative action theory highlights ideal speech situation and the open communication as the cornerstone of the democratic ideal. He emphasizes the 'neutrality' and 'transparency' of as two key features of any communication. Social media platforms (or similar platform) will assist to develop a similar environment to citizens to reach the objective of Habermas's communicative action theory [12].

In designing inter-governmental communication between environmental authorities, 'boundary spanning' and 'boundary objects' could be considered in defining each authority's roles and responsibilities. This will be useful in designing collaboration services. This e-platform will be a 'boundary object' to provide a collaborative form of governance in solving environmental issues. It is necessary to bridge physical, cognitive and social boundaries through the platform. Some previous studies have been carried out by Termeer C.J & Bruinsma A. (2016) in ICT-enabled boundary spanning arrangements (IBSAs) which can help to cross boundaries and thus contribute to collaborative solutions to sustainability problems[13].

All in all, the above analyses clearly showcase that, had it been notified to the authorities on a proper responsible platform, in an effective manner, and provided the solutions on time, Wilpattu issue becoming a racial issue could have been prevented.

VI. CONCLUSION

In conclusion, the above research showcases how a small-scale social problem became a national level environmental concern due to lack of transparency of involved parties, negligence and lack of access to updated information.

It is evident through the social media analysis that the general public is so eager to involve in environmental sustainability-related activities and they would like to contribute in different ways towards achieving this national and global need. It is the government's responsibility to act as the mediator of such issues while not letting environmental related concerns to be the root cause of political, racial or religious dilemma. Interviews conducted with officers of environmental-related government authorities assure the above as well.

While, many government organizations do not have any ICT related mechanism to cope up with environmental concerns, through this research it is clear that, there is a demand for such a mechanism

that involve different stakeholders including the general public and to share information among relevant governmental authorities in addressing environmental issues.

Therefore, it is proposed to develop an e-service to collaborate among different stakeholders to avoid environmental concerns becoming national issues that will only hinder the sustainable development of the country.

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Identifying a Review Analysis Technique for a Mobile App which analyzes customer reviews

Saluwadana S.M.R.B

Faculty of Computing

Sri Lanka Institute of Information Technology

Malabe, Sri Lanka

ravindu.saluwadana@my.sliit.lk

Manori Gamage

Faculty of Computing

Sri Lanka Institute of Information Technology

Malabe, Sri Lanka

manori.g@sliit.lk

Abstract— **At present due to the high competition among e-commerce companies, customer satisfaction has become a vital factor on the success of a business. Customers mainly pay attention to product or shop reviews and ratings, before purchasing a product. So, customer reviews have become a very important factor in the business. Review can be a rating or text-based summary which describes their perception or experience on the shop. It is advantages for the merchants if they can get an insight about customer reviews on their business. In order to do this, identifying a review analysis technique is important. Authors used Sentiment Analysis approach which is provided by Natural Language Processing library called Natural Language Tool Kit, to analyze customer reviews which can be positive or negative. In this research authors try to find out a best fitting most accurate algorithm for completing this task. The result of this research will be used by the merchant dashboard feature of the author's proposed cross platform mobile application, which is used to send location-based notifications to customers about promotions and offers by merchants. Through the merchant dashboard merchants are provided feedback in the form of statistical charts, summaries and recommendations to improve their business.**

Keywords— Natural Language Processing, NLTK, Review Analysis, Sentiment Analysis

I. INTRODUCTION

In today's world online shopping is used by millions of users to fulfil their various needs. According to estimated statistics by 2040 around 95% of all purchases are expected to be via e-commerce [1]. So, customers reviews are an important aspect for every e-business. Around68%

of customers trust opinions which are posted on internet and around 85% of customers trust online reviews as much as personal recommendation [2]. So according to statistical data, on average reviews produce an 18% uplift in sales [3][4]. In order to attract more customers, merchant's provide more sales offers to their customers. But most of the people have a busy life style because of their daily works. So, they might miss some great offers and promotions. To overcome this problem, we proposed the cross platform mobile application which is capable to run on both android and iOS mobile devices. Basically, what we are planning is to track the current location of users and send location-based notifications to customers with great offers and promotions. Furthermore, customer are able to provide a feedback in the form of rating or comment about their experience. Among other features, this research is focused on the merchant dashboard feature of the proposed mobile app. Basically, merchant dashboard provides recommendations to the merchant based on the available customer reviews. Through the merchant dashboard merchants can view the status of their business and take necessary actions to improve their business.

Customers always look for a better service. So, merchants must consider about their customer needs. Otherwise merchant's business is going to decrease always in the sales market. Customers mainly discuss topics like price, offers, customer service and so on. Because of that knowing about their business is a must for merchants. If the customer is unsatisfied merchant should know the

reason for unsatisfactory. Success of the business is depending on the number of customers who are satisfied with the business.

The main objective of this research is to provide recommendation to merchants for improvement of the business. To give those recommendations customer reviews will be analyzed. Both positive and negative reviews should be analyzed to give suggestions. And give statistical chart representing trending offers, less value offers and so on. Then also merchants can target those offers. Find out most accurate algorithm for review analysis and generating suggestions will be done through this research component.

This paper organized in the following way. While next section explains about related works in this context next section provide a methodology. After that shows results and discussion.

II. RELATED WORK

In year 2015 T. Tsunoda proposed a novel task for utilizing review analysis to suggest product advertisement improvements. They use the review analysis technique. By using review analysis technique, they determine which aspects can be included in a blurb of the product. show aspect candidates that could be incorporated into the blurb ordered by their importance to users for a given product is the goal of their task. As the review analysis technique, they break their tasks into two sub tasks. They are aspect grouping and aspect group ranking. They are assigning aspect expressions to aspect groups to manage aspects at the semantic level. They next score aspect groups to suggest only important aspect groups. For the aspect grouping they used one of the semi-supervised learning methods. Those methods are described by zhai et al in year 2010 [5]. For the aspect group ranking they used aspect ranking method. That method proposed by Lnui et al in year 2013.

Customer reviews can have a more impact on business. Because of that most of the researches are mostly focus on that area. Specially in year 2015 C. Yang, Z. Chen, T. Wang and P. sun developed a system call FOBPRAM which stands Feature Ontology Based Product Review Miner [6]. They specially targeting to develop a system which can be based on ontology of a phone. specially they extract an opinion of customers. Mainly for analyzing customers opinions they used three-way

process. Firstly, they used ontology tree for data pre-processing and also in their process they used information entropy. And also, an outcome of their process is a summary which contains customer opinions. In their research they haven't used sentiment classification as well as feature extraction. But the technique that they were used is to find an association between the feature and sub-features of a product.

Muhammad Zubair Asghar cited a Review about Feature extraction in sentiment analysis and they discuss about existing techniques and approaches for feature extraction in sentiment analysis and opinion mining [7]. They were analyzed 4 different feature selection techniques. That were NLP, Clustering based, statistical and Hybrid. They analyzed many numbers of papers to identify most used technique. According to their statistics NLP is mostly used technique than others.

Mika V. Mantyla, Daniel Graziotin and Miikka kuutila do a review about the evolution of sentiment analysis [8]. They analyze different research papers published on the internet that are based on sentiment analysis. Around 6996 papers from scopes. They found the basic idea about sentiment analysis is used to detecting and extracting information from natural language. For example, sentiment analysis is mostly used to opinion mining and information extraction. Sentiment analysis do some prediction based on polarity score. The main goal of their paper is to tells what problem each paper tries to address. Mainly based on the types of goals they identified two classes. Application domain oriented is one of them. It focuses about business domain of sentiment analysis and other is human and behavior oriented. It is focus on the areas that could be used in several application domains.

The paper about good vs bad review analysis shows important of the review analysis to the products in e-commerce companies [9]. E-commerce companies mainly consider about customer satisfaction. When customers do online shopping, they look for reviews and ratings of products. They show how sentiment analysis method fits for analyzing customer reviews. They used NRC emotion lexicon to determine the overall responses of the products. To determine that they used eight emotions of the customers. They proposed an approach by analyze different research papers. They use amazon fine food reviews as a dataset which is most suitable dataset to their context. So,

in amazon platform users can be rate to a product from 1 to 5. To do their experiment they analyze two types of reviews of a product that are given by customers. Those are most reviewed and less reviewed products. They also used technique of a word cloud for analyzing two types of reviews.

Finally, because of their proposed approach customers can get better understand about quality of products.

Chang, Jae-Yong proposed a sentiment analysis approach on product reviews classification in on-line shopping mall [10]. Mainly they are analyzing positive and negative reviews using sentient analysis technique. They used opinion mining technique provided by sentiment analysis to classifying subjective opinions of customer reviews.

Basically, according to previous research done by various persons NLP is a most commonly used technique than others. Following figure tells us usage of feature selection techniques. Following chart is a result of a review done by Muhammad Zubair Asghar , Aurangzeb khan , Shakeel Ahmad and Fazal Masud Kundi [7].
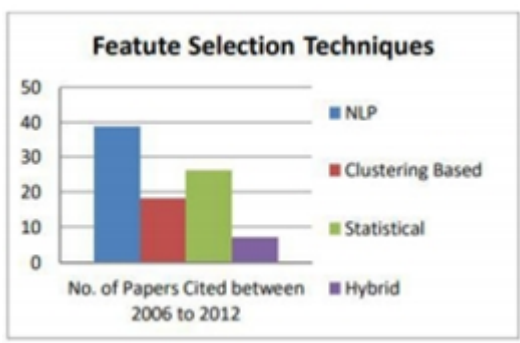

Figure 1: Usage of feature selection Techniques

III. METHODLOGY

Reviews are most important aspect of the business. So, if most of reviews are positive that's much better. That's why review analysis is needed for business. For the merchant perspective also much better to identify number of unsatisfied customers and satisfied customers with their business. Then they can try to do something to improve sales of the business.

This function is giving overall idea about merchant's business to merchants. This merchant dashboard consists of several sub sections. Such as Review analysis and generating suggestions. Mainly we used natural language processing techniques to deal with text-based reviews. Also, in hear we analyzed ratings that are given by the customers and try to give one common rating to a shop. In order to do that we used k-means clustering algorithm. To give common rating for shop first we group all the ratings that are given by customers to shop based on similarities of ratings. Then we count number of ratings in each cluster. Then finally we identify mostly given rating and assign a rating for a shop. Figure 2 shows screenshot of the merchant dashboard in our proposed solution for merchants in the shops.

Figure 2: Merchant Dashboard of the proposed solution

So, first step of analyzing text review is to divide positive and negative reviews. And this division is helpful to create a statistical chart also. By counting positive and negative reviews we can easily say how many customers are satisfied to their business and how many customers are unsatisfied. That detail can be represented in a statistical chart as statistical data. But reviews can be neural as well. The merchant dashboard is also generating suggestions which is more useful to merchants for improvement of the shop as well. In hear we used summarization

technique provided by deep neural network to generate less complex suggestions.

1. Dataset

To train the algorithm we use hotel reviews dataset from the machine learning and deep learning repository call "kaggle". Datafiniti_Hotel_Reviews.csv file contains 10000 reviews. It has several attributes like id, date added, date updated , address , country , reviews rating , reviews text and so on. Likewise, there are 25 attributes contain in a dataset.

2. Natural Language Processing Natural language processing is the newest

research area which is deal with texts. Basically, computer can't understand human language.

That's why natural language processing has been used. Natural language processing provides several libraries to analyzing texts. The main library that is provided by natural language processing is natural language processing toolkit (NLTK). NLTK provides lot of functionalities like sentiment analysis, name entity recognition and so on.

3. Sentiment Analysis

Sentiment analysis is also a most important function which is provided by NLTK. Basically, what this function does is to categorize texts as a positive, negative and neural texts. Categorization of review is easy to create statistical data as well.

In sentiment analysis there is a method call polarity score which helps us to divide reviews as a positive negative and neural. Following equation [11] shows how polarity score has been calculated.

$$(\quad (\text{ Polarity (Word)))} / N \text{ (Words)}$$

Following figure shows the way that we are calculated compound polarity score.

```
for word in data_list:
    if(sid.polarity_scores(str(word))['compound']) >= 0.5:
        pos_word_list.append(word)
    elif(sid.polarity_scores(str(word))['compound']) <= -0.5:
        neg_word_list.append(word)
    else:
        neu_word_list.append(word)
```

Figure 3: Calculating Polarity Score

4. Long Short Term Memory

Long Short Term Memory (LSTM) is used to summarize all the reviews. This is a technique coming from deep neural networks. Following diagram shows the process of LSTM.

Basically, in here as input we provide all negative reviews to this LSTM network. After that it that it goes through different layers in the LSTM and provide an output as a summary of all negative reviews. We used attention layer, dense layer and so on in the LSTM layers. And also, we used encoder decoder mechanism in LSTM network for text summarization process. As soon as we got a summary we can easily categorize reviews that are mostly negative and, less negative. Based on that we can easily give suggestions for improvement of the business.
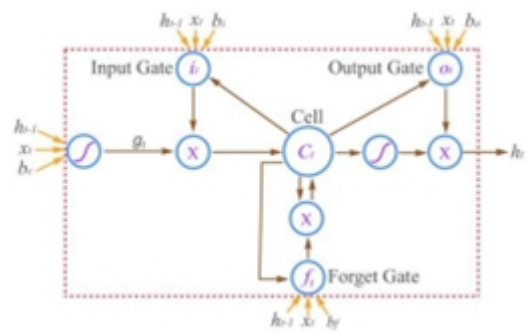
Figure 4 : Process of LSTM network Basically

IV. RESULTS AND DISCUSSION

Finally, we evaluated algorithms to find out performance of the algorithm. To evaluating the algorithms three algorithms has been analyzed. Such as Decision Tree Algorithm, Random Forest Algorithm and Naive Bayes Algorithm. After analyzing those three algorithms we did a comparison of each algorithm. Basically, this comparison is also for find out more accurate algorithm. Evaluating of accuracy has been done in two stages. Only difference is in first stage we used hierarchical clustering for grouping. In stage two we used k-means clustering for grouping. Following table shows comparison results of each algorithms in first stage.

Algorithm	Incorrect Predictions	Correct Predictions	Accuracy
Decision Tree	134	2023	0.86
Random Forest	68	2142	0.88
Naive Bayes	172	1296	0.58

Following table shows comparison of each algorithms in second stage.

TABLE 2 : COMPARISON OF ALGORITHMS IN SECOND STAGE

Algorithm	Incorrect Predictions	Correct Predictions	Accuracy
Decision Tree	92	2202	0.91
Random Forest	21	2300	92.84
Naive Bayes	75	1669	0.67

So according to testing results Random forest algorithm is much better than other algorithms. Then according to those testing results finally we decided to build a Random Forest classifier.
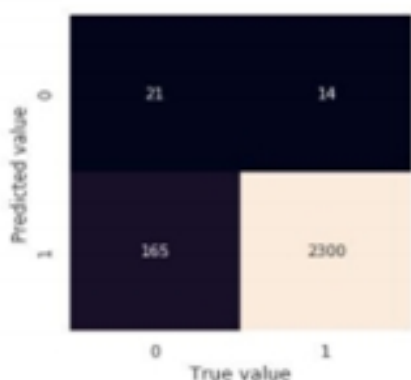

Figure 4: Accuracy of a Random Forest Algorithm

2. K-Means Clustering

K-Means is an algorithm which is used for clustering. This is an unsupervised learning technique and basically there are no exact output. We used this clustering algorithm for grouping relevant fields. In K-means clustering algorithm we used elbow method to find out optimal number of k values. Following chart shows an elbow method.

According to testing results K-means is also a more accurate algorithm for clustering than hierarchical clustering.
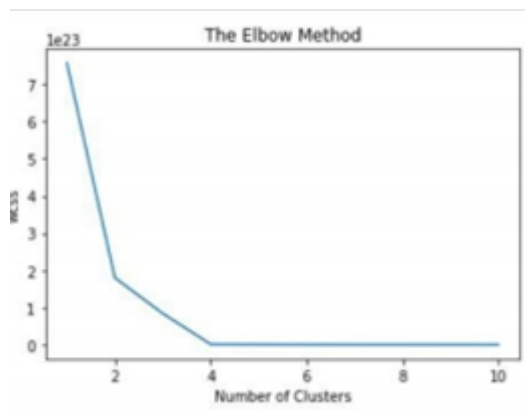
Figure 5: Elbow method

V.   CONCLUSION AND FUTURE WORK

We are targeting to improve sales of ane-business by giving suggestions to merchants. To give suggestions we used review analysis technique provided by NLP. Merchants can also see their shop progress representing in the statistical chart. Statistical chart consists number of unsatisfied customers and number of satisfied customers to business. Also, suggestions are generated automatically from the system. Based on suggestions merchants can take decision for their business.

As a future work we will trying to give negative words which are mostly affect to merchant's business to merchants with the percentage (The percentage that word negatively affect to merchant's business). Also, we will improve the system to generate statistical data based on system generated suggestions. This statistical data represents changes to sales of the business if the merchant improves the business according to suggestions

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Social Media and Expressive Citizenship: Expressive Facebook Use and Interactive Political Expression

D M S Gayanika
NSBM Green University Town
Sri Lanka
sashini@nsbm.lk

Abstract— **Substantial studies have investigated nature of citizenship and various aspects of conceptualization of citizenship from informed, dutiful to self-actualizing models. The main reason to this shift is due to political changes and its impact on civic engagement in political participation. Young generation in digital era is identified as transformed citizens from informed to expressive citizens. With heavy use of social media, especially Facebook this study examined the association between young Facebook users social and entertainment expressive Facebook use and their interactive political expression as an alternative model to traditional citizenship models.**

Keywords—citizenship models, Social media, expressive use, political expression

I. Introduction

The debate on "a good citizen" and to what extent good citizenship is a malleable, subject to changes over time and shaped by political and social forces. Since the behavior of citizens affected by political systems which changes rapidly, the notion of good citizenship has changed over the course of history. The sine qua non of good citizenship today, as socially constructed and maintained are likely to be changing with evolving social and technological conditions. Further, with the ascent of social media, increasing scholarship has contended that democratic citizenship models have shifted from informed citizenship to expressive citizenship [10]. This is mainly due to the recent statistics, which show that people are less politically engaged than in the past because they increasingly turn away from news consumption while embracing social- and entertainment-related activities especially among young generation [4]. Hence new forms of citizenship models are important as this situation should not be viewed as a decline but rather as a change in the form of political engagement which has to be studied [8].

The conversion from traditional "dutiful citizen" model to new "actualizing citizenship" model suggests that expression related to social and personal interests within peer-to-peer networks is likely to trigger political behaviors [10]. With the technological improvements and the increased opportunities offered by digital media for people to express interests and cultivate social relations, thus laying the foundation for expressive forms of civic and political participation. Hence to understand this newest form of expressive citizenship model, here it is been studied that how non-political expressive acts on Facebook are associated with political participation as suggested by [10].

II. Literature review

A. Traditional vs new citizenship models

Citizens of any nation act their role in public life depending on the internal and external environmental factors, hence not in static nature. They act differently and most often based on political culture and opportunities of their time and place [7]. With globalization and industrialization, the changes are rapid, hence scholars have done many studies on various citizenship models describing various aspects of civic engagement. In the middle of the twentieth century these models were introduced as hierarchical, dutiful, politically

formal citizenship and towards the end of it to more personally defined and self-expressive models [11]. These different citizenship models are in other words theories or systematic set of ideas that can help which civic perceptions or behaviors cluster together, and how they should be interpreted [8]. As stated, reference [8], will also states that like in other theories, citizenship models also has its own descriptive and normative aspects. Descriptively it explains current voting turn-outs, or levels of young people's political knowledge yet, closely connected to normative assumptions such as how should a "good citizen" act?

In theoretical aspect, the early theories such as representative liberal theory explain that a good citizen is the informed voter, who can choose intelligently between candidates and parties [6] whereas, in discursive theory good citizens participate in public discourse, and do so while maintaining civility and mutual respect. With multiplicity of definitions of a good citizen, the new citizenship models explain that a good citizen is either informed and membership-oriented, or participatory and expressive [8]. However, this is also under criticisms that a good citizen can be same citizens who vote and are informed are also the ones most likely to engage in participatory modes of politics [1]. The informed citizenship are knowledgeable participants in several aspects of political life thus, only informed citizens can enable a healthy democracy. In dutiful citizenship models, the motivation for political action is more strongly based on a sense of duty or obligation to defined social groups [11]

B. Social media and citizenship models

In informed or dutiful citizenship models, the role of (traditional) media was mostly as a source of information mainly include information like political ads, and primarily the news. The dutiful citizen's own political expression is limited and aimed at specific institutional targets through voting, or through membership in formal civic organizations [8]. In these traditional models the media is primarily receiving political news through newspapers, television or radio.

In the new era of digital age peer socializing and entertainment activities on platforms like Facebook have become deeply woven into the fabric of social media users' daily lives. According to statistics in Sri Lanka, 86.65% of Facebook users are recorded in October 2019 (Statcounter, 2019). People use Facebook mainly for social or entertainment purposes. However, in the context of changing citizenship models, this non-political Facebook use has a significant role to play in political participation.

As stated in [5], those who use digital media to share perspectives on a daily basis (e.g., sharing a photo about lunch) are more likely to employ the same tools to engage in civic activities (e.g., sharing photos about collective actions). Therefore social expressive use of Facebook (disclosure of everyday personal experiences related to school, work, family, and relationships) and entertainment expressive use of Facebook (expression of personal interests, such as gaming, sports, and music) has an association between political communication on the site, which is interactive political expression, such as sharing content about political and social issues [2]. According to reference [10] users who frequently engage in social and entertainment expressive activities on Facebook (like, share or comment) will also be more likely to engage in interactive political expression on the site.

With young people the above preposition is much valid. According to reference [11], young peoples' orientations towards public life are much less about participation in conventional political action (Dutiful citizenship) and more about expressing complex identities through personally resonant activities, consumption, and self-expression. Hence the following hypothesis were developed to measure the association between social and entertainment expressive Facebook use of young people on their political expression on Facebook.

H1: Social expressive Facebook use is positively associated with interactive political expression on Facebook.

H2: Entertainment expressive Facebook use is positively associated with interactive political expression on Facebook.

III.   METHODOLOGY

The current study used data collected through Facebook with young Facebook users in Sri Lanka in September 2019 using aged 18 – 30. 150 individuals who self-identified as Facebook users were included in the online survey.

Different types of expressive Facebook use were captured by asking how often respondents engage in

three activities on a 5-point scale ranging from 1 (never) to 5 (very frequently), including "liking," "commenting on," and "posting or sharing," in loops in reference to two topical domains: personal life (e.g., work, school, relationships, or family) and entertainment interests (e.g., sports, movies, food, or music).

Three items asked how often respondents expressed opinions about politically related topics (e.g., elections, government, human rights, and economics) on Facebook. Three modes of political expression, including "liking," "commenting on," and "posting or sharing" were asked in loops in reference to political and social issues. The response scale ranged from 1 (never) to 5 (very frequently).

Data analysis was conducted using SPSS (Statistical Package for Social Sciences).
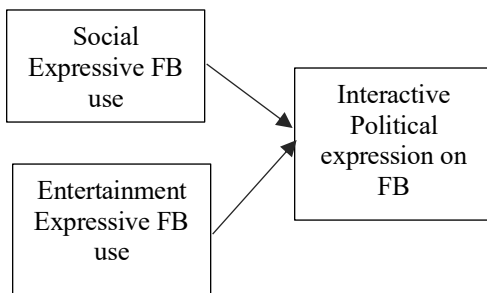

Fig. 1.   Conceptual framework tested

Substantial research findings explain that political communication can be interactive or political communication through social media or political talk in face-to face settings. Political communication in expressive citizenship models transform political observers to political participants [3].

TABLE I.   OPERATIONALIZATION

Independent Variables	
Social Expressive Facebook Use	*Scale*
how often you have engaged in Facebook,	
• "liking" someone's personal life (work, school, relationship, family)	*1 (never) to 5 (very frequently)*
• "commenting on" someone's personal life (work, school, relationship, family)	*1 (never) to 5 (very frequently)*
• "posting or sharing" your personal life (work, school, relationship, family)	*1 (never) to 5 (very frequently)*
Entertainment Expressive Facebook Use	

Independent Variables	
Social Expressive Facebook Use	*Scale*
how often you have engaged in Facebook,	
• "liking" someone's entertainment interest (sports, movies, food, or music)	*1 (never) to 5 (very frequently)*
• "commenting on "someone's entertainment interest (sports, movies, food, or music)	*1 (never) to 5 (very frequently)*
• "posting or sharing" your entertainment interest (sports, movies, food, or music)	*1 (never) to 5 (very frequently)*
Interactive Political expression on FB	
• "Liking" political and social issues (elections, government, human rights etc.)	*1 (never) to 5 (very frequently)*
• "Commenting on" political and social issues (elections, government, human rights etc.)	*1 (never) to 5 (very frequently)*
• "Posting or sharing" political and social issues (elections, government, human rights etc.)	*1 (never) to 5 (very frequently)*

Two hypotheses were tested using regression analysis (H1: Social expressive Facebook use is positively associated with interactive political expression on Facebook; H2: Entertainment expressive Facebook use is positively associated with interactive political expression on Facebook)

IV.   RESULTS AND CONCLUSION

Examining the demographic profile of the respondents, the age of the sample in the study is younger (M= 24), income and education reflect the sample respondents are earning average of monthly Rs. 35,000 and the education reflect the majority has a degree. Hence the regression results explain the educated youth expressive citizenship use of Facebook and their political communication.

Among newspapers, television and web news use as forms of news media the descriptive statistics explain that how many days the respondents consumed news in past week from new paper(s) (M= 2.39), television (M= 5.43) and websites (M= 4.57) reflecting the television is taking the lead.

The reliability analysis explain that the three latent variables are reliable with above 0.7 Cronbach alpha value as explained in table 2.

TABLE II.   RELIABILITY ANALYSIS

VARIABLE	CRONBACH ALPHA
Social Expressive FB use	8.05
Entertainment Expressive FB use	8.12
Interactive Political expression on FB	7.56

The correlation analysis of the association between social and entertainment expressive use and interactive political expression on FB explain that there is a significant positive relationship between expressive use of FB and political expression on FB (table 3).

TABLE III. CORRELATION ANALYSIS

Variable	Pearson Correlation	Significance
Social Expressive FB use	0.564	0.000
Entertainment Expressive FB use	0.432	0.000

In the first and second hypotheses, it is predicted that social (H1) and entertainment (H2) expressive Facebook use were positively associated with interactive political expression on Facebook, respectively. As Fig. 2 shows, both social ($ß=0.31$, $p < .05$) and entertainment expressive Facebook use ($ß=0.30$, $p < .001$) are positive predictors of interactive political expression on Facebook, supporting H1 and H2.
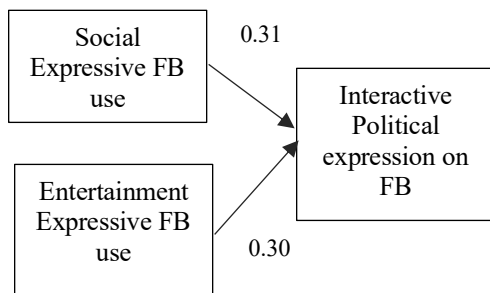

Fig. 2. Hypothesis testing

The coefficients of both hypothesis (H1 and H2) is accepted with the significant value of H1 and H2 are both less than 0.05. Therefore the regression results show that the emergent expressive citizenship models can be supported by empirical data.

Several implications can be drawn from these findings. While supporting the expressive-citizenship models, in particular Facebook users who frequently share about their personal life and entertainment interests online are also more likely to engage in interactive political expression on the site. These findings are contrary to prior work suggesting that the use of digital media for social or recreational purposes may distract citizens from public engagement [3]. One possible explanation

for the conflicting findings is that the results of earlier work, as in [3], may not be generalizable over time because in the early years of Internet use, those who had Internet access may have had few friends and family members with similar access, which would have limited the opportunities for meaningful interactions [9].

The results also prove that the young generations' political communication is through non-political social media is accurate preposition. Hence the results accept both hypothesis it is clear that the traditional dutiful citizenship models cannot be applied to young generation hence expressive citizenship models are much valid.

Several potential limitations should be noted. The sample should be more diverse explaining the youth characteristics and control variables should also be tested. Future research should consider the affordances of different social media sites other than Facebook and further examine whether the findings are consistent across different sites and countries.

$$R^2 = 0.57 \ p < 0.05$$

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A Study on The Impact Of Integrated Reporting on Corporate Reporting Practices: A Case of Two Sri Lankan Companies

Tharani Sooriyaarachchi
Faculty of Business
NSBM Green University Town
Homagama, Sri Lanka
tharani.d@nsbm.lk

Daupadee Gamage
Faculty of Business
NSBM Green University Town
Homagama, Sri Lanka
daupadee.g@nsbm.lk

Abstract—The study unfolds the impacts of the adaptation of Integrated Reporting on corporate reporting practices. The analysis is specifically carried out emphasizing on the guiding principles and the content elements of the IR Framework.

The research was carried out on two public limited companies, one being a diversified holding company and the other operates in the field of Insurance. Thematic case study approach was used, as this study warrants in-depth analysis. The findings were analyzed based on IR Framework and the model drawn from Laughlin (1998) which was built by Hinings and Greenwood (1988) guided by the work of Miller and Friesen (1984).

The research findings unveil that, one company has adopted integrated thinking, prior to the official adoption of IR. Thus, there has not been a considerable change in the value creation processes and decision making processes of the organization. Since the company has always incorporated IR thinking there has not been a drastic change in the reporting process. However, the adoption has improved the connectivity of non- financial information, the formats and structures used for reporting.

On the contrary there is no sufficient evidence to suggest that the other company in the insurance sector has practiced integrated thinking prior to the official adoption of IR. Therefore, the adoption of IR has created a significant impact on their reporting processes.

This research fills the existing gap of literature with regard to implications of IR practices in developing countries and also analyses the level of adherence of guiding principles and the content elements of IR Framework by the practitioners.

Keywords—Content Elements, Guiding Principles, Integrated Reporting, Organizational Reporting Practices

I. INTRODUCTION

Integrated reporting (herein after referred to as IR) is the latest addition to the line of proposed developments aimed at enhancing the quality and relevance of organizational reporting practices.

Failure of the previous initiatives including social reporting, environmental reporting and sustainability accounting, to achieve the desired aim of providing useful information beyond financial information to the stakeholders to support them in their decision- making process has resulted in the development of the International <IR> Framework (herein after referred to as the IR Framework) by the International Integrated Reporting Council (IIRC).

 IR promotes a more comprehensive and coherent approach to corporate reporting, which amalgamates financial information and non-financial information to better communicate the value created by an organization to its stakeholders over short, medium and long term and the IR agenda advocates bringing transformations to corporate reporting practices (Coulson et al. [2]).

The rate of adoption of IR worldwide is at an accelerating rate and with the latest survey done by IIRC in 2016 over 1,000 companies worldwide have implemented IR and 40 out of 290 Sri Lankan

companies have prepared integrated reports by 2017 as highlighted in the keynote speech made by Richard Howitt, CEO of the (IIRC) at CMA Excellence in Integrated Reporting Awards 2017.In this context, this study investigates whether the change brought by IR is substantive or symbolic. Under this broad issue the following research questions are being addressed.

1. How did the implementation of IR affect the organizational reporting processes?

2. How did the implementation of IR affect the content of the reports issued by the organization?

3. How organizations have used information gathered through the IR process in the decision-making process?

These issues are explored in the context of a developing country based on two companies that has adopted IR in 2014 and these reports have gained recognition at the competitions on IR organized by Professional Accounting Bodies (PABs) in Sri Lanka as well as in the South Asian Region.In this context, the objectives of this paper are three-fold as indicated below:

1. To explore the impact of IR on organizational reporting processes.

2. To explore changes to report content post IR implementation

3. To analyse how IR is used as a decision-making tool in an organization.

This study extends the current discussion on the contribution of IR as to the transformation of organisational reporting practices in general and more specifically in a developing country context by addressing the changes in organizational reporting practices and decision-making processes due to IR. In addition to this theoretical contribution, the study sheds light to policy makers, practitioners as well as propagators as to the change brought in an organisation based on IR.The remaining sections of the paper are structured as follows: Section 2 presents the review of literature followed by section 3 which discusses the research methodology in detail and section 4 which covers the research findings, the section 5 carries the conclusion, the section 6 carries the implications of the study and finally the section 7 carries the limitations of the research and suggestions for future research.

II. LITERATURE REVIEW

A. The development of IR.

The existing literature states that integrated reporting has been practiced in the world even before the formation of IIRC [3]. Moreover, key researchers in the area suggests that organizations shifted from traditional financial reporting to disclosure of non- financial information with the intention of meeting the expectations of the stakeholders [3],[4]. The empirical studies reveal that at the initial stage of this transformation organizations incorporated non- financial disclosures into annual reports and subsequently separate reports were issued by organisations to disclose the material non-financial information more comprehensively due to the popular belief, that financial reports and non-financial reports cater two separate audiences and not the same audience [5]. However, the corporations later realised that these standalone reports were too complex and resulted in issues such as silo thinking and lack of uniformity in reporting practices. With this realisation, companies started amalgamating financial and non - financial information into a single report which is was widely known as an integrated report [3],[5].

B. Diffusion of IR

Factors such as higher investor protection, higher private expenditures for tertiary education, higher economic development and higher corporate responsibility enhance the likelihood of companies engaging in IR as suggested by many of the key contributors. Moreover, the level of forward-looking disclosures made by companies are impacted by several institutional factors and that that both gender diversity and firm size are positively related to forward- looking disclosures in integrated reporting and leverage is negatively related to forward looking disclosures. Further, the findings uncovers that despite the popular opinion, there is no significant impact created by board size, board composition, profitability or industry on forward-looking disclosures [6],[7]. According to [8], along with the technological improvements, Sri Lankan companies have realized that the information requirements of the stakeholders have widened beyond just pure financials and that the early adopters of integrated reporting are

companies who have followed sustainability reporting in the future making it a transition from sustainability reporting rather than a complete transformation in their reporting processes and practices.

C. The expected change and the actual change of reporting practices as a result of implementation of IR.

Key contributors in the area has established that IR is fundamentally about the establishment of an innovative global reporting framework which would complement distinct reporting requirements in a manner that would increase the effectiveness of what entities report and a tool that enables organizations to assess how the organization created value for its investors overtime and how the organization has performed during the period in terms of the multiple capitals [4],[9]. The available literature reveals that the organizations are expected to change their organizational reporting practices through a greater cross functional communication to facilitate the diffusion of integrated reporting, make substantial changes that restructures the business model where integrated thinking is encouraged , embrace sustainability [5],[4],[10],[11],[12]. Moreover, it's further revealed that and that IR should and that integrated reporting should be embedded to the organizational strategy and should endorse efficiency and productivity of capital allocation and acts as dynamism for sustainability [13]. Even though a it was expected that a considerable transformation would occur in organizational reporting practices as a result of implementation of IR, the empirical evidence suggests that the expected changes didn't occur [4] and that most organizations use IR as a reputational management tool , legitimacy management tool [10],[11] and as a result many integrated reports fail to create a coconnectivity between financial information and non-financial information [12],[13]. As per [8], the adopters of integrated reporting are following the trend of adopting IR and have not really learnt the meaning of IR which has resulted in a "practice -reporting portrayal gap".

Moreover, empirical evidence further suggests that even though there were no radical changes made to the organizational reporting practices that incremental changes were made to the reporting mechanisms [9] and the quality of integrated reports in terms of materiality, connectivity of information, reliability and completeness were improved [14]. Hence, the researchers identified that there exists a research gap of the impact of IR on organisational reporting practices. The research is performed in the Sri Lankan context due to the identified high diffusion rate of IR in the country [8] and the fact that no prior research of this nature has been conducted in Sri Lanka.

The researchers identified and addressed the following research issue;

The study focuses on the fact whether there was an impact on organisational reporting practices as a result of adoption of IR and if there was a change whether its' substantive or symbolic. Under this broad issue, the following three research questions are addressed in the study:

1. How did the implementation of IR affect the organizational reporting processes?

This question explores the ways in which the implementation of IR and the adherence to the IIRC Framework on IR in terms of guiding principles have impacted the organizational reporting processes.

2. How did the implementation of IR affect the content of the reports issued by the organization?

This question addresses how the adherence to IIRC Framework on IR in terms of its content elements has changed the content of the reports issued by the organization.

3. How organizations have used information gathered through the IR process in the decision-making process?

This question explores how organizations use the information generated by the IR process in taking strategic decisions.

### III. RESEARCH METHODS

A. Research Approach

The study adopts case study approach as the selected organisations need an in-depth thematic analysis. Hence, a case study was done on two Sri Lankan companies who were early adopters of IR and are recognized for their integrated reports by professional accounting bodies , to identify how

IR has impacted on its reporting practices and decision-making process.

B. Conceptual Diagram

The conceptual diagram was developed based on the IIRC Framework and the design archetype model extracted from [1].

The diagram elaborates how the implementation of IR affects the organizational reporting processes, how the implementation of IR changes the content of the report and how the changes in the above said reporting practices impacted the strategic decision-making process of the company through using the seven guiding principles and eight content elements outlined by the IIRC.Finally, it demonstrates how the value creation process in terms of implementation of IR will change within the context of the organizational culture and the three levels of interpretative schemes explained in the Laughlin model namely, meta-rules, mission / purpose, beliefs / values and norms as a result of implementation of IR and how it will make an impact on strategic decision making.
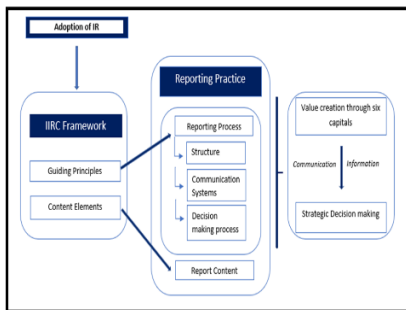
C. Operationalization

Accordingly, under the operationalization, the following main themes were used to analyze the study.

1.Impact on the reporting process– The changes made to the organizational reporting processes was measured through the seven guiding principles provided by the IIRC and the archetype model extracted from [1].
2.Impact on the report content– The changes made to the report content was measured using the 8 content elements provided by the IIRC.

3.Impact on strategic decision making – The changes made to the value creation process through the six capitals was used to measure the impact on strategic decision making.

Accordingly, the main themes of the study can be elaborated and explained as below.

Seven Guiding Principles
1.Strategic focus and future orientation- Reporting should become futuristic and in line with the corporate strategy after the implementation of IR.
2.Connectivity of information- Reporting should become holistic and there should be a connection between financial information and non-financial information with the introduction of IR.
3.Stakeholder relationships- Integrated Report should meet the expectations of the stakeholders and should provide them with the necessary information about the value created.
4.Materiality- Integrated Report should disclose material information.
5.Conciseness- Integrated Report should be precise and easy to understand
6.Reliability and completeness- Integrated Report should be unbiased and should disclose all positive and the negative relevant material information accurately.
7.Consistency and comparability- Integrated Report should be consistent overtime and should be presented in a manner that is comparable with previous reports of the same organization or the similar reports of other organizations.

Eight Content Elements
1.Organizational Overview and external environment – The Integrated Report should explain what the organization does and the circumstances under which it operates.
2.Governance – The integrated report should explain how the organizational governance structure supports its ability to create value in short, medium and long term.
3.Business Model – The content of the Integrated Report will change based on the business model of the organization and hence the reason why IIRC does not impose rules on reporting structures.
4.Risks and Opportunities – The Integrated Report should explain the specific risks and opportunities that affect the organization's value creating ability.
5.Strategy and Resource Allocation – The Integrated Report should explain where the

organization wishes to be in future and what are their plans to reach the set goals.

6.Performance – The Integrated Report should point out to what extent the organization had achieved its strategic objectives and what are its outcomes in terms of effects on the mentioned 6 capitals in the conceptual diagram.

7.Outlook – The Integrated Report should explain the challenges and uncertainties the organization would encounter in pursuing its strategy and the potential implications of the said challenges on the business model and future performance.

8.Basis of Presentation – The Integrated Report should explain the basis for determining what matters to be included in the Report and how are the matters quantified and evaluated.

Strategic Decision making

Any store of value that an organization can use to produce goods or services is referred as capital and organizations possess six such capitals namely Manufactured Capital, Intellectual Capital, Financial Capital, Human Capital, Social and Relationship Capital and Natural Capital. Core and other activities of an organization which leads to either the creation or the destruction of the value is known as value creation processes.It is anticipated that implementation of IR and the adherence to the IIRC guiding principles and the content elements would transform the reporting practices of an organization in a manner that would show how all six types of capital would influence the organizational value creation process and that the information generated through value creation would be used by the organization in making informed strategic decisions.

D. Sources and Collection of data

As this is a case study data has been collected through several methods and triangulated the data to examine the objectives of the study.

Review of integrated reports – The Annual Reports of the selected companies for four years before the implementation of IR in 2015 (from 2011/2012 to 2014/2015) and four years after the implementation of IR (from 2015/2016 to 2018/2019) was analysed to gather data as to

analyse how the content of annual reports had changed in terms of the content elements of the IIRC framework.

Questionnaire - A Questionnaire was distributed among 24 managerial level employees representing the various divisions involved with the reporting process of the companies (12 questionnaires for each company) to collect data as to the changes made to the organizational reporting structure and to how the information generated through reports are used in strategic level decision making-Through the guiding principles section of the questionnaire, the changes to the reporting process brought in through implementation of IR was explored and through the content element section of the questionnaire, the changes to the report content brought in through the implementation of IR was explored.

Interviews –The top management in charge of the finance function, sustainability, CSR and other related functions were interviewed separately one hour each to identify the changes made organizational structure, organizational vision and mission, organizational goals and objectives, organizational strategic thinking and organizational reporting practices through face to face interviews. An interview guide (Annexure 02) covering all areas related to the research was used to gather information in a methodical manner.

This was an exploratory and descriptive case study and the data gathered through these different sources were triangulated along with the information included in corporate websites and other online materials, information from media articles and standalone sustainability reports. Moreover, a thematic analysis was carried out based on the theoretical framework of the study to examine objectives of identifying the implications of IR on organizational reporting process and the report content of reports and to identify how the information generated through these reports are

used by the management in making strategic decisions.

Therefore, the first research objective of exploring the influence of IR on organizational reporting processes is accomplished by comparing the 7 guiding principles of IR with the reporting practices pre and post the adoption of IR. The second objective of analysing post adoption changes to the report is achieved by comparing the contents of the annual reports and integrated reports issued by the company under review before and after the adoption of IR. The third objective of analysing the changes to the decision making practices is achieved through comparing how the decision-making mechanism of the company has changed as a result of implementing IR.

IV. FINDINGS AND DISCUSSION

The operationalization of the study was done through 3 key themes in accordance with the IR Framework. According to the conceptual diagram, reporting practices of the company under review is analysed through the reporting processes by the use of 07 guiding principles of IR and the report content is analysed using the 8 content elements of IR as per the IR Framework.

A. Transition to IR

The diffusion of integrated reporting around the globe was one of the most significant changes made to the traditional corporate reporting process after the introduction of sustainability reporting. Accordingly, these changes were introduced to Sri Lanka in the latter part of 2010.
Whilst it was a major move to some of the companies, the ones who operated with a futuristic view had identified these key changes decades ahead [3] and companies that had followed Sustainability Reporting in the past managed to adopt to IR without minimal effort [8]. Likewise, the company A under review is also one of the few companies who had prepared themselves for these changes in advance. The company A had the practice of disclosing non-financial data such as the sustainability performance, corporate governance and the corporate social responsibility of the company either in the same report along with the financial information or in separate individual

reports even before the company adopted the concept of IR in a formal manner in the year 2015. However, company B, was not in the practice of issuing non-financial data before the adoption of IR in 2015 despite the company calculating certain non-financial information for their decision-making process.

The Group Financial Controller of Company A stated:

We always had a unified cohesive way of thinking across the group across various employee levels even before the terms Integrated Thinking and Integrated Reporting came to play. We didn't have a proper name to define this view, but we called it "the umbrella view".
We tried several ways of presenting non-financial information to the stakeholders including issuing stand-alone reports, incorporating non-financial information to separate sections of the annual report and adopting formats used by other award winning local and global companies renowned for their non-financial reports. However, with the recent development of IR, company adopted the IR principles and guidelines in to their reporting process. However, it should be noted that even though adopting to IR principles were a major change to some of the companies, it wasn't the case for the company under review.

Moreover, Manager – Corporate Finance and strategy emphasized of Company A stated that:

We didn't adopt IR initially when early adopters of IR in Sri Lanka did because we opted to present our own story rather than adhering to a general format but then we realized that the stakeholders were more receptive of the reports issued by the early adopters of IR than the reports issued by us.

The Finance Manager of Company B stated:

We were not in the practise of disclosing non- financial information to our stakeholders. However, we were in the practise of measuring certain non- financial indicators of performance even prior to the adoption of IR. When we realized that other companies are issuing Integrated reports and these reports are warmly welcomed by the public it was decided that we also should adopt IR.

As suggested by [4], companies are motivated by either the pressure from the stakeholders for the company to adopt the IR guidelines or to appear as a good corporate citizen than the competitors. The company B adopted IR to meet the expectations of the stakeholders.

The company A had identified the stakeholders' need for non-financial information even before the adoption of IR and had tested out different methods of disclosing those additional information requested by the stakeholders through various methods even before the adoption of IR.Therefore, it's evident that company A managed to successfully adopt IR with minimal change when compared to company B. Which is backed by [9], where it was suggested that companies who were in the practise of issuing non- financial information prior to implementation of IR manage to adopt IR with little effort compared to others.

B. Implications of IR on reporting process of the company.

The researchers analysed the changes made to the reporting process of the companies using the guiding principles of the IIRC framework. As shown in Table 1 the researchers identified that no change had been made to the reporting process in terms of stakeholder relationships, conciseness and reliability and completeness in company A. Moreover, when considering the connectivity of information, materiality of information and consistency and comparability of the disclosed information improved significantly after the adoption of IR when company A is considered.

TABLE I.   IMPACTS TO REPORTING PROCESS (A)

Element	Company A							
	Pre-IR adoption era				Post-IR adoption era			
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2018/19	2017/18
1. Strategic focus and future orientation	Due to inherent limitations (i.e secrecy) the strategic focus of the organization was not completely reported.							
2. Connectivity of information	✔	✔	✔	✔	Improved connectivity			
3. Stakeholder relationships	✔	✔	✔	✔	✔	✔	✔	✔
4. Materiality	✔	✔	✔	✔	Weightage given to non-financial information was increased			
5. Conciseness	✔	✔	✔	✔	✔	✔	✔	✔
6. Reliability and completeness	✔	✔	✔	✔	✔	✔	✔	✔
7. Consistency and comparability	✔	✔	✔	✔	Both consistency and comparability was increased			

*Table1 - Impacts to reporting process through IR adoption - Company A

As shown in Table 2 it was revealed that drastic changes had been made to the reporting process in terms of connectivity of information, stakeholder relationships in company B. Furthermore, it was identified that the company had always maintained materiality, conciseness, reliability and completeness, consistency and comparability in reporting financial information and that the company started reporting non-financial information with the same level of materiality, conciseness, reliability and completeness,

consistency and comparability with the adoption of IR.

TABLE II.   IMPACTS TO REPORTING PROCESS (B)

Element	Company B							
	Pre-IR adoption era				Post-IR adoption era			
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2018/19	2017/18
1. Strategic focus and future orientation	Due to inherent limitations (i.e secrecy) the strategic focus of the organization was not completely reported.							
2. Connectivity of information	X	X	X	X	✔	✔	✔	✔
3. Stakeholder relationships	X	X	X	X	✔	✔	✔	✔
4. Materiality	Only material financial information was disclosed.				✔	✔	✔	✔
5. Conciseness	Financial information disclosed was concise.				✔	✔	✔	✔
6. Reliability and completeness	Financial information disclosed was reliable and complete.				✔	✔	✔	✔
7. Consistency and comparability	Financial information disclosed was consistent and comparable.				✔	✔	✔	✔

*Table2 - Impacts to reporting process through IR adoption - Company B

Further, the research findings advocate that due to the inherent limitations including secrecy and confidentiality both organizations do not completely report the strategic focus and futuristic details in their reports.The changes in the reporting process of the companies were further analysed using the archetype model extracted from Laughlin to identify the changes made to the process in terms of the organizational reporting structure, the decision-making process and the communication system. It was revealed that there were no drastic changes made to the organizational structure in terms of new positions, new job roles, new organizational divisions in company A and that there were minor changes to the organizational reporting structure in terms of introducing new job roles in company B.

C. Implications of IR on the report content of the reports issued company.

TABLE III.   IMPLICATIONS TO REPORT CONTENT (A)

Element	Company A							
	Pre-IR adoption era				Post-IR adoption era			
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
1. Organizational Overview and external environment	✔	✔	✔	✔	Improved clarity and relevance in the external environment disclosures			
2. Governance	✔	✔	✔	✔	✔	✔	✔	✔
3. Business Model	✔	✔	✔	✔	✔	✔	✔	✔
4. Risks and Opportunities	✔	✔	✔	✔	✔	✔	✔	✔
5. Strategy and Resource Allocation	✔	✔	✔	✔	✔	✔	✔	✔
6. Performance	✔	✔	✔	✔	✔	✔	✔	✔
7. Outlook	✔	✔	✔	✔	✔	✔	✔	✔
8. Basis of Presentation	Both the financial and non financial information were available				Level of clarity was increased			

*Table 3 - Implications to report content through IR adoption for company A

The researchers analyzed the changes made to the report content of the reports issued by company A with reference to the content elements given in the IIRC framework (Table 3) and identified that no significant change had been made to the report content in terms of information about governance,

business model, risks and opportunities, strategy and resource allocation, performance and outlook. Moreover, it was revealed that the level of clarity and relevance improved for the disclosures in Organizational overview and external environment as well as in the basis of presentation.

TABLE IV.   IMPLICATIONS TO REPORT CONTENT (B)

Element	Company B							
	Pre-IR adoption era				Post-IR adoption era			
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
1. Organizational Overview and external environment	✓	✓	✓	✓	Improved clarity and relevance in the external environment disclosures			
2. Governance	✓	✓	✓	✓	✓	✓	✓	✓
3. Business Model	x	x	x	x	✓	✓	✓	✓
4. Risks and Opportunities	✓	✓	✓	✓	✓	✓	✓	✓
5. Strategy and Resource Allocation	x	x	x	x	✓	✓	✓	✓
6. Performance	x	x	x	x	✓	✓	✓	✓
7. Outlook	x	x	x	x	✓	✓	✓	✓
8. Basis of Presentation	Only Financial information were available				Level of clarity was increased for Financial information. Non financial information was also disclosed			

*Table 4 - Implications to report content through IR adoption for company B

Furthermore, the researchers performed the same analysis to the report content of the reports issued by company B (Table 4) and identified that no significant change had been made to the report content in terms of information on both governance and risks and opportunities but that a drastic change had been made to the content of reports with regard to information on business model, strategy and resource allocation, performance and outlook. Moreover, it was revealed that the level of clarity and relevance improved for the disclosures in Organizational overview and external environment as well as in the basis of presentation. In terms of basis of presentation, it was further identified that company B only disclosed financial information prior to adoption of IR and non-financial information were incorporated only after the adoption of IR.

D. Implications of IR on decision making of the company.

With regard to company A, it was revealed that all the layers of the organization from the Board of Directors to the operational employees of the company share the same vision regarding the company and the thinking of all the employees are in line with the shared vision due to the "Umbrella view" concept that existed within the company and the decisions taken by the top management is cascaded down effectively to achieve the organizational objectives through integrated thinking. Therefore, it was revealed that no significant change had been made to organizational strategic decision making with the

adoption of IR as integrated thinking was already established within the organization. The researchers were able to identify that there was silo thinking between different departments prior to the adoption of IR in company B and non-financial information was rarely used effectively in their decision-making process. The researchers further found out that with the adoption of IR the company started incorporating non-financial information in decision making more often and that the all the divisions started working together more. However, it was identified that the company B has not yet reached a level of integrated thinking as they engage in IR more with the intention of adhering to the expectations of the stakeholders and to follow the trend set by other companies.

V. CONCLUSION

The research findings advocate that corporate reporting practices of organizations which had integrated thinking precedent to the implementation of the IR Framework by the IIRC in 2013 [3] and were in the practice of reporting beyond financials would not be impacted significantly with the adoption of IR and only incremental changes would be made to the reports issued by such organizations in terms of the presentation of the information and the quality of the presentation in terms of connectivity of information, completeness and materiality [15].

The research findings further emphasize that organizations follow IR for the sake of following the trend in the corporate world [8] and that even though radical changes would be made to corporate reporting practices when organizations that didn't disclose non-financial information adopt IR those changes would be symbolic as most organizations use IR IR as a reputational management tool and a legitimacy management tool [10] [11]. Moreover, he gathered information revealed that companies who have successfully adopted IR were the ones who were always in the habit of disclosing non-financial information and had integrated thinking embedded to their organizational cultures rather than companies who tried to implement IR as a completely new practice.

VI.   IMPLICATIONS OF THE STUDY

Literature on the implications of IR on organizational reporting practices identifies little

or no change in the substance or quality of the reports produced following the introduction and implementation of IR. It further identifies little or no shift in the general thinking patterns of organizations to incorporate a more integrated and holistic thinking attitude.

This research study contributes to the existing literature on the topic as the study explored the implications of IR on organizational reporting practices of two Sri Lankan companies and advocated that there had been no radical changes in corporate reporting practices of companies that had integrated thinking prior to adoption of IR and were always in the practice of issuing non-financial information as a result of implementing IR and that even though there is a significant symbolic changes in corporate reporting practices of organizations who were not in the practice of disclosing non-financial information this change has failed to create a transformation in the organization. The research would be useful for corporates in understanding the impact of integrated reporting on their reporting practices and to decide how effectively the organization has implemented IR. The research would also be helpful in analysing whether the changes in reporting practices as a result of implementation are substantive or symbolic which would help the independent third parties who offer awards for integrated reports to make better judgments.

VII. RESEARCH LIMITATIONS

The research was conducted as a case study and explored a Sri Lankan Business conglomerate that operates across various industries and another Sri Lankan company in the Insurance Industry. Therefore, the research findings may not be universally applicable to all the industries and all the organizations across the globe. Furthermore, the research findings might not be applicable to a country where the diffusion rate of IR is not high like Sri Lanka. The researchers believe that future research can be improved by conducting a case study which considers multiple number of organizations across several regions with different IR diffusion rates representing a variety of business industries.

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Gaming Lingo: A lexicosemantic Analysis

Natashya Chamba

English Laguage Teaching Unit, Faculty of Business

NSBM Green University Town

Homagama, Sri Lanka

natashya@nsbm.lk

Abstract—**This paper focuses on the gaming community's unique linguistic usage of the English language. For this purpose, the researcher peruses online corpuses available within RPG sites and general online gaming dictionaries, in order to ascertain if there is an influence on the day-to-day interactive communications among gamers in Sri Lanka.**

Keywords—L33T Speak, gaming lingo, online culture, lexicosemantic, gaming community

I. INTRODUCTION

L33T Speak, or the more popularly known Gaming Lingo is a variety of English used primarily, as its name suggests, within the gaming community. With the constant evolvement of technology, the gaming spheres too has expanded and developed to the extent that people are able to create virtual realities and worlds within the online gaming forum. These online gaming forums in turn create online gaming communities. The online gaming community is a constructed virtual community comprising of people around the world with the common love for games and virtual interaction. Whilst their habit has invited the whining of parents on a global scale, some studies have proven it to be fertile grounds for education and even language acquisition. It is the effect of the latter that interests me.

Thus, my study will focus on the lexicosemantic variations that exists within the language used to communicate via the gaming worlds. The reasons for said variations will be examined and the main aim would be to ascertain the level of influence such gaming lingo has on a gamer's day to day speech/vocabulary. Further, this study will build up on the framework of Schneider's Five Phase Model of World

Englishers, for which the gaming virtual world would provide fruitful grounds for its application.

The gaming community comprises of a diverse group of people of all ages, nationalities and languages. But as most of the gaming arenas are created by American Companies, the language predominantly used within the game, for both, instruction and interaction is English. Whilst the game developers used a standard variety of English, the gamers have taken the liberty to invent a unique lingo that they consider an elite and exclusive form of speech. This is a form of speaking in writing (Spitzer, 1986) that has evolved within the gaming interfaces, chat rooms and logs. The main reasoning behind this is due to the highly exclusive nature of the gaming community that strives to differentiate themselves from other online communities or cyber related systems, as an elite community within the virtual worlds. Further, the fast-paced nature of the games as well result in the coining and clipping of easier to type words.

Thus, it can be observed that the most productive word formations are clippings, initialisms and acronyms. Another lexicosemantic feature that constantly persists is semantic variations.

The nature of the gaming lingo within the gaming community becomes very interesting to observe as like in the real world the language used here too is constantly evolving. A word gains popularity for a while and then is dropped as time passes. Further, almost all these online games consist of a user based/created dictionary that helps keep record of the vocabulary used and the varied meanings within the gaming world, in order to provide orientation for non-gamers or new gamers. It is from these online corpuses that I will draw the majority of my data.

II. LITERATURE REVIEW

"Probably no other domain [virtual worlds] within the Internet offers such possibilities for creative, idiosyncratic, imaginative expression, and the likelihood that this situation will produce a distinctive linguistic variety…" [2]. This is my premise and it is this very fact that makes the gaming worlds a productive space for my study of lexicosematic variations.

A study by [1] on "Virtual Discourse Structure: An analysis of Conversation in World of Warcraft" delved into the discourse of one of the most popular online Role Playing Games (RPGs), World of Warcraft, which has been used as the prime case study for organized conversation in text-only mediums. The author uses the traditional tools of Conversation Analysis (Sacks, Schegloff, & Jefferson, 1974; Hutchby & Wooffitt, 1996) to analyze online discourse. In order to gather data, the author observes and analyses logs of chat from within the game world. The author is able to see patterns in chat turn taking, especially over multiple-message turns, via the Turn Construction Unit Continuation theory (Schegloff, 1996; Couper-Kuhlen & Ono, 2007). Further, the author showcases the viable role the tools of Cohesion (Halliday & Hasan, 1976) play in the linking of turns. Finally, certain aspects of WoW participant communication are analyzed, with the main focus on repair functions in the discourse, namely *-repair for typographical errors and an in-group feature "get out of my head!" for overlap. Through this study the author is able to prove that online discourse is organized and constructed. This becomes important for my study as it delves into one of my chosen RPGs for analysis, while this has been looked through the lens of a communication medium, I will be dissecting the linguistic element of the site.

In reference [2], chapter on "The Language of Virtual Worlds, from his book, Language and the Internet, he focuses on the language used within the inhabitants of virtual worlds. These worlds maybe social, educational or gaming zones. As reference [2] focus is on the various forms of texts used to operate one's avatar (projection of self) within virtual worlds. He distinguishes between spoken and action commands and further establishes the link between typist and character and language used thus. In the study [2] bases his study primarily on MUDs (Multiuser Dimension) and further draws from a previous study by Cherny who created a MUD in order to fulfill her research requirement, named ElseMOO. Drawing examples via these methods, Crystal is able to see patterns as well as conclude the multi-dimensional nature of these virtual worlds. The most intriguing element that [2] points out is that such virtual worlds, especially due to its imaginary construction becomes a productive platform for linguistic creativity, which is precisely my interest in the subject.

Another research conducted by [3] on "Ubercool Morphology of Internet Gamers: A Linguistic Analysis", is a pilot study looks at the language of Internet Gamers as one of the many dialects used in the larger context of language used on the Internet and specifically examines the formation of words within the gaming community that contributes to their unique dialect. The author gathers data via gaming chat rooms, limiting the study to the chat rooms of the Quake Clans. The researcher uses both live chat as well as chat logs received from the anonymous participants of these chat rooms. A standard variety was then established by the frequency of usage, out of which clippings was found to be the most common word formation practice within the community. Further, she concretizes the fact that it is indeed a form of text speech that is used within this community and is largely communicated in English, almost no evidence of other languages were found. The observations of clippings being one of the most productive word formation processes in the language used by gamers is of interest to me, as it does largely reflect my own observations, for which, I gather the main reasoning behind it is the fast paced nature of the gaming sphere.

In reference [4], "Word Formation on Internet Gaming Forums" she looks into the frequent language use on the internet that leads to newly generated words, which then in turn is transferred to the oral language. The author strives to identify the most commonly used word-formation processes in gaming chat rooms. For this purpose, the researcher only focuses on the English words used and formed within this gaming forum. The study also discovers certain trends in word usage and easily identifies the most actively utilized vocabulary. Within the limited pilot study carried out, the author is able to carry out a qualitative research of indicative results, applicable only to particular gaming forums and should not therefore be generalized. The study proved lexical categories, abbreviations and truncation to be the most common word formation processes used with a count of 75 percent. Other, generally frequently used morphological processes, such as loan words resulted in a meager 1 to 5 percent. The reasoning behind this was the lack of subject matter that

allowed for the introduction of loan words within these forums and also the limited opportunity for the usage of other languages, other than English, within the forums. Abbreviations, acronyms and clippings on the other hand provided the participants of the forum an easy and swift method of communication and further enhanced their sense of community of familiar groups meeting online. This article quite closely looks at a part of what my study focuses on, the morphological aspect of the language used within gaming forums, thus making it quite relevant to my study although the net speak has and will continue to evolve.

Another interesting study by reference [5] on "The Lexis of Electronic Gaming on the Web: A Sinclairian Approach" reexamines his previous thesis from 2000 that takes into consideration Sinclair's lexical model for examining linguistic phenomena on the Web such as electronic gaming. In lieu of this, [5] establishes a more effective methodology in order to discover lexical units of meaning for this popular online genre. The study is based on a word corpus of approximately one million, comprising advertising descriptions, gaming reviews, and discussion forums among gaming participants. Using the data from the corpus, [5] then screens it through an integrated corpus linguistic tool, WMatrix. This tool accurately generates word frequency profiles, concordances, part-of-speech annotation and semantic content analyses. Through this dataset gained via this tool, [5] is then able to look into the various illustrative lexemes from this genre, and in order to gain a holistic point of view, he inspects the concordances using Sinclair's model and compares it with some popular online dictionaries. The use of a technical linguistic tool in this study, gives it more accuracy, nevertheless, I believe that the tedious task of observations allows one to actively interact with the processes of word formation and semantic variation, giving it more depth.

Studies like what reference [6] have conducted on "Massively Multiplayer Online Role-Playing Games as Arenas for Second Language Learning" are quite popular, he examines the high probability of language education via massively multiplayer online role-playing games (MMORPGs). In lieu of this, the development and key features of these games are investigated. The author then looks into the various theories at the time, which suggested the effectiveness of game-based learning, and further explores the truth behind the value claims of utilizing network-based gaming in computer assisted language learning (CALL). Drawing from previous literature, Peterson than critically examines the three influential learner-based studies. This showcased that the available research material was inadequate and therefore had its limitations. Further, the analysis displayed that MMORPGs form a motivational device for learner training for intermediate and advanced level English language learners, encouraging language interaction. The research further indicated that network-based gaming provided its participants with the opportunity for vocabulary acquisition resulting in the improvement of communication skills. The gaming sphere does provide a more enjoyable method of language acquisition, but the question still remains, is the language acquired thus, acceptable?

Whilst the main studies conducted under the online gaming genre and linguistics are largely based on its unique lingo and how it is formed as well as language acquisition, my study will focus on the prior as a base and will delve into the common usage of this language in the real life, out of the virtual world and especially among Sri Lankan youth.

III.   RESEARCH QUESTIONS

A. Research Question 01 : Does Gaming Lingo influence a Gamer's day-to-day vocabulary?

This is the main research question which strives to claim that gamers are indeed influenced by the lingo used within their gaming communities and are therefore, quite likely to employ the same words in their real lives amongst their real friends and family.

B. Research Question 02 :Is there acceptance outside the community?

This secondary research question strives to ascertain if, they do use it in their real lives, has it gained acceptance. If so, is it only amongst the tech savvy, SMS generation or is it likely to be accepted by all?

C. Reseaech Question 03 : Does it fit into Scheider's Model?

Finally, does the variant Gaming lingo fit into Schneider's Five Phase Model? It is model of great controversy and established by most linguists as impossible to follow phase by phase, but rather that language evolves within all phases at once.

Nevertheless, does this constructed virtual gaming world fit in more aptly?

IV. METHODOLOGY

A. Online Dictionaries

This is phase one of my study. Perused the General Online Gaming Slang Dictionary and the Specific RPG dictionaries: World of War Craft, Final Fantasy, DOTA. [User based corpus] in order to gather the unique recorded lingo. Thus, establishing a corpus for which I would keep referring back to.

B. Observations

In order to observe if the words recorded in the online dictionaries were in usage amongst the gaming community in real time, chat room logs were observed in confidence and with the permission of a few fellow gamers, whose identities will remain anonymous for this study.

C. Interviews

Informal interviews were conducted with current and past gamers via chat and text in order to gather if they do use the lingo outside of the gaming sphere or if it was purely game bound.

V. RESULTS AND DISCUSSION

The online dictionaries brought to light that the productive word processes were acronyms, initialisms and clippings. Further, within these words, Semantic variations were also apparent. The main reasoning behind these lexicosematic variations is the rapid pace of the gaming world and thus emerges out of convenience. It was further observed that the semantic variations were more due to the encouragement of an exclusive atmosphere within the gaming community as well, the idea of a second virtual life that is different from the mundane lives in the real world.

Find Examples below;

Acronyms/Initialisms

- AH - Auction House
- BG/BGs - Battleground
- CC - Crowd Control
- DnD - Do Not Disturb
- GY - Graveyard
- HoT - Heal over Time
- IDK - I Don't Know
- IMO - Abbreviation for "In My Opinion"
- LFM - Looking for More
- LFW - Looking for Work
- MOTD - Message Of The Day
- AFAIK - (acr)(phrase) As Far As I Know
- FTW/FTL - (acr)(phrase) For the win. FTL refers to the opposite, For the loss.

Clippings

- Add - (n.) Additional, unwanted monster that had entered the fray
- Disco - Disconnect or go LD (link dead) - Semantic Shift
- Aggro - (n.) A shortening of "Aggressive (behavior)". This term refers to the behavior of an enemy approaching and attacking, as opposed to your attacking first.
- Hume - (n.) Humes are the most basic of races, closely resembling the humans of our world.
- Bio - Short for "biological break"; usually means a bathroom break or sometimes to eat. (SS/E)
- Inc -Short for "incoming" which is a term used by someone to notify their fellow party members of an aggroed mob coming their way.

Other

- Farming – Obliterating monsters – (In RL - The village is situated in a farming country)– Semantic Shift
- Camper – Stays in one place and attacks only whatever comes his/her way --- Semantic Restriction
- Creep – A type of a monster --- Semantic Restriction
- Rape – Brutal attack of a monster till it dies --- Semantic Amelioration
- Gang Bang – Organized group mission--- Semantic Amelioration
- Noob – Newbie

VI.   CONCLUSION

This study has made it evident that the large online gaming community has its own English dialect and thus becomes a variety within the internet language variety. The unique gaming lingo has been established as used within and without the gaming sphere, thus a contributor to World Englishes. We can also conclude that only certain words are adopted, it is still an ongoing process; words are added and dropped on a daily basis, and due to the nature of the gaming world it adopts a rapid speed in which new things are adopted and then become history. This nature makes it quite difficult to keep track of all the words that are ever created, data will therefore, never be fully accurate. Another limiting factor is the exclusivity of the gaming community, which makes it difficult for others to accurately study their unique lingo, thus maybe confined to a particular group. Finally, acceptability is gained, on condition: the game itself encompasses its own languages, elvish, orcish, simlish , but doesn't really endorse the user slang, acceptance is gained therefore, within the gaming community only and amongst the people of the electronic age, the youth mostly, who do not look at the text messaging lingo as a bastardization of the English Language.

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Factors Affecting Domestic Tourists' Satisfaction in Hikkaduwa, Sri Lanka

Kanchana Geeth Samaraweera
Department of Economics
University of Colombo
Colombo, Sri Lanka
kanchanageeth@gmail.com

T Gamage Yashodhara Upekshani Ananda
Department of Economics
University of Sri Jayewardenepura
Nugegoda, Sri Lanka
yashodhara.upekshani@gmail.com

Abstract - **Tourism is one of the enormous and emerging sectors in the world economy which contributes about 10% to the global gross domestic product. The progress and the instigation are inevitably determined by the level of satisfaction of the tourists in a destination. As an island, Sri Lanka has great opportunities to promote tourism. Hikkaduwa is one of the eye catching areas which can mesmerize both international and domestic tourists. Sri Lankan tourism industry is in a backward position in promoting domestic tourism and only few studies had been conducted to measure the domestic tourists' satisfaction in Sri Lanka. Under this backdrop, it is prudent to answer what are the factors which maximize the Western province tourists' satisfaction in Hikkaduwa, Sri Lanka. The general objective of this study is to identify the Western province domestic tourists' perception towards the satisfaction gained from Hikkaduwa as a tourist destination. Furthermore, the study attempts to investigate the relevance of 5A's concept on domestic tourists' satisfaction.**

The operational methodology for this study is a factor analysis which has three stages. First stage is the Exploratory Factor Analysis to identify the major factors that influence the domestic tourists' satisfaction in Hikkaduwa. Second stage is the Confirmatory Factor Analysis to confirm the identified major factors from the Exploratory Factor Analysis. Finally, the Structural Equation Model to identify the relationships between the identified factors in the model.

The Descriptive analysis of collected results has shown that majority of the Western province domestic tourists have prior experience in Hikkaduwa. According to the Factor analysis, the study found that Accommodation, Amenities, Attractions, Accessibility and Activities influence the domestic tourists' satisfaction. Moreover, the study revealed that Accommodation, Amenities, Attractions, Accessibility and Activities have a significantly positive impact on domestic tourists' satisfaction in Hikkaduwa. However, the activities impact 95% on domestic tourists' satisfaction and it is the most crucial factor.

Finally, this study suggests to introduce low budget tour packages, publication of an accommodation guide and tourist guide map in native languages and maintain the quality of the accommodations. Additionally, improving activities in the destination would help the stakeholders to increase the satisfaction level and the future growth of the domestic tourism industry in Hikkaduwa.

Keywords— Domestic Tourism, Tourists' Satisfaction, 5A's, Factor Analysis

I. INTRODUCTION

Tourism is an important strand in the economy of Asia and Pacific countries. Most of the counties have adopted many strategies to expand tourism in their countries [1]. To get multiple socioeconomic benefits from tourism, all nations must introduce low cost business models which are diversified [2].

"Domestic tourism comprises the activities of a resident visitor within the country of reference, either as part of a domestic tourism trip or part of an outbound tourism trip" [3]. "A domestic traveler is any person residing in a country who travels to a place within the country, outside his or her usual environment for a period not exceeding 12 months and whose main purpose of visit is other than the exercise of an activity remunerated from within the place visited" [4]. Pierret [2] reviewed that according

to the UNWTO estimations the global level domestic tourism records 73% of total overnights, 74% of arrivals and 69% of overnights at hotels, 89% of arrivals and 75% of overnights in other (non-hotel) accommodations.

Sri Lankans also like to experience the cultural and natural richness of their own country. Hence it is very important to pay attention to the domestic tourist satisfaction. Tourist satisfaction is one of the leading factors which assists to deal with the competitiveness of the tourism industry [5]. When evaluating the tourist satisfaction, a priority should be given to the factor of Accommodation. According to the capacity available in 2017 by resort regions, the South coast region had 35.23% accommodations out of the total capacity and it is recorded as the highest accommodation capacity in 2017 [6]. Therefore the domestic population is also mainly attracted to the South coast zone extends from Wadduwa to Tissamaharama. The finest Southern beaches are Tangalle, Beruwala, Mirissa, Bentota, Unawatuna and Hikkaduwa. The largest proportion of nights local guests spent was reported from the South coast as 31.73% [6], because of these beautiful beaches.

According to the details of domestic visitors by location in 2017, the number of local visitors arrived to Galle was 67,248 and the revenue from that area was Rs.1,810,015 [7]. Hikkaduwa is one of the most famous areas in Galle in Southern region. Uysal [8] defined that the attractiveness of the tourist destinations always drags the tourists and the reason for this attractiveness is the appealing sources in those areas. Likewise, the natural attractions like beach, corals and also the cultural attractions like Seenigama Muhudu Viharaya, Tsunami Honganji Viharaya, and Naga Viharaya are some of the great diversions in Hikkaduwa for the domestic travelers. This area is very distinctive for eco-tourism which benefits for the locals as well as the environment. The sustainable tourism destination management is responsible to improve the tourist satisfaction by providing a high service quality [9].

Tourists normally consider the tourist satisfaction as a key element that can be used to measure a tourism service [10]. Under this backdrop, it is prudent to answer what are the factors which maximize the Western province tourists' satisfaction in Hikkaduwa, Sri Lanka.

The general objective of this study is to identify the Western province domestic tourists' perception towards the satisfaction gained from Hikkaduwa as a tourist destination. Furthermore, the study attempts to investigate the relevance of 5A's concept on domestic tourists' satisfaction.

II. LITRETURE REVIEW

a. Tourist Satisfaction

As customer satisfaction is a term which relates to marketing, it is one of the principal measures for marketers as well as for the businessmen.

There is no doubt that consumers expect to gain their satisfaction through consuming various goods and services. To maintain the consumer satisfaction a good or service must be different or unique from other products. If a particular product or service is divergent from other products or services which are in the same market, it can give satisfaction to the consumers and also maintain its market demand [11].

Customers highly repurchase products depending on the quality, expectations and satisfaction gained by them. But they lower the repurchasing when competition, differentiation and experience is high and when switching costs and difficulty of standardization is low [12].

Customers usually differentiate the actual gains with the expected gains of any product. They would be well satisfied and purchase the same product again, if the actual gains are higher than the expected gains. Nevertheless, if the actual gains are lower than the expected gains, customers would be dissatisfied [13]. To magnify the customer satisfaction, the quality of the product and plentifulness is important [14].

Tourist satisfaction is identified as one of the crucial assessments that can be used to measure the tourism service. Tourists' intentions on revisiting the destinations are sharply connected with the factor, "satisfaction". Therefore it is one of the foremost elements which assists any destination to increase their profits and to capture an out spread market share.

Hence, when interpreting about the satisfaction it is very expedient to spotlight on the various definitions on satisfaction within the tourism literature. In some cases satisfaction can be defined as the consequence of customers'

judgment on the service quality which they recognized [15]. But in compliance with some other papers, satisfaction and service quality are headed towards different directions [16], [17]. The reason for this is, the presence of discrete elementary handling mechanisms to assess the satisfaction and service quality [18].

As specified by Kozak and Rimmington [19] tourists mainly select their destinations, utilize goods and services at the destinations, and tend to revisit those destinations according to the satisfaction they gain. Therefore, tourist satisfaction is very essential in promoting destinations.

According to Bowie and Chang [20], tourist satisfaction depends on the service quality of the destination. Therefore, in order to retain the competitiveness of destinations and to raise them, the tourism development authorities and tourism operators should take necessary steps to improve the satisfaction [17].

Individual satisfaction is derived by contrasting the anticipated and underwent experience of a good or service [21]. Yuksel and Rimmington [22] pointed out that the competition, product differentiation, customers' consumption can be increased by the tourist satisfaction.

According to Baker and Crompton [23], tourist satisfaction is the conceptual conclusion gained through various facilities and services in the destination as well as the standard of travelers' experience.

b. Accommodation

Accommodation services are essential in order to improve the tourist satisfaction. In tourism accommodation is considered as the second home for tourists.

Gnanapala [24] identified that the facilities in the accommodation like room services and maintenance, quality and standards of bathrooms, night life and entertainments, shopping facilities and recreation facilities positively influence the satisfaction level of travelers. Tourists are greatly satisfied when their accommodation is pretty and attractive, modern and fashionable, having a pleasant and friendly staff, having an eye catching view etc. [25], [26]. The language proficiency, friendliness and efficiency of the staff in the accommodation also enhance the satisfaction level of tourists [27].

A factor that strongly influence for the satisfaction of a customer is the price that the customer has to pay [28]. Accordingly, apart from the facilities, there are some other factors in the accommodations which improve the satisfaction of the tourists. Jeyamugan [29] reveals that reasonable price for accommodation, safety of visitors and emergency preparedness positively impacts on tourists' perception which in turns derives a higher satisfaction. The food safety should be in an equal level from street food vendors to high class food restaurants [30]. Consequently, the accommodations should also be clean, safe and secured [31].

c. Amenities

The amenities act as a motivational factor which make the tourists to revisit a place [29]. Amenities include the hygiene and sanitation factors and infrastructure facilities too. These amenities should be developed in order to develop the tourism industry.

According to Jeyamugan [29] hygienic food preparation, cleanliness of destinations, safe drinking water, availability of health services has a positive correlation with tourist satisfaction.

The infrastructure facilities like parking facilities and space, telecommunication facilities, banking services, money exchange, signs and indicators also show a positive relationship with satisfaction [32], [33].

Gnanapala [24] identified the factors such as banking services, internet and IDD facilities, customs and airport services impact greatly for the tourists' perception and satisfaction.

d. Attractions

The uniqueness of a place attracts more visitors. Therefore if there is a variety of natural and cultural attractions the tourers will attach to visit that place again and again. Also the tourist satisfaction increases if the people who live in that destination are warm welcoming and if there is a variety of food and beverages.

When evaluating the natural attractions and cultural attractions Jeyamugan [29] identified some motives which enchant the tourists such as pleasant climate, heritage ambience, being harmonious with nature, historical sights, archeological sites and monuments, natural features, convenient location

etc. Among them the pleasant climate, historical sights and convenient location have a better relationship with tourist satisfaction.

Quality food and beverages also plays an enormous role to attract travelers. According to Gnanapala [24], the tourists' perception and satisfaction has a positive correlation with the factors such as quality and taste of foods, quality and taste of beverages, variety of foods, reasonability of food prices, food serving methods and ability to eat tourists' favorite foods.

Among the factors like variety of cuisines, variety of restaurants, traditional food, availability of children foods, availability of foods for elderly people, tastiness of food served, temperature of food served, portions of food and presentation of dishes, a less interaction is shown by the variety of cuisines and variety of restaurants to the factor food and beverages [29].

e. Accessibility

Destinations should have accessibility. Because it is significant to attract tourists to the destination places. For that it needs some factors like good road network to reach the destination, affordable traveling cost, adequate information and documents about the destination, able to reach the destination without traffic congestions etc.

As stated by Baker and Crompton [23] the time and cost taken to transport to the destination is one of the foremost factors that influence for travelers' satisfaction.

Jeyamugan [29] identified some factors which affect for tourist satisfaction that directly connects to accessibility as road networks, rail networks, taxi services, ease of access, uncongested roads etc. There he has concluded that taxi services are less interactive with accessibility.

Tourists' perception and satisfaction can be measured by using the variables such as the quality, friendliness and responsiveness, communication skills, site explanations and ability to provide relevant information by tour guides [24].

f. Activities

If any destination has much of activities to engage in, then the tourers tend to visit that place very often. Therefore tourist satisfaction depends also on activities in the destination.

Relaxing and restful, availability of leisure activities, beach would be uncrowded, comfort for sunbathing in the beach [29] are some special activities in a destination. Nevertheless, Jeyamugan [29] examined that among the above factors only the relaxing and restful shows a positive relationship with the tourist satisfaction.

III. METHODOLOGY

This study is based on a cross-sectional design to gather primary quantitative data through a structured questionnaire. The methodology is focused on identifying the factors that influence the Western province domestic tourists' satisfaction in Hikkaduwa costal area. The study adopts a convenience sampling technique to generate a sample of 485 domestic tourists in Western province.

The operational methodology adopted for this study is a factor analysis which has three stages. First stage is the Exploratory Factor Analysis (EFA) to identify the major factors that influence the domestic tourists' satisfaction in Hikkaduwa. Second stage is the Confirmatory Factor Analysis (CFA) to confirm the identified major factors from the Exploratory Factor Analysis (EFA). Finally, the Structural Equation Model (SEM) to identify the relationships between the identified factors in the model. Further, the study includes the following hypothesis testing.

- Hypothesis 1 (H1): Accommodation (ACC) has a significantly positive effect on Domestic Tourists' Satisfaction (DTS).

- Hypothesis 2 (H2): Amenities (AME) have a significantly positive effect on Domestic Tourists' Satisfaction (DTS).

- Hypothesis 3 (H3): Attractions (ATT) have a significantly positive effect on Domestic Tourists' Satisfaction (DTS).

- Hypothesis 4 (H4): Accessibility (ACE) has a significantly positive effect on Domestic Tourists' Satisfaction (DTS).

- Hypothesis 5 (H5): Activities (ACT) have a significantly positive effect on Domestic Tourists' Satisfaction (DTS).

IV. RESULTS & DISSUSIONS

a. The demographic profile of the respondents

Districts, Gender, Ethnic Group, Marital status, Age, Economic Activity Status, Educational Level and Sector, were the demographic factors collected from the respondents which were taken into the consideration for the further analysis. The demographic factors are clearly described in the subsections given below.

Colombo district recorded the majority of the sample with 204 respondents (42.06%) while the Gampaha and Kalutara districts recorded 151 and 130 respectively.

According to the study 223 were females and 262 were males. The majority was males, representing 54.02% proportion of the sample and females represented 45.98%.

The most of domestic tourists were Sinhalese (62.27%). Other ethnic groups in the selected sample were Sri Lanka Moor (95, 19.59%) Sri Lankan Tamil (70, 14.43%), Indian Tamil (11, 2.27%) and Burgher (1.44%).

As per the frequency of age group of respondents mentioned in Table 2, respondents who ranged from age 25-29 years were recorded with a frequency of 92 out of 485 (18.97%) and this age group was the most responsive group to the survey. It can be identified 364 (75.05%) respondents ranged from age 20-44. It depicts that this sample is a combination of young and matured population. When considering about the marital status of respondents, the majority of the respondents were married and it was 301 out of 485 (62.06%), then 152 (31.34%) responses were collected from the respondents who are never married. The respondents who are divorced was 18 out 485 (3.71%), and other categories of marital status were recorded with fewer frequencies as 9 and 5 out of 485 and they are widowed and separated respectively.

Regarding the economic activity of the respondents, majority of the respondents (310 out of 485, 63.92%) are employed. Other 64 (13.20%) respondents were students, 47

respondents were un-employers (9.69%) and 28 and 36 respondents out of 485 were respectively engaged with other household work and pensioners.

The highest education level of the majority (227 out of 485, 46.80%) highest education level was G.C.E. O/L and 134 (27.63%) respondents with G.C.E A/L qualifications. Other respondents were with the qualification of grade 5 and below, grade 6-10 and degree and above categories were recorded with the frequencies of 27, 11 and 86 respectively.

"A visitor (domestic, inbound and outbound) is classified as a tourist (or overnight visitor), if her/his trip includes an overnight stay" [3]. Therefore accommodation is an essential segment of the tourism. 103 of the sample have chosen boutique villas as their accommodation place. Most of the respondents had visited Hikkaduwa more than two times. 27.84 percent of them had visited Hikkaduwa for the third time and 29 respondents had visited more than five times previously. 58 of the sample had responded it was their first visit to Hikkaduwa.

b. Factor Analysis

The exploratory analysis carried out in the literature review identified 24 factors that affect domestic tourists' satisfaction. This indicates that the results obtained from EFA for the 24 observed variables are reliable. CFA was conducted to verify the factor structure of the identified set of variables as shown in Figure 1.

Observed Variables	ACC	AME	ATT	ACE	ACT	DTS
Enough accommodations around the destination (ACC 1)	0.838					
Accommodation prices are affordable (ACC 2)	0.777					
Facilities in the accommodations are in best condition (ACC 3)	0.848					
Accommodations are safe and secured (ACC 4)	0.633					
Proper sanitary facilities in destination (AME 1)		0.804				
Ample parking spaces in destination (AME 2)		0.706				
ATM facilities are available around the destination (AME 3)		0.756				
Proper medical treatments and other emergency services are available (AME 4)		0.751				
Natural attractions in destination (ATT 1)			0.823			
Cultural attractions in destination (ATT 2)			0.800			
People who live in destination are warm welcoming (ATT 3)			0.524			
Variety of food and beverages in destination (ATT 4)			0.717			
Good road network to reach the destination (ACE 1)				0.627		
Traveling cost is affordable (ACE 2)				0.716		
Adequate information and documents about the destination are available (ACE 3)				0.809		
You can reach the destination without traffic congestions (ACE 4)				0.759		
Suitable atmosphere to relax on the beach & has boat ride facilities (ACT 1)					0.724	
Destination is safe to swim and do other water sports (ACT 2)					0.818	
Purpose is to attend the cultural events at the destination (ACT 3)					0.633	
Purpose is to visit Hikkaduwa National Park (ACT 4)					0.820	
You can gain the maximum satisfaction from this destination for the amount you spend (DTS 1)						0.707
This destination is having the best facilities (DTS 2)						0.817
The most satisfied destination among the other destinations in the country (DTS 3)						0.707
You are recommending this place to any other person (DTS 4)						0.791

Fig. 1: Rotated Component Matrix of the Accepted Model

According to Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, this study has a high sample adequacy, as the KMO value is 0.923. Therefore, degree of common variance of KMO value is perfectly predicted; confirming the acceptance of the modified model. The resulting six components explain 66.389% of total variance and were labelled as follows to explain all factors related to the underlying features of factors under each category. To measure the reliability of latent constructs, the Cronbach Alpha test was carried out, and it was more than 0.9 for each of the six components. Accordingly, it indicated that the results were highly reliable [34].
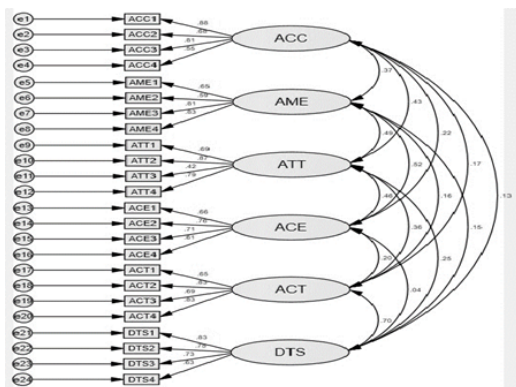

Fig. 2: Output from the Accepted Model of CFA

As shown in Figure 2, all factor loadings for the observed variables are averagely above 0.5. Higher loadings of variables suggest that tourists' perception towards satisfaction is influenced by Accommodation (ACC), Amenities (AME), Attractions (ATT), Accessibility (ACE), and Activities (ACT). For a model to be valid, the CMIN/DF value must be in the range of 1.0-3.0 [35]. Therefore, the accepted model is considered as the best fit model extracted from the CFA, with a CMIN/DF value of 1.838 and RMSEA value of 0.065. This indicates that the model has achieved the absolute fit. In addition, the model is identified as a valid model through achieving uni-dimensionality with factor loadings averagely greater than 0.5 for all observed variables.
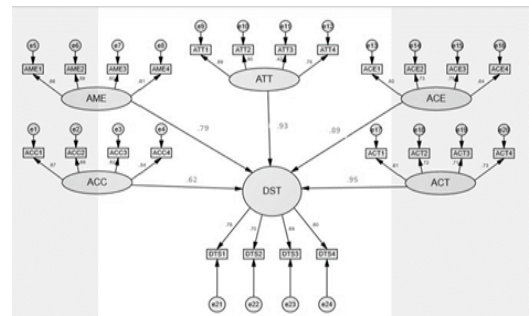

Fig. 3: Output from the Accepted model of SEM

The SEM was employed in order to identify the conceptual relationship as expressed in the aforementioned hypotheses. In the model CMIN/DF value of 2.528 and RMSEA value of 0.42. Hence the model is absolute fit because the CMIN/DF is within 1-3 and RMSEA value is less than 0.8. [35]. As shown in Figure 3, Accommodation (ACC), Amenities (AME), Attractions (ATT), Accessibility (ACE), and Activities (ACT) have a significantly positive relationship with Domestic Tourists' Satisfaction (DTS). As per the coefficient values, Accommodation (ACC) is impacting 62% for the Domestic Tourists' Satisfaction (DTS). Amenities (AME) are impacting 79% for the Domestic Tourists' Satisfaction (DTS). Attractions (ATT) are impacting 93% for the Domestic Tourists' Satisfaction (DTS). Accessibility (ACC) is impacting 89% for the Domestic Tourists Satisfaction and Activities (ACT) are impacting 95% for the Domestic Tourists' Satisfaction. According to the SEM, activities have a comparatively higher impact towards domestic tourist' satisfaction in Western province. As shown in Figure 3, the significantly positive relationships confirm that all the developed hypotheses are acceptable.

V.   CONCLUSION & RECOMMENDATIONS

This study mainly focuses on 5A's that influence Western province domestic tourists' satisfaction in Hikkaduwa. Literature Review identified five major variables that affect the Western province domestic tourists' perception. The EFA and CFA identified that all five variables in 5A's influence the Western province domestic tourists' perception and satisfaction in Hikkaduwa. The identified major latent variables

are Accommodation, Amenities, Attractions, Accessibility and Activities. The study found that Accommodation, Amenities, Attractions, Accessibility and Activities have a significantly positive impact on Western province domestic tourists' satisfaction in Hikkaduwa. However, the activities impact 95% on domestic tourists' satisfaction and it is the most crucial factor.

Finally, this study suggests encouraging the travel agents to introduce low budget tour packages for domestic tourists, publication of an accommodation guide, preparation of domestic tourist guide maps in Sinhala, Tamil and English languages, maintain the quality and hygiene of the accommodations and media promotional campaigns. In addition to that developing the destinations with more activities for domestic tourists would help the tourist industry service providers and governing authorities to increase the satisfaction level of domestic tourists in Western province and the future growth of the domestic tourism industry in Hikkaduwa. If domestic tourism industry is more stable, the tourism industry of Sri Lanka would not be terribly affected under any collapse in the international tourism.

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Use of ICT Supported Interventions for Occupational Stress Management: A Systematic Review of Published Studies

M.K.Weerasekara
Faculty of Computing
NSBM Green University Town
Homagama, Sri Lanka
manoja@nsbm.lk

P.H. Thilakarathne
Faculty of Computing
NSBM Green University Town
Homagama, Sri Lanka
pramudya.h@nsbm.lk

Abstract—**Problem: Occupational stress has become a key source of stress among the working population which has created numerous negative impacts on the community and of worldwide organizations, and they are expected to become a major health hazard in the forthcoming decades. Objective: This article aims at providing a systematic review and a descriptive evaluation of the interventions supported by ICT (Information and Communication Technology) for occupational stress management. Methods: A systematic review of three databases (Scopus, Web of Science and MEDLINE) was carried out using broad search queries and PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines were followed to ensure a transparent and replicable process. Results: This article provides a quantitative and qualitative description of 20 studies about occupational stress interventions supported by ICT. The following factors were considered for the analysis: the form of the intervention, the focus of the intervention, and efficacy of the intervention. Conclusions: The systematic review demonstrated that ICT supported stress management interventions are effective in most of the situation. It is also highlighted that a clear gap appears to exist between work-stress theories and ICT applications available for occupational stress management.**

Keywords—Occupational stress, ICT, Intervention, Digital, Mobile,Web, Efficacy

I. INTRODUCTION

Stress is a global phenomenon and a major healthcare challenge in the 21st century. Almost everyone is exposed to a wide range of pressures in both personal and work life. Some individual's cope very well with this pressure, on the other hand, some individual's find it difficult to manage the situation, and that is when individuals fall into the "stress".

Defining the term "stress" and categorization of stress type is a tedious task as the definition is uniquely personal. The term "stress" evolves after the 1920s and it is a form of the Middle English "destresse", derived via Old French from the Latin word 'stringere', "to draw tight" [1] Occupational stress is a branch of stress which is associated with one's work environment or job conditions. The imbalance of occupational "demand" and individual's "supply" will cause occupational stress; where high pressure, unrealistic goals, and expectations within the occupation does not match with an employee's knowledge, skills, and capacity. According to Vokic et al. [2], occupational stress is the nonspecific response of the body to any demand placed upon it. It is commonly believed that stress to a certain level is acceptable and considered positive. Whereas, the excessive amount of stress is considered negative or potentially harmful to both physical and mental wellbeing. Further, it is a physical and mental condition which has an impact on an individual 's productivity, effectiveness, personal health, and quality of work. According to the International Labour Organization, ineptitudes caused by occupational stress cost up to 10 percent of a country's Gross National Production [3]. At an individual level, occupational stress causes a negative impact on both work life and personal life affecting the quality and wellbeing [4]. Nowadays, stress-related disorders are a major public health matter in many countries and many organizations. This tends to increase in coming years. These disorders impact the economic and social environment of both individuals and organizations [5]. According to the analysis of three years'(2012-2014) worth of global Employee Assistance Programs conducted across Asia, Europe, Africa, North America, and South America covering more

than 100,000 employees revealed a significant increase in stress, anxiety, and depression [6]. Same survey data shows a dramatic increase in the number of employees who are reporting serious mental and emotional health concerns. Studies exploring the impact of work-related stress on organizational outcome have discovered forms of stress behavior affecting competitiveness, productivity, and the public image of the organization [7]. For example, besides the impact on workers' physical wellbeing, a poor psychosocial working environment contributing to work-related stress can result in increased absenteeism and presenteeism, as well as reduced commitment, motivation, and satisfaction, along with a greater rate of staff turnover and intention to quit [7].

Pestonjee [8] suggested three important aspects of life from which stress is originated, i) job and the organization, ii) social sector, and iii) intra-psychic sector. The job and organizational sector referred to the work environment. The social sector referred to the social and cultural context of an individual's life. The last factor, the intra-psychic encompasses things which were intimate and personal to an individual. The present study has focused on the job and the organizational sector. Human behavior within an organization influenced by many factors, such as physical, social and psychological. The type of relationship employee had with the organization was defined by the term "role." Every individual in the organization had an assigned role to play. Through the role has defined set of responsibilities where an individual interacted and got interacted with the system. Therefore, an organization can be considered a system of roles [9].

The interventions applied to occupational stress can be categorized according to their scale [10]: individual and organizational. Furthermore, the interventions can also be classified according to their purposes [10] such as identification, primary prevention methods, secondary prevention methods, and tertiary prevention or treatment. According to Schaufeli et al. [10], there are few well-designed studies concerning the intervention in occupational stress. Also, these studies have demonstrated that the interventions studied benefit only a reduced number of people and are carried out by an instructor/therapist in a physical location. The use of Information and Communication Technologies (ICT) can help to improve the efficiency of interventions, since it is possible to carry them out at a larger scale, regardless of time, place, or group of people [11]. In the same way, the

user can access information in a quick, easy, and confidential manner [12].

This review was motivated by the research undertaken for the design and development of ICT supported toolkit for occupational stress management. Thus, this study aims to answer the following research questions; 1. what is the form of intervention? 2. what is the focus of the intervention? And 3. What is the efficacy of the intervention? This article elaborated the outcome of a systematic review and a descriptive evaluation of interventions supported by ICT for occupational stress management.

II. METHODOLOGY

A. Approach: Systematic Literature Review

Systematic literature review uses "a systematic, explicit, and reproducible method for identifying, evaluating, and synthesizing an existing body of completed and recorded work produced by researchers, scholars and practitioners" [13]. This approach was initially developed for synthesizing medical research evidence, but then it is increasingly used in other fields, such as social and business studies [14]. In contrast to narrative reviews and scoping literature reviews, systematic reviews focus on specific research questions with narrow parameters called rubrics; the selection process is guided by a set of inclusion/exclusion criteria and extract data only from the included studies; all the included studies are evaluated for the quality using different set criteria, and derive conclusions on the evidence/findings relating to the initial research question(s) [15].

B. Search Strategy

During the systematic literature review process, a rigorous search strategy and inclusion criteria were used to obtain articles relating to ICT supported interventions for occupational stress management. Three international research databases (MEDLINE, Scopus, and Web of Science Core Collection), relating to health, technology, and social science disciplines were cross-examined on December 02 and 03, 2018 via Stockholm University library portal. To search for articles, keywords were identified under four main topics (Occupation, stress, ICT, and Intervention). The keywords used to represent occupation were: burnout, occupational, workplace, work-related, job-related. The keywords used to identify stress

were: stress and burn-out. The keywords used to signify ICT were: ICT, internet, mobile, web, informatics, digital, and computer. The keywords used to refer interventions were: intervention, prevention, therapy, and management. Based on the above keywords following complex search query was constructed: ("occupational" or "workplace" or "work-related" or "job-related") AND ("stress" or "burn-out") AND ("ICT" or "internet" or "web" or "mobile" or "computer" or "digital" or "informatics") AND ("intervention" or "management" or "therapy" or "prevention"). The search was limited to the abstracts, keywords, and titles of the articles. To ensure a transparent and replicable process, the PRISMA guidelines were followed [16].

C. Article screening, selection and quantity assurance

The broad search query was executed on selected databases (Scopus, Web of Science, and MEDLINE) and resultant article set was then screened in three iterations based on different exclusion/inclusion criteria.

At the first iteration, the following inclusion criteria were established: articles published within 2008-2018 in English language and published in journals or conference proceedings. To assure the quality of the articles master thesis, news reports, textbooks, and unpublished working papers were excluded. The resultant article set then screened to eliminate duplicate entries within three database search results. Microsoft Excel "Remove Duplicate" feature was used to eliminate duplicate entries from the result set. At the second iteration titles and abstracts screening was carried to eliminate articles that did not use ICT in the interventions or that did not focus on occupational stress. At the final iteration, articles were screened rigorously based on the content of the article. Following exclusion criteria were used for the final screening; 1: no full text or detailed methodology section available 2. Occupational stress is assessed as a minor part of large-scale mental health issues 3. Comparisons, evaluation, and reviews of ICT supported stress intervention 4. The technical aspect of the ICT intervention is discussed with no focus on evaluation. To the end of the third iteration resultant article number further reduced and the final selection was forwarded for final analysis. The selected articles adhered the set inclusion criteria; journal and conference papers in English published under the topic ICT supported interventions for occupational stress management within 2008 to 2018 period. Since no major discrepancies identified therefore selected 20 articles were forwarded for data extraction and thematic analysis.

D. Data extraction and thematic analysis

The author extracted information from all eligible studies using a structured Excel form containing the following headers: study authors, publication year; sample setting (the type of occupation in which the study was conducted, size of the sample); type of intervention used; study design; intervention delivery mode (the type of ICT used, duration of the intervention, support or guidance provided during the intervention); focus or scale of the intervention (individual, organizational, individual/organizational level); underpinning theoretical basis; and main findings (conclusions, comments).

The extracted dataset further analyzed in two main aspects; intervention used, and methodology adopted during the study. To analyze the interventions used in the studies, three rubrics were formed; 1. The form of intervention 2. The focus of the intervention and 3. Efficacy of the intervention. Each study was classified according to the treatment/therapy used (form), intervention level (focus) and the effect (efficacy) of the intervention compared with a control state. Next, to investigate the methodology implemented within the selected studies, three sub-questions were formed; 1. What is the methodology adopted during the study (sampling technique, data collection, and data analysis), two how they have implemented in the study and 3. Why this methodology was selected (purpose, advantages, and disadvantages). A three-level stress scale was designed to describe the efficacy of the intervention. The symbol "POSITIVE" was used to represent a positive effect of the intervention in stress; the symbol "NEGATIVE" was used to represent a negative effect, and the symbol "ID" was used to represent an indeterminate effect. The acronym "DNA" (Does Not Apply) was used for studies under development that did not give conclusive results, or that did not assess the effect of the intervention. These rubrics provided a convenient means of categorizing study findings to achieve the main objective and their intended outcomes.

III. RESULTS

1429 results were generated by the search strategy, and 789 titles and abstracts remained after applying exclusion criteria one at the first iteration.

Of these titles/abstracts then screened for duplicates. From resulted in 673 articles/titles, 470 was removed because they were not related ICT supported stress interventions for occupational stress management. After applying exclusion criteria, three at the third iteration another 176 were removed as they were discussing technical aspect of the intervention or reviews related to ICT intervention or stress is assessed as a minor part of a large mental health problem. After examining the full texts and excluding articles not appearing to meet the inclusion criteria, 27 publications remained. In summary, 20 publications representing 5 qualitative ([17], [18], [19], [20] and [21]) and 15 quantitative ([22]–[36]) studies were included in the final analysis.

A. General publication statistics

All the 20 qualifying articles were published within the last ten years (between 2008 to and 2017), peaking in 2016 when six were published. The majority (15 of 20, 75%) of the studies were conducted in 2013 to 2017 period. The interventions have been carried out in German (25%), Japan (20%), Sweden (15%), United States (15%), Finland (15%), Great Britain (5%) and Hongkong (5%). All the selected studies were published as journal articles.

B. General statistics of the ICT Intervention: Form, Focus, and Efficacy

i. The form of the Intervention

The form of intervention were analyzed using five sub rubrics; delivery mode, intervention technique, theoretical baseline, intervention period, and guidance/support rendered within the duration.

It was noted that the majority of the interventions were primarily delivered via the website (9 of 20, 45%). Six interventions were delivered solely via a mobile platform. While three studies delivered in a "blended" format using web/mobile and web/email platforms. Two other studies used only computer platforms.

Moreover, four interventions (20%) were adopted Cognitive Behavioral Technique (CBT), and two studies followed Mindfulness practices, and three other studies followed Acceptance-Commitment Theory (ACT). One study followed a combination of Mindfulness and CBT technique, and another study followed Behavioral Activation Treatment. Out of 20 studies, 9 followed different

program content related to the profession of the study population.

However, considering the underpinning theoretical model or framework followed during the intervention it is noted that majority of the interventions (12 of 20, 60%) did not follow any theoretical model or framework where only 40% followed a theoretical baseline. Lazarus's Transactional Model of Stress (TMS) was used in 3 of 20 studies. One study followed the Social Cognitive Theory. Other four studies did not follow any theoretical model or framework but referenced different concepts (self-efficacy, Serious gaming, and blended learning) in the delivery of the program.

Considering the intervention period, most of the studies (8 of 20, 40%) followed 6 to an 8-week duration where 20% of the studies followed 3 to 6 months period. One study was delivered within 7 days. The maximum intervention period is six months, and two studies have not discussed the intervention period.

Guidance and support from program facilitators or therapist were delivered through various modalities including e-mail, text message, phone call, support groups, e-coach feedback, and online forum moderation where the majority of interventions (12 of 20, 60%) delivered with minimal to moderate level support and guidance and eight studies did not indicate whether support or guidance received from the facilitators during the intervention.

ii. The focus of the Intervention

The focus of the intervention sub-themed using the following rubrics; the scale of intervention and target audience. To accurately illustrate the included literature, the scale of interventions described in these studies were categorized as "individual," "organizational," or "individual/organization interface" focused regarding their target strategy, based on a categorization proposed by De Frank and Cooper [1]. "Individual-focused" interventions support employees undergoing stress symptoms and provide them with knowledge and skills needed to cope effectively with their personal levels of stress. "Organizational" interventions address aspects of the working environment that may be stress-inducing. They generally aim to create a less-stressful friendly environment for employees.

Finally, "organizational/individual interface" interventions aim to resolve issues as these relate to interactions between employees and their organization, such as role conflict and person-environment fit [2].

According to the analysis, the majority (17 of 20, 85%) of the interventions focused on "individuals" aspects where 10% addressed organizational level, and 5% supported both organizational/individual interface

Study samples covered a variety of working environment including academics (20%), health sector employees (15%), technical/technological officers (10%), sales officers (10%), customer care officers (10%) and other working professionals (35%). Majority of the study settings established in western countries (e.g. Sweden, Switzerland, etc.) and one study was conducted in Japan working environment.

Individual-level interventions delivered via different types of modalities including web, mobile, email, computer-based or using blended approaches. Comparatively, organizational and organizational/individual interfaces were catered only with web platforms. All the organizational level interventions followed specific training programs related to their work environment than practising standard CBT or Mindfulness programs. At the organizational/individual interface, web forums were used to facilitate two-way discussions whereas individual-focused interventions used CBT, Mindfulness programs, Behavior Activation Treatments, ACT or combination of CBT and Mindfulness programs.

iii. Efficacy of the Intervention

From analyzing the efficacy of interventions, it was noted that 15 out of 20 studies (75%) had a "POSITIVE" effect on occupational stress, three studies had "NO EFFECT," and two studies did not apply because they did not measure the impact of the intervention.

Among the interventions supported by Web technologies, 66.67% (6 studies) had a positive effect on the occupational stress; 33.33% (3 studies) had a no effect on the stress levels of the employees. From the interventions delivered via a mobile platform, four studies out of 6 had a positive effect, and two studies did not assess the effect of the intervention. Interventions delivered using a blended approach; web and mobile platform had a 100% positive effect on occupational stress. For the interventions supported by computer platform (2-studies based on standalone software applications) yields 100% efficacy.

Considering the focus of the intervention, studies which had "individual-level" focus marked 82.35% positive effect and 5.88% did not affect occupational stress level. The interventions targeted both individual and organizational level (only one study) had 100% positive effect and interventions targeted only organizations recorded no effect on the stress levels.

The interventions followed CBT, Mindfulness techniques, and Behavioral Activation Treatment techniques had a 100% positive effect on occupational stress level whereas blended approach on CBT and Mindfulness study did not assess the effect of the intervention. The ACT enabled interventions recorded 66.67% (2 studies) positive effect on the occupational stress level.

The ICT supported interventions guided by a moderator/facilitator or a therapist, had a 75% (9 of 12) positive effect on occupational stress level while unguided/unsupported interventions resulted in 62.5% positive effect.

IV. DISCUSSION

The results of the present studies are also consistent with those of previous studies regarding major work-related stressors, effects of stress on health and stress management strategies. But considering the sample size and selection strategies occupied during the study limits the transferability and generalizability of the findings beyond the study environment.

Majority of the studies followed Randomized controlled trials (RCTs) approach. RCTs are the type of field experiment in which effects of treatment is measured in trials involving comparisons between experimental and control group. Selected approach is a key strength of this type of studies as RCTs are considered as the gold standard for research design in medical and health research concerned with health interventions.

All interventions except those carried out by Leung et al. [18], Kawakami et al. [36], and [35] were focused on participants individually, which in turn is consistent with reports by Shaufeli [10]: "the majority of interventions in burnout are carried out on an individual basis." It is also noted that interventions yielded a significant level of efficacy

when the study is involved in participants with recognized high-stress scores when persons who take responsibility for the treatment benefit more from unguided interventions. When considering the focus of the intervention respondents prefer tailormade treatments than following generic activities[17]. It is also noted that sending frequent, daily notifications may enhance exposure to intervention content without deterring continued engagement. These are major design concerns that need to focus on the design stage of the ICT intervention.

A clear gap appears to exist between work-stress theories and available ICT interventions for occupational stress management. It is also noted that no proper evaluation mechanism is available to measure the effectiveness of the ICT intervention. Thus, further research efforts are necessary to fulfil this theoretical and empirical gap.

V. CONCLUSION

This article described the state of the art of recently published studies related to interventions on occupational stress management based on ICT. Based on the evidence, it can be considered as a guide for the design, development, and evaluation of future interventions.

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Vygotsky's Sociocultural Theory In The Context of Synchronous Computer Mediated Corrective Feedback

W A P Udeshinee
Department of Computer and Systems Sciences
Stockholm University
Stockholm, Sweden
piyumi@dsv.su.se

Ola Knutsson
Department of Computer and Systems Sciences
Stockholm University
Stockholm, Sweden
knutsson@dsv.su.se

Sirkku Männikkö-Barbutiu
Department of Computer and Systems Sciences
Stockholm University
Stockholm, Sweden
sirkku@dsv.su.se

Abstract— **This paper reviews two major theoretical principles associated with sociocultural theory (SCT), which was introduced in the writings of early Soviet Psychologist, Lev Semyonovich Vygotsky. Vygotsky's sociocultural theory has widely been used in the second language acquisition research. His theory proposes four main domains that are supportive in language acquisition: mediation, genetic method, internalisation and Zone of Proximal Development. This paper will only focus on the notions of Mediation and Zone of Proximal Development. Mediation means the involvement of a third factor (mediator) into the interaction between two objects, events or persons. Zone of Proximal Development is defined as the distance between a child's actual development level as determined by independent problem solving and the potential of development as determined through problem solving guided by an adult or other more capable peers. According to Vygotskian theory, maturation and direct interaction of a person with the environment is not sufficient to develop higher mental functions, so that an intentional mediation is necessary. Therefore, computer mediated corrective feedback could play the role of intentional mediation to develop language skills of adult learners of English. However, mediation and zone of proximal development have not been much discussed in the context of computer mediated corrective feedback. Therefore, this paper will discuss the potential of corrective feedback through chat conversations in the light of mediation and zone of proximal development.**

Keywords— Sociocultural Theory, Mediation, Zone of Proximal Development, Computer Mediated Corrective Feedback

I. INTRODUCTION

During the past few decades many studies were conducted to explore how a second language could better be taught. So, second language acquisition research has had different shifts of focus throughout the past few years. The focus was on the role of the teacher, role of the student [1] and recently focus has also placed on the role of technology[2].

The point of departure for this article is the Vygotskian notion that the knowledge is social and created in collaboration[3] and that learning is mediated[4]. Sociocultural theory has been the focus of many researches on computer mediated communication due to these traits. A timeline that was published by Lantolf & Beckett [5] using 48 publications indicates that these researches focus on several key concepts that the theory encompasses: zone of proximal development, dynamic assessment, private speech, internalization, regulation, activity theory, and the genetic method. However, there is hardly any research on computer mediated corrective feedback (CF through chat conversations) that has been discussed in the light of sociocultural theory. Therefore, this article intends to discuss the potential of CF through chat conversations using sociocultural theory.

A. Introduction to sociocultural Theory

Sociocultural theory which was introduced in the writings of Soviet Psychologist, Lev Semyonovich Vygotsky is a very popular theory in the second language learning scholarship. This theory has been discussed in different names in the literature and even Vygotsky does not seem to have

used the term in his writings[5]. It is Wertsch who has coined the name "Sociocultural Theory" in his essays to distinguish this theory from other similar concepts and theories[6][5]. This theory has been interpreted by various scholars in different ways specially because Vygotsky's writings have been translated to many languages and that resulted in different scholars interpreting them in different ways.

Vygotsky's sociocultural theory is grounded in collectivity rather than individuality. This concept would be a result of his exposure to the social context that he was born to. He was born in 1896 when the country was soon to witness Russian Revolution. That was an era which brought hope to many people for a more egalitarian society [7]. A R Luria, one of Vygotsky's colleagues put that thought into words in the following manner (cited in Lantolf et al., 2018):

"The limits of our restricted, private world were broken down by the Revolution, and new vistas opened before us. We were swept up in a great historical movement. Our private interests were consumed by the wider social goals of a new, collective society . . ." [7, p. 2].

Sociocultural theory was the result of Vygotsky's attempt to lay the foundation for a theory that helps understand how to approach the higher level of human thinking and development with the support of collective effort.

B. Understanding language learning using Sociocultural Theory

Sociocultural theory also discusses the concept that the action is mediated and that it can't be separated from the milieu in which it is carried out[8]. Thus, it is understood that learning is also not independent, but mediated, and it cannot be separated from the social environment. According to Vygostskian Sociocultural theory, learning can happen in three ways: Genetically, with the impact of the social life and with mediation of tools and signs[8]. In terms of second language acquisition, learning a second language does not happen genetically, so it must be mediated by either social life or some tools, or both. Here comes the importance of corrective feedback since it can play a significant role as a form of mediation in second language acquisition.

Ellis et al.[9] has simply defined Corrective Feedback in second language (L2) learning contexts as 'responses to learner utterances containing an error' (p.340). In sociocultural theory, what Vygotsky tries to confirm is that higher mental functions cannot be adequately developed only by maturation and direct interaction of a person with the environment, so some form of external, intentional mediation is necessary[4]. Thus, the corrective feedback given by the teacher in the chat conversations could fulfill this requirement to development. Here, the corrective feedback given by the teacher could become the intentional mediation and chat conversations could create the external collaborative environment which has been highlighted by Vygotsky.

As Kozulin [4] mentions, Vygotsky's idea was that in one's native language, the primitive aspects of speech are acquired before the more complex ones. With a foreign language, the higher forms develop before spontaneous, fluent speech. A child's strong points in a foreign language are his weak points in his native language and vice versa. In his native language, he is fluent in the language and can use most of the grammar rules appropriately though he doesn't realise what they are and the rules behind them. However, in terms of a foreign language he realises the grammar rules that construct the language before starting to communicate fluently in that language. Another challenge in learning a second language is that spontaneous knowledge of language gained through L1 acquisition often clashes with the requirements of studying an L2. For an example, in Sinhala, there are only 3 tenses: past, present and future whereas in English, there are 12 tenses that the learner has to master in; so, they cannot compare the tenses of the two languages with each other to make the learning process easy. This is where as Vygotsky emphasizes, instruction comes into play. Since learners learn the language (not acquire the language), instruction is mandatory to improve.

Children use words appropriately much earlier than they understand their full meaning[4]. As an example, when a child learns the term, 'dolphin', she may interpret it as a big fish whereas the real meaning is 'aquatic mammal'. This is applicable for children who are acquiring their L1, so is for adults who are learning their L2. This is why authentic L2 instruction in pragmatic situations is more supportive than making learners memorise simple word lists. So, chat conversations could create that pragmatic situation where authentic L2 (second language) instruction could be given in the form of corrective feedback.

II. MEDIATION

Mediation can be considered as the focal point of sociocultural theory[6][4]. Mediation is the "involvement of a third factor into the interaction between two objects, events or persons"[4]. This third factor could be a result of participating in a cultural activity such as manufacturing a product, educating children, playing a sport, etc. or using cultural artifacts such as books, newspapers, computers, software etc. or encountering cultural concepts such as time, person, family, law etc.[6]. These mediators could be in the form of objectives, symbols or persons[10]. Objectives could be computers, books, social media, chat conversations, etc. and symbols could be the language while persons could be the parents, teachers, interlocutors, etc. In a psychological sense, mediation affects the formation, development, enhancement or deterioration of human mental functions.

The quality of the language environment and the quality of the mediation provided by the parents play an important role in turning children's speech into a tool of their oral communication. And in this process, if a wrong form is internalised, it would be difficult to eliminate it from the mind. I believe that such errors could become fossilised in the mind and language teachers have to make strenuous efforts to eliminate such errors.one way of eliminating such fossilized errors would be to provide the learners with corrective feedback.

This mediation can occur in three ways: via symbolic tools, via human mediation and via specially designed learning activities[4]. This human mediation can occur when teacher is chatting with students and when giving corrective feedback to erroneous utterances. Further, specially designed learning activities that can be implemented through chat conversations will also act as intentional mediation which is emphasized in Vygotskian theory. As Thorne[11] mentions, the design of the tool, i.e, the activity in this case, is also important to make the mediation effective. Thus, the mediation of the teacher, corrective feedback and the chat conversations could play a significant role in improving learners' language skills.

III. ZONE OF PROXIMAL DEVELOPMENT

Zone of proximal development could be misunderstood by people assuming that it is a synonym for scaffolding; assisting someone to learn something[12]. Vygotsky introduces the notion, Zone of Proximal Development which is (cited in Holzman, 2018) "the distance between a child's actual development level as determined by independent problem solving and the potential of development as determined through problem solving guided by an adult or other more capable peers"[13, p.44]. Thus, Vygotsky argued that instructions should be based on the potential of development rather than the actual development.

Holzman[12] argues that through the notion of Zone of Proximal Development, Vygotsky wanted to discuss the psychological development, not learning. He further argues that if Vygotsky wanted to discuss learning, he would have named it as Zone of Proximal Learning (ZPL) instead of Zone of Proximal Development(ZPD). However, I think ZPD is a notion that can also effectively be used in second language learning because the teachers should be well aware of the learners' ZPD if they wish to improve the language skills of the students.

Vygotsky is against the idea that learning follows development. He argues that development should follow learning and that there is no point in providing instruction if it does not become a source for development. Instruction has to lead development and should help the learner explore new formations. He also mentions that only instruction which is useful in childhood is that which "moves ahead of development, that which leads it …pushing it further and eliciting new formations"(Cited in Holzman, 2018)[13, p.43]. in the same way, instructions should help the second language learner explore new formations of the language and use them.

ZPD has captivated the attention of many scholars due to several reasons: assisted performance which is the impetus behind the Vygotskian writings, and the fact that it discusses the achieved development and potential of development[6]. ZPD is now used in the second language learning scholarship to discuss parent-child interaction, teacher-student interaction, peer interaction environments and individual and collective interactions with artifacts.

As slightly mentioned above, there are contentious debates in the scholarship on what ZPD really is and on the relationship ZPD has with scaffolding, assisted performance and Krashen's i+1 hypothesis[6]. There is an argument in literature whether ZPD is the same as Krashen's i+1 hypothesis. Krashen's i+1 hypothesis means that the learner should receive an input which is one stage above his current level[13]. But ZPD means the gap between the learning an individual can achieve

without any mediation and the learning he/she can achieve with the mediation. This mediation could be a teacher or a more capable peer. It is also argued that ZPD is used synonymously with scaffolding which means the support that an adult, mostly the teacher can give for the learner's improvement. But in ZPD, it is not just about supporting the learner; the teacher has to understand the ZPD of the learner and support development.

Holzman[6] considers ZPD not as a zone but as an activity. He claims that knowing is doing an activity that is created by people together rather than individually. For instance, a child tries to pretend that she is a mother and play with a doll. Here, the child is trying to do something that she is not. So, it is understood that this phenomenon, ZPD is being played by children unbeknownst to them. Vygotsky also argues that children learn through imitation and mimicking. Further, he emphasizes that when imitating they do not imitate anything and everything, rather they tend to imitate the things that are beyond them. There creates the ZPD of the child which helps them to achieve development (Vygotsky, 1978 cited in Holzman, 2006)[12].

In terms of first language acquisition, each and every child is exposed to the ZPD. Infants are exposed to the conversations of adults before they start speaking. Thus, the ZPD is created. In terms of second language acquisition, especially in the case with adults, this would be very similar to the context where a child is acquiring their first language. Learner is exposed to the other fluent speakers' conversations in his target language. Thus, in this context, the teacher has a very significant role in understanding the ZPD of learners, and authentic situations must be created as much as possible in order to make the learner receive the language input without his knowledge. What I mean is the learner should learn the langauge without making strenuous efforts; he should not be feeling that he is learning a language.

In the same way, when the learner is given corrective feedback, he should not really feel that his grammar is corrected. It has to happen in a very casual manner and I believe that chat conversations, since it is very close to people as a communication means, would be able to fulfill this requirement of exposing the learner to the correct language use in a casual and informal manner.

Holzman[12] discusses the way a child is creating ZPD using the following example:

Child: Coo-coo!

Adult: Want to a cookie?

Child: Mama

Ault: Yes, mummy's giving you a cookie.

Child: Mama cookie.

Thus, the child is exposed to the accurate complete sentences. What I argue is that in the same way, a teacher could provide the correct usage of the language to the learner in the chat conversations. As Schmidt[14] emphasizes, the noticing is also very crucial if the learner needs to correct their mistakes. Thus, it is clear that corrective feedback through chat conversations can let the adult learner notice his language erorrs. As an example, the following conversation between the teacher and the learner could be similar to the conversation mentioned above which happened between the adult and the child.

Learner: I was go to the temple yesterday.

Teacher: you went to the temple?

Learner: Yes, I went to the temple. Because it is a Poya day.

Teacher: Yes, it was a Poya day yesterday.

Here, the learner's level and the level that the learner can achieve are explicit here. Since this revelation happens through a chat conversation (not in public), this could help the learner to get away with inhibitions and the chat platform will give the opportunity for the less vocal to express themselves[15].

IV. SOCIOCULTURAL THEORY IN COMPUTER MEDIATED COMMUNICATION

Computer mediated communication (CMC)which supports human interaction via computer technology has achieved a significant place in today's communication specially due to its interactive and social nature [16][2][17]. Leow[2] argues that the most productive platform for language learning would be the platform where the learner can be exposed to the target language and be able to process the language simultaneously. Thus, synchronous computer mediated corrective feedback could be "effective in providing a lower anxiety communicative environment for students who find oral production in a second language classroom stressful"[18] (p. 213).

Warschauer[19] argues that CMC helps collaborative learning and proposes five features

that make CMC different from other communication means: text-based and computer-mediated interaction, many-to-many communication, time and place independence, long distance exchanges, and hypermedia links (p.470). He also posits that text mediated tools support collaborative learning by giving access to expression and interaction. According to Vygotsky, learning and development happen as a result of intended action mediated by various tools [19]. He also emphasizes on the importance of collaborative learning among peer learners or between teacher and learners because it will help the learner to improve through zone of proximal development. Kroonenberg's study[20] finds out that chat platform benefits the learners in several ways: it provides rapid interaction, closer attention to the text (time to reflect), and helps learners to be more expressive (especially the ones who are timid in oral communication). Thus, it is understood that there is a potential for the collaborative learning and intended learning to take place in the learning that occurs in chat conversations.

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V. POTENTIAL OF CORRECTIVE FEEDBACK IN CHAT CONVERSATIONS

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It is also said that learning is a goal directed activity, and the quality of such activity plays a significant role in development of learner's performance[12]. Further, sociocultural theory posits that if the psychologist is to understand the child's development, they must consider not only the actual level of development but the zone of proximal development[12]. This could be applied to second language learning. There should be a quality in the activities designed by the teacher to improve the language skills of the learners and also the teacher has to be aware of not only the learner's actual development but also the zone of proximal development.

The theory further argues that learning/instruction is not something which follows development, but something that leads development[12]. So, it is understood that there is a potential for corrective feedback to lead development. Vygotsky also discussed the psychological development of children with special needs. He argued that such children should not be segregated and kept with the similar children but should be mixed with the others who are more capable if they need to go through the learning-leading-development process[6]. I believe this concept is well applicable for the second language learning process as well since the learners with less

fluency should be exposed to the other learners with more fluency if they are to improve their language skills. This could be easily done through chat conversations among peer learners.

As Kormos (2011) finds out, many learners are quite aware of the proper L2 form but are unable to retrieve it in real time. Therefore, the process of internalisation acquires an important additional dimension- not only the proper L2 forms and their use of conveying meanings should be internalised, but their retrieval and conversational use should become automatic. Chat conversations should be able to support internalization of correct grammar forms and also be able to make the conversations automatic and impromptu.

In the context of Sri Lanka, learners of English have a love-hate relationship with the English language[21]. Although they desire to learn the language, they hate learning it because they do not have the confidence to speak it especially due to the anti- English -sentiments that prevail in the society towards English language and its speakers. In this scenario, there is potential for the chat platform to provide the learners the opportunity to converse in English without anxiety. Because of the anxiety level of most of the English learners in Sri Lankan, there should be a mediation which helps reduce this anxiety. Corrective feedback could be an effective mediation to improve the language of adult learners, but it could create anxiety among learners[22]. However, if the corrective feedback is given through chat communication, it will help the learners to get away with the anxiety[23]. At the same time since chat conversations are very similar to the oral communication[15], it will help improve learners' oral fluency. Therefore, I argue that chat conversations could be a better platform to give corrective feedback to the learners.

Thus, it is clear that if corrective feedback is given through chat conversations by teachers, learners will be able to improve their language skills because they receive authentic L2 instructions in a pragmatic situation with the support of a deliberate, intended activity in a collaborative environment through his/her zone of proximal development.

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Protection of Copyright Owners & Authors Rights in the Internet: A Comparative Analysis of IP Law in Sri Lanka and European Directives

Isuru Sri Bandara Nishshanka
Faculty of Computing
NSBM Green University Town
Homagama, Sri Lanka
ibandara4@gmail.com

Aparrajitha Ariyadasa
ATD Legal Associates
42 Galpotta Rd
Sri Jayawardenepura Kotte, Sri Lanka
aparrajitha@gmail.com

Abstract— **Protection of copyright of original intellectual Creations has become an uphill task under the prevailing highly connected and complicated global environment with the digitalization and the internet. This paper scrutinizes the effectiveness of the copyright protection of the current legal regime in Sri Lanka in a comparative analysis with the European Union Directives in order to seek the answer for the research gap to conclude whether the Sri Lankan Intellectual Property (IP) regime is sufficient to safeguard the rights of the copyright owners and authors with the rapid involvement of the internet. This study is expedient due to lack of investigation in the Sri Lankan academia. The exploration rested on secondary sources and data was analyzed by a qualitative approach. Materials included national and international legislation, academic and media data. The study stood on the comparative legal analysis, integrated legal interpretation and modeling. In addition to that, key informants in the field were interviewed as a supplementary primary source of information. The research findings suggest the free riders are exploiting the existing loopholes of the legal systems and law enforcement areas. Therefore, a special emphasis should be paid to the protection of intellectual property rights on the internet. The article identifies major approaches in legislation and practice on EU regulations and explores a number of current options: IP enforcement as a harmonized and regulated or not regulated by separate rules of law, Digital Single Market etc. The research findings laid grounds for preliminary recommendations on legal drafting with regard to IP status as that of harmonized and autonomous legal personality. It could be concluded that the Sri Lankan IP Legislation consist of many lope holes to safe guard their copyright of the Owners and Authors due to**

the territorial nature of enforcement, lack of harmonization and lack of proper regulations and awareness. In order to prevent those problems, it is suggested various options such as development and amendments of the national legislation, introduce IT-IP regulations, introduction of the data privacy Act etc. further research could be recommended to discover the challenges for IP law in artificial Intelligence.

Keywords— *IP, Internet, Economic Rights, Moral Rights, EU Directives, Digital Single Market*

I. INTRODUCTION

Copyright law is seeking to strike a balance between the rights of the creator and the copyright owner to manage and protect their businesses and work. Currently, copyright has become increasingly important, particularly in terms of accurately ensuring the source of information. The Internet has allowed the consumers across the globe to access information easily and with few boundaries. Yet this tool has also allowed the consumers to access and reproduce works without adhering to copyright requirements. How has the copyright law dealt with this problem and how can it seek to alleviate the boundaries set by internationality? And how is the Sri Lankan law support for the copyrighting laws locally and internationally. It is sad to mention that, the violation of the legitimate rights of the copyright owners has been gradually increased. Overall looking at EU laws, Laws of the EU are updated with the technological development and digitalization which was finally enacted with Intellectual Property Act No. 36 of 2003. The misappropriation of property rights

would challenge the interests of the owners who devoted their skills, interests and labor to create that work with a financial motive. The primary objective of this research is to identify, Explore and analyze the changing nature of the challenges on copyrights and related rights in an era of digitalization. Currently, Intellectual Property plays a main role as a valuable intangible asset in digitalizing and developing world. It is mostly focused on the originality of ones work under digitalizing and developing technology (Inventions, computer applications, art, scientific inventions, etc.). Almost all the developing and developed countries are trying their best to protect the original work within their countries and outside due to the importance of their work. In order to overcome these problems, legal academia have been strengthened accordingly addressing the originality of the work. This article scrutinizes copyright laws in Sri Lanka to explore whether the Law is effectively responding challenges that are posed by the internet and digitalization, comparative to EU copyright law. Therefore, copyright and related rights can be considered as a one of the most important intellectual property rights which should be achieved. In order to reach the answers to the research problem, it is hereby questioned the Laws of Sri Lanka to protect copyright owners and authors, EU directives and the Comparative analysis to make recommendations and suggestions. Aims and objectives of this article is to understand whether the Sri Lankan Legal regime is sufficient to address online piracy of copyright. In order to reach the said aims and objectives, primary sources such as statutes and EU directives as well as secondary sources are used as methodology in this article. This research is limited to compare the Directive (EU) 2019/790 of The European Parliament and of The Council of 17 April 2019 on copyright and related rights in the Digital Single Market and amending Directives 96/9/EC and 2001/29/EC with the Intellectual Property Act No.36 of 2003.

II. LITERATURE SURVEY

If economic losses are an indication of a crime's seriousness, and if current estimates are to be believed, then film piracy constitute a crime wave nearing epidemic proportions [1]. Apart from that, Danahar B., Smith M.D, Telang R. in 2019 discuss whether file sharing displaces sales of media goods and then discuss whether such displacement will lead to reduced incentives to produce new creative works. They continue by summarizing recent findings on what businesses can do to compete with piracy and the effectiveness of antipiracy interventions on encouraging consumers to migrate from illegal to legal consumption channels. It was concluded by demonstrating that without additional empirical evidence, it will be difficult to determine the socially optimal set of strategies and government copyright policies in the digital era [2]. Choy D.Y Perez A, 2007 describes that online piracy has shown to be an important source of technological and strategic innovation to both industry incumbents and newcomers. They describe the evolution of pirate technologies and the associated online communities. Then, it examines the processes by which pirate technologies and communities have stimulated innovation and the creation of pirate as well as legitimate business models and conclude with some suggestions by which incumbents and entrepreneurs may deal with and take advantage of piracy. Online piracy has had and is likely to continue to have a large impact on the fast-changing media and software industries. Given the irrepressible growth of piracy communities, legal battles, while necessary, may be limited in their effectiveness. An alternative for both incumbents and entrepreneurs may be to view online piracy as a source of innovation that has been lacking in the traditional media sector. [3] Chaudry. P et el., 2011 addresses the increased willingness of younger generation towards pirate goods in the internet has led the academics to suggest new antipiracy technologies. [4] Batch. D, 2004 in his article concludes that more work on the intricate interplay of technology, business strategy, and public policy in necessary, particularly in the highly dynamic field of digital media could be suggested in order to reduce online piracy [5]. Jayawardena D.S.R. & Chandrathilake M.A.N. 2010, Investigated on the Sri Lankan Legal Regime and concludes that Ignorance and mis-understanding about the copyright Law, encouragement of infringement in Internet platforms and the existing "Doctrinal" approach to derivative work create overlap in the " idea/ Expression" dichotomy and require new approach to deal with digital environmental conditions. Law fails to provide justification for

the additional protection provided to the computer programs in comparison to other creative work. [6]

With the development of internet and the technology copyright laws are extend to the IT field as well. Discussing about Copyright law related to IT one of the most effective internationally recognized Copyright law is Europe union law."Coherence has become particularly crucial in the EU's cyber security policy because, for a long time, its governance was highly scattered, with relevant actors working independently from each other in areas as distinct as law enforcement, critical information infrastructure protection, and defense. The continued pursuit of policy coherence, coupled with the sustained increase in attacks on critical information infrastructures and on personal and commercial data, led the EU to further reinforce its new role by publishing its first cyber security strategy in 2013 (European Commission and HREU, 2013)." According to Helena Carrapico & Andre Barrinha (2018) Europe Union Cyber Security law is more practical implementation to the law enforcement. Acording to Dr.Kanchana kariyawasam, Dr Chamila Thalagala and Dr. Althaf Marsoof() reasearch article "As identified by many research studies,1 "the present copyright law in Sri Lanka is an impediment to public access to knowledge, which is a prerequisite for a knowledge-based economy.

The stringent and unbalanced manner in which copyright owners rights are protected under Sri Lankan copyright law makes it highly doubtful whether the law caters to the current needs and interests of Sri Lanka and whether it supports the Government's aspirations of moving towards a knowledge based economy." So there is a doubt whether this IP law can protect the copyright owner's right in knowledge-based economy. For this situation already Europe union have introduced many directives to IT field because knowledge-based economy rest upon top of the IT field because all the knowledge is share via internet or as computer programs.

III. COMPARATIVE ANALYSIS OF IP LAW IN SRI LANKA AND EU COPYRIGHT DIRECTIVES

The main objective of the Directive (EU) 2019/790 Of The European Parliament and of the Council of 17 April 2019 is that to make a harmonized legal framework which contributes to the proper functioning of the internal market, and stimulates innovation, creativity, investment and production of new content, also in the digital environment, in order to avoid the fragmentation of the internal market. It further discusses about cross border use of the Copyrightable work. In particular, but not only, as regards the dissemination of out-of-commerce works and other subject matter and the online availability of audiovisual works on video-on-demand platforms, with a view to ensuring wider access to content. It also contains rules to facilitate the use of content in the public domain. In order to achieve a well-functioning and fair marketplace for copyright, there should also be rules on rights in publications, on the use of works which totally contrasts with the Sri Lankan IP Act and the objectives of the said Act has no clue with the inventions of the internet (Article 1-5).

Moreover, other subject matter by online service providers storing and giving access to user uploaded content, on the transparency of authors' and performers' contracts, on authors' and performers' remuneration, as well as a mechanism for the revocation of rights that authors and performers have transferred on an exclusive basis. Apart from that the Directive promotes academic research through internet while securing rights of the authors while safeguarding the cross-border involvements. It seeks a fair balance between the authors and other right holders while Sri Lankan Authors rights are limited to black letters which were dr4afted in the 2003 giving a territorial nature to the enforcement (Article 8).

However, in the Union, confronts text and data mining companies in order to protect data and insist them to obtain the authorization of the Authors and the Authors are highly safeguarded from text and data mining of content. In certain instances, text and data mining can involve acts protected by copyright, by the sui generis database right or by both, in particular, the reproduction of works or other subject matter, the extraction of contents from a database or both which occur for example when the data are normalized in the process of text and data mining. Where no exception or limitation applies, an authorization to undertake such acts is required from right holders (Article 9).

EU Directives specifically elaborates the fair use of copyrightable work by giving the loop hole to data mining companies while Sri Lankan Law doesn't utter a word about digitization and data

mining. Even though the fair use exception is elaborated in the IP Act, it doesn't specify the digital data and Work.

License of material to harmonize the scope of the new mandatory exception or limitation in relation to digital uses and cross-border teaching activities, the arrangements for implementation can vary from one Member State to another, to the extent that they do not hamper the effective application of the exception or limitation or cross-border uses of the content. Sri Lankan Law being a territorial Law, is therefore been unable to address Cross border Piracy of Digital Work.

EU Directives forces the Member States to provide for an exception to permit cultural heritage institutions to reproduce works and other subject matter permanently in their collections for preservation purposes, for example to address technological obsolescence or the degradation of original supports or to insure such works and other subject matter. Even though Sri Lankan IP Act protects Folklore by its section 6, there have not been mechanisms suggested to protect rights and licensing mechanisms to secure them. The provisions on collective licensing of out-of-commerce works or other subject matter introduced by this Directive might not provide a solution for all cases in which cultural heritage institutions encounter difficulties in obtaining all the necessary authorizations from right holders for the use of such out-of-commerce works or other subject matter.

EU Directives strongly suggest Member States should ensure that appropriate safeguards are in place to protect the legitimate interests of right holders that have not mandated the organization offering the license and that those safeguards apply in a non-discriminatory manner. Even though IP Act safeguards owner and authors by way of the Section 9 and 10, there is no proper mechanism stipulated in the Act.

Video-on-demand services have the potential to play a decisive role in the dissemination of audiovisual works across the EU. However, the availability of such works, in particular European works, on video-on-demand services remains limited. Agreements on the online exploitation of such works can be difficult to conclude due to issues related to the licensing of rights. Such issues could, for instance, arise when the holder of the rights for a given territory has a low economic incentive to exploit a work online and

does not license or holds back the online rights, which can lead to audiovisual works being unavailable on video-on-demand services. Other issues could relate to windows of exploitation (Article 51).

It is addressed that online content-sharing service providers perform an act of communication to the public or of making available to the public when they give the public access to copyright protected works or other protected subject matter uploaded by their users. (Article 64). It is appropriate to provide for a specific liability mechanism for the purposes of this Directive for cases in which no authorization has been granted (Article 66). Apart from that, Enforcement mechanism of the National laws should be in compliance with the EU Law. In contrast, the IP Act is silent on the online content sharing even though it protects literary work by way of Section 06 of the IP Act and also the territorial nature of the enforcement of copyright law (Section 120) has become a barrier in taking actions against infringement of online content. EU Suggests strong assessment criteria for the owners of copyright online content-sharing service provider has made its best efforts in accordance with the high industry standards of professional diligence, account should be taken of whether the service provider has taken all the steps that would be taken by a diligent operator to achieve the result of preventing the availability of unauthorized works or other subject matter on its website, taking into account best industry practices and the effectiveness of the steps taken in light of all relevant factors and developments, as well as the principle of proportionality. (Article 66). Sri Lankan Law is totally silent about the content providers and it doesn't speak about the intermediary liability.

The rules provided for in EU Directive are intended to take into account the specific case of start-up companies working with user uploads to develop new business models (Article 67) and online content providers should be transparent with right holders. (Article 68) apart from that, EU has been elaborated the fair use exemption on the contents of on-line service providers. (Article 69, 70). Remuneration of authors and performers should be appropriate and proportionate to the actual or potential economic value of the licensed or transferred rights, taking into account the author's or performer's contribution to the overall work or other subject matter and all other circumstances of the case, such as market

practices or the actual exploitation of the work. A lump sum payment can also constitute proportionate remuneration, but it should not be the rule. Member States should have the freedom to define specific cases for the application of lump sums, taking into account the specificities of each sector. Member States should be free to implement the principle of appropriate and proportionate remuneration through different existing or newly introduced mechanisms, which could include collective bargaining and other mechanisms, provided that such mechanisms are in conformity with applicable Union law (Article 73). Similarly, in IP Act Moral rights recognizes the remuneration of the Authors.

III. CONCLUSION

In conclusion, Law of the EU is properly updated in accordance with the technological development and digitalization. In contrast to the IP Law of Sri Lanka, EU Directives lays down aiming to harmonize the law applicable to copyright in the framework of the internal market, taking into account, in particular, digital and cross-border uses of protected content. It also lays down rules on exceptions and limitations to copyright and related rights, on the facilitation of licenses, as well as rules which aim to ensure a well-functioning marketplace for the exploitation of works and other subject matter. Moreover, EU Directives introduce Digital Single Market Strategy to secure the online content. Apart from that it emphasizes the exemptions for Text and data mining for the purposes of scientific research, cross boarder teaching and cross border cultural heritage. It takes measures to improve licensing and collective licensing practices and ensure wider access to content while giving a recognition and remuneration to the Authors of the content. Apart from that, Access to and availability of audiovisual works on video-on-demand platforms and the intermediary liability of the on-line platforms are properly addressed in EU Directives. Apart from that, Works of visual art in the public domain, work of online press publications, use of protected content by online content-sharing service providers and Fair remuneration in exploitation contracts of authors are elaborated and liabilities are specified in its articles.

Transparency obligation of the Member states to ensure that authors receive a remuneration on a regular basis will not deprive the authors by content piracy. Alternate dispute resolution procedure will lower the number of court cases of IP related nature. Apart from that protection of personnel data will ensure the data privacy of the authors. Apart from the above gaps, Sri Lankan Law have already been analyzed as a territorial law in the enforcement and lack of harmonization of the IP Law have made barriers to preserve the content in the internet.

Therefore, it is suggested to amend the IP Act accordingly and also make rules and regulations to regulate the internet making intermediaries liable for copyright infringement.

Literature is suggested to research mechanisms and regulations to harmonize IP the laws in Sri Lanka with other nations and also further research could be recommended to discover the challenges for IP law in artificial Intelligence.

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A Challenge from Humanoid Bots: An Analysis of the Legal Regime in Sri Lanka on Artificial Intellegence

Aparrajitha Ariyadasa
ATD Legal Associates
42 Galpotta Rd
Sri Jayawardenepura Kotte, Sri Lanka
aparrajitha@gmail.com

Abstract— Sofia, the world's best-known humanoid bot has challenged legal regimes in the world. Rapid and unregulated development of Artificial Intelligence (AI) has major repercussions for Legal personality. AI which is a specialized area of Information Technology (IT), focuses on the simulation of human intelligence processes by machines has become an important area in the ongoing global fourth industrial revolution. This new development has created opportunities as well as the challenges everywhere in the global society, has not been sufficiently investigated in Sri Lanka.

In this Back drop, this paper explores current legislation, policies and legal regulations of AI in Sri Lanka with two other jurisdictions in order to sort the solutions to the research problem in which questions the sufficiency of the legislation to protect AI status of BOTS in order to reach its main objective to examine the challenges of AI on the legal regime paying special emphasis to Sri Lanka. The research rested on qualitative approach to study by usage of primary and secondary sources, materials included national and international legislation, academic and media data. The study stood on the comparative legal analysis, integrated legal interpretation and modeling. In addition to that, key informants were interviewed where necessary to construct strong arguments and balanced conclusions or recommendations.

This research argues that special emphasis should be laid to the prospective of treating AI as an autonomous legal personality and separate subject of law and control. The article identifies major approaches in legislation and practice on national regulation of AI and explores a number of current options: AI as a subject of law introduced into national legislation without prior background, AI as a subject of law equal to a person, and regulated or not regulated by separate rules of law, etc.

Findings laid grounds to conclude that Sri Lanka has not still been prepared for the challenges posed by AI within the legal system of the country. Some awareness and preparedness are visible in exploiting the opportunities offered by the AI. The legal educational institutions are slowly working to expand the AI components to their study programs. Infrastructural facilities for AI are insufficient at legal institutions in the country and for preliminary recommendations on legal drafting with regard to AI status as that of autonomous legal personality.

Policy recommendation can be suggested that, it is essential to introduce accelerated programs to bridge the existing gaps in the AI in the country. Awareness programs would be useful at the initial stage covering all important layers of the legal system in the country. Some basic components should be introduced to the school curriculum to make people aware of the implications of AI on legal system of the country. Sufficient public funds should be allocated with proper planning horizons in this exercise and they can be used for development of national legislation and further research on legal aspects of robotic AI.

Keywords— AI, Chat Bot, Humanoid Bot, Legal Personality, Legal Status, IP

I. INTRODUCTION

The technical paradigm of the advanced economy shapes novel markets, which deliver rise to modern administrative measures and subjects for control, including Artificial Intelligence. The over drift basically concerns the arrangement of innovations that will profoundly alter the feasible market economy, constraining experts out of diverse zones. With respect to lawyers, the circumstances offer small trust, right presently there are innovations that uproot attorneys from the market [1].

One of the remarkable blueprints that affect both the legal services market is the occurrence of the DoNotPay chat in the UK, and currently covers over 1,000 fields of law [2]. The popularity of the above service is due to the fact that it successfully challenged over 160,000 parking tickets issued illegally to car owners [3] the processed requests amounted to 64%.

As regards the Russian market, Sber Bank launched a robot lawyer to file claims for individuals, the company Glavstrah Control launched a bot to settle insurance disputes [4]. At the same time, it is already impossible to stop the current technological trend, therefore, the existing technological model needs legislative base to regulate AI. Both lawmakers and researchers focus on the issue [5].

Against this back drop, the present research investigate that prominent weight should be attached to the issue of treating artificial intellect as separate subject of control within civil and administrative and also in criminal proceedings within the context AI competing with human. The purpose of the study is to identify key trends in Sri Lankan legislations on AI. The objectives of the study are the following:

Research of current models of state regulation of AI, Identification of challenges in the current and prospective model of administrative and legal regulation of AI, Development of recommendations to improve the above regulatory apparatus.

II. METHODOLOGY

The study was conducted within the qualitative paradigm and integrated data from social, legislative and academic practice. Research materials integrated a number of sources such as legislative base and draft bills concerning AI regulation, research papers of scholars who specialize in the field under study, official media sources. The research methodology rested on comparative legal research, techniques of analysis and synthesis, hypothesis formation, a method of interpretation of norms, a method of legal modeling, etc. Due to the research period limits it was not possible to cover the entire list and depth of legal phenomena in the field of AI.

Therefore, the first stage focused on two models of the current mechanism of state regulation of AI that were selected as subject to study: introduction of AI in legal relations, as a subject of law without providing legislative infrastructure; preparation for the introduction of AI in legal relations on the basis of the comprehensive complex of legislative infrastructure. At this stage, the analysis of regulatory sources and their interpretation was implemented.

The second stage focused on some countries that develop the legislative base for robotics - Estonia, Germany, the USA, Russia and make their policies public. And compared with the Laws of Sri Lanka. This stage explored the main features in determining the legal personality of the robot, the basis for perspective legislation, formed by the state, business and legal experts. A method of comparative legal research, generalization and a method of interpretation of standard norms was mostly used at this stage. In the third stage the methods used were of legal interpreting and modeling to identify key legal gaps within the framework of the two current paradigms to regulate legal relations between a human and a robot.

III. RESULTS AND DISCUSSION

The study made it possible to identify major basic approaches to AI state regulation across the countries.

a. A. AI as Subject of Law Introduced into National Legislation without Prior Background

Currently in general, the approach to AI is implemented either in the form of a software package (virtual platform, chat bots, Human Bots, programs, etc., which do not have a material shell), or programmatically (robot, drone, etc.) as an instrument for specific goals laid down in the framework of legal relations formed by legal entities [6]. At the same time, there are cases when actions with regard to robot status contradict current national legal norms.

A case from Saudi Arabia: Riyadh announced in 2017 that robot Sofia, that positions itself as a woman, was granted the citizenship of Saudi Arabia (Saudi Arabia Gives Citizenship, 2017). This step contradicts to a number of laws that determine the model of behavior of subjects of legal relations in different conditions. First it contradicts the norm of Saudi Arabia citizenship that can be obtained in the following ways (Saudi Nationality System, 2018):

By birth; in a traditional family, where the mother and father are Saudi Arabia citizens; The birth of a legal entity in Saudi Arabia, a family where the father is a citizen of Saudi Arabia, and the

mother is not a citizen of the country. At the same time, a notarized acknowledgment of paternity is deemed to be necessary.

- The birth of the subject: by the mother of a Saudi citizen, where the father is not a citizen of the RAA, provided that coming of age, the subject has a permanent residence permit and is fluent in Arabic.

- By marriage;

- By naturalization under a number of conditions: reaching the legal age; fluent in Arabic; settlement over 10 years; legitimate way of earning; no criminal record; compliance with the norms of conduct set out in the country.

Furthermore, the case understudy contradicts the accepted model of female behavior in Saudi Arabia society that introduces specific requirements to female activities, including obligation to travel accompanied by a male mahram, wearing hijab, job placement limits, limits to traveling abroad, restrictive issues in family life and inheritance rules, and some other restrictions stemming from the Shariah.

Moreover, the robot citizenship contradicts the female rights in Saudi Arabia, where a woman can perform public functions, through representation in a consultative assembly (Shura), a number of women hold positions in the public service [7]

A case form Japan: Japan in 2017 provided a residence permit for the chat bot Shibuya Mirai under a special regulation [8. However, this action contradicts laws regarding residence permit procedure in Japan. It is opened for foreign specialists employed in Japanese companies, participants in the family reunification program, entrepreneurs and investors doing business in Japan, scientists, artists and athletes of world level, foreigners who married a Japanese citizen, foreign students when studying at a Japanese higher educational institution, foreign citizens in special cases (passing service, etc.). Citizenship granting in Japan is regulated by the Law on Citizenship of Japan (Nationality Law of Japan, 2018).

The Law states two options, namely by birth or naturalization. In the case of birth, the child should be born in Japan (without reference to the nationality of the parents), or by the father, and the mother holding the Japanese citizenship. In the case of naturalization, the person should live in Japan

over 5 years, have legal capacity and reach the age of twenty, have adequate standard of living, and no affiliation with organizations associated with activities against Japan.

In Sri Lanka, Section 4 of the Citizenship Act No.16 of 2003 in Sri Lanka, grants citizenship for a person inside or outside of Sri Lanka by in decent if his father was born in Sri Lanka, or   his paternal grandfather and paternal great grandfather were born in Sri Lanka, by way of discretion of the minister (Sec.8) and By birth (Sec. 7).

b.   B.   AI as Subject of Law, Equal to a Person, and not Regulated by Separate Rules of Law

Bearing in mind above mentioned legal precedents of AI status as equal to human being in Saudi Arabia, Japan and Sri Lanka, we consider its important to focus on the procedural aspect of the public legal relations:

- Neither the chat bot, nor the robot Sofia, applied for citizenship (residence permit)

- Meets the criteria of capacity (age qualification)

- They do not meet the criteria of settle or do not speak the national language to the extent set out by law.

Due to the above formal criteria, robot and the chat-bot should have faced a refusal when submitting the documents. Further problems arise for AI to comply with the legislation specified by the host country. First, the emancipated woman is a robot that does not comply with the requirements specified for clothing, ethics of behavior (male escort), and this robot should have been brought to administrative and criminal responsibility under the current Saudi Arabia legislation. As regards chat bot, there are fewer problematic issues, as it does not have a material shell and is tied to the location of the server.

With regard to the duties, human Bots (AI) also receives rights, as any citizen (or a resident who has obtained a residence permit). In case of the robot Sophia, now in Saudi Arabia women can act in the executive branches, participate in labor relations and marry. However, there is no adequate state regulation with regard to securing and terminating the respective legal relations. As a consequence, when the robot is equated to a person, there will be a problem both in Sharia courts and in courts of

general jurisdiction, since the model of conduct is not specified by law.

In case of Chat-bots, the circumstance requires point by point thought through a publicly-legal Prism. AI performs freely legal capacities and acts as an operational mediator in communication between the inhabitants of Shibuya Province and government authorities. Continuing from the truth that this AI has got a resident permit as a foreign specialist (made by Microsoft) or a civil servant (serving the area), the address emerges concerning the arrange of the   work contract, that is the only formal ground to grant residence permit. Moreover, Legal Capacity for being above 18 will not be fulfilled in this scenario.

In Exploration, case of erroneous or awkward exhortation is given by AI, it may lead to legal consequences since the enactment cannot record the responsibility of the AI since there is no tangible shell. The Microsoft as a developer is insured by the fact that the AI is a separate legal entity with all the ensuing consequences. Apart from that, liability of the developer has not been properly defined or stated in the enactments.

Considering ethical moral viewpoint, the subjects below considered don't consist of it. Besides, in case of regulatory or criminal claims being recorded, corpus dilicti will be fragmented, due to the need of aim (and its formal mindfulness)

c.   C.   AI as a Matter of Law Spanning Continents under Current and Prospective Legislation

Equal status is granted to AI in Saudi Arabia and Japan, but so far there has been no debate on A I for legal status in Sri Lanka. Thus, the UK formed the AI Committee in the "House of Lords" [8]. The U.S. government is not trying to recognize AI's legal status as an entity and concentrating on the legal definition of AI. Section 3 of the AI bill sets out the criteria generalizing AI.

- Artificial systems that can perform tasks without the presence of humans (autonomous systems)

- Systems that think as if they were equivalent to the human brain and can pass the Turing test or other comparable examination by manipulating natural language, reflecting intelli gence, automatic reasoning and learning systems that act rationally achieve goals through perception, planning,

reasoning, learning, communication, decision making and action [9].

As for EU countries, they pay specific attention to legal regulation for un-manned vehicles. Thus, the German Traffic Act [10] imposes the responsibility for managing an automated or semi-automated vehicle on the owner and envisages partial involvement of the Federal Ministry of Transport and the Digital Infrastructure. In the EU resolution on robotics, a more detailed and understandable approach to the concept of current and prospective robotics legislation is presented (European Parliament Resolution, 2017). It defines types of AI use, covers issues of liability, ethics, and provides basic rules of conduct for developers, operators, and manufacturers in the field of robotics, the rules base on the three laws of robot technology by Azimov (1942).

The first key issue is the robot's independence with AI and the degree of participation of third parties in robot operation. As a result, a legal conflict arises, as the robot cannot be held liable for acts and (or) negligence within the context of the current legislation and as a result, responsibility rests with the user, software developer or supplier.

At the same time, the EU resolution raises the issue of liability in the event that the robot caused damage due to the robot's own decisions (based on the embedded algorithms) and the third party responsible for paying damages cannot be identified

At the same time, there is a separate AI reservation with the concepts of neural networks (self-learning), which cannot in theory be anticipated and, as a consequence, the current legal system cannot take their behavior into account or, as a consequence, assess the culprit in the proceedings.

There is a parallel EU law bill in Russia, called the Grishin Law (2015), which is under review by the Russian Parliament. The draft law makes changes to the provisions of the Russian Federation's Civil Code and, irrespective of the independence of the robot, places all issues and liability on the designer, operator or manufacturer of the robot, Representation, problems in law, enforcement agencies, etc. In addition, there is a Robotics and AI Model Convention that sets guidelines for the development and use of robots and AI [11]. The paper appears to be well placed as it lays the foundation for specific branch of legal regulations on the production and use of AI in society.

The legislative measures in place with respect to robotics are considered to be similar in nature in the case of current initiatives by the EU countries, the EU Parliament and Russia, in which case the robot has minimal legal capacity and all responsibility for their actions lies with the owners. There are also a variety of daunting variables at the same time.

First of all, the EU resolution does not address such concerns as the future reach of the operation of the device. The Russian law allows for a limited list of robot free use that is restricted strictly to peaceful purposes, as with current developments in the Civil Code. As a consequence, a number of issues arise. In the case of drone use under a serviceman's command, it is simply a tool to execute an order, the serviceman is liable for proper and improper use. Threat and danger to a human is initially rooted in the use of a device for the respective tasks in the case of robot use for military purposes.

On the other side, robots (drones) are used for military purposes in Russia and abroad. Due to the current use of a robotic AI for a dual purpose, it raises the question of the dispute between Asimov's concepts and EU regulations, etc.

The second key aspect is the robot's lack of autonomous operation. As a result, the robot is just another type of vehicle and the need for more control of the "modernized device" disappears in the spirit of this rule, as responsibility for any action lies solely with the manufacturer, the operator and so on. The EU resolution gives a clear reason that it is difficult to include a third person as responsible f or the actions of the AI system in the event of complete autonomy of a robot, and the situation re quires special consideration and specific solutions.

In relation to the Russian administrative legal framework, we discuss the third factor. This consideration stems from the current situation with the inclusion and growth of the issue of AI status within the Russian Civil Code.

In my opinion, the rationale of legal science and practices demands that the above circumstances, their classification, be defined in a separate legislative act, as the authority of the national executive agencies with regard to robotics. Moreover, the robot citizenship contradicts the female rights in Saudi Arabia, where a woman can perform public functions, through representation in a consultative assembly a number of women hold positions in the public service.

In contrast to the above analysis, Sri Lanka is still Silent about giving legal status to AI therefore, there is no legislation to be recognized in Sri Lanka.

IV. CONCLUSION

The research findings made it possible to define two paradigms of shaping legal relationships that occur between robotic AI and an individual, namely human rights equalization and robot equalization, on the one hand, and the concept of legal personality of a fully autonomous robotic AI, on the other.

We encounter the issue of the current legislative framework and the lack of effective regulatory mechanisms for this topic in the case of the equalization of human rights and the robot. In the event of an organizational, criminal or other incident, the executive bodies will face the challenge of defining the Corpus Delicti, developing effective tools to influence behavior, and to determine the third party's participation in the offence committed by robotic AI.

In fact, the current legislation recognizes that robotic AI can enforce public authority functions. The question of the validity of legal capacity and the evaluation of potential legal risks arises as a consequence of the use of automated self-learning AI. Robotic AI does not have an innate set of moral and ethical values in a civil servant.

The second paradigm of relationships between robotic AI and man suggests some positive legislative framework being created. At the same time, in the current versions of national legislation, the issue of the legal identity of a fully autonomous robotic AI, its legal capability and responsibility has not been resolved. In the new version of the rule, in the case of an illegal accident, the whole is solely with the AI founder, programmer or operator. This approach greatly restricts the design potential of robotic AI. As a consequence, its use is only possible in the sense of complementary human functions. Therefore, it is considered that it is appropriate to create a legal vision of the specific purpose of robotic AI, to explore and define its legal existence in accordance with the "heart" of the law defined as the basic concept of prospective legislation. Given the findings of the study, the research would propose that the Sri Lankan legislators should consider: The possibility of establishing in the field of robotics a self-regulation institute that will be able to develop guidelines and

codes of conduct that are mandatory for managers and operators of robot agents to comply with, as well as for the robot agents themselves. The creation of such an organization as the approved body in the field of robotics at the national (federal) level, which will be able to determine the types of operation permissible to robots, given that the robot is a source of great risk.

In conclusion, Law of the EU is properly updated in accordance with the technological development and digitalization. In contrast to the IP Law of Sri Lanka, EU Directives lays down aiming to harmonize the law applicable to copyright in the framework of the internal market, taking into account, in particular, digital and cross-border uses of protected content. It also lays down rules on exceptions and limitations to copyright and related rights, on the facilitation of licenses, as well as rules which aim to ensure a well-functioning marketplace for the exploitation of works and other subject matter. Moreover, EU Directives introduce Digital Single Market Strategy to secure the online content. Apart from that it emphasizes the exemptions for Text and data mining for the purposes of scientific research, cross boarder teaching and cross border cultural heritage. It takes measures to improve licensing and collective licensing practices and ensure wider access to content while giving a recognition and remuneration to the Authors of the content. Apart from that, Access to and availability of audiovisual works on video-on-demand platforms and the intermediary liability of the on-line platforms are properly addressed in EU Directives. Apart from that, Works of visual art in the public domain, work of online press publications, use of protected content by online content-sharing service providers and Fair remuneration in exploitation contracts of authors are elaborated and liabilities are specified in its articles. Transparency obligation of the Member states to ensure that authors receive a remuneration on a regular basis will not deprive the authors by content piracy. Alternate dispute resolution procedure will lower the number of court cases of IP related nature. Apart from that protection of personnel data will ensure the data privacy of the authors. Apart from the above gaps, Sri Lankan Law have already been analyzed as a territorial law in the enforcement and lack of harmonization of the IP Law have made barriers to preserve the content in the internet.

Therefore, it is suggested to amend the IP Act accordingly and also make rules and regulations to regulate the internet making intermediaries liable for copyright infringement.

Literature is suggested to research mechanisms and regulations to harmonize IP the laws in Sri Lanka with other nations and also further research could be recommended to discover the challenges for IP law in artificial Intelligence.

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University-Industry Collaboration as a Source of Innovation and ICT Entrepreneurship: A Systematic Literature Review

Chaminda Wijesinghe
Faculty of Computing
NSBM Green University Town
Homagama, Sri Lanka
chamindaw@nsbm.lk

Abstract— **University-industry collaboration has become a vital component in emerging economies. As universities gradually become the center of society's knowledge production system, their role in innovation becomes more diverse. In the pursuit of such a role, universities are encouraged to establish university-industry collaboration (UIC) context that supports faculties and students to engage in entrepreneurial activities. I present a systematic literature review of the studies conducted in the discipline of University-industry collaboration towards innovation and entrepreneurship. The focus of the study is mainly given to the methodologies used by researchers and presented in journal articles.**

Keywords— University-industry, collaboration, Innovation, ICT, Entrepreneurship

I. INTRODUCTION

Collaboration between Universities and Industries is critical for relevant skills development through education and training. this is also important for commercialization of research and promotion of entrepreneurship through start-up and spin-off companies.

Building the capacity of the world's people and social institutions to create a prosperous and developed society will require a vast increase in the access to knowledge. This will entail approaches that facilitate the generation, application, and diffusion of knowledge at the local level. Rather than unquestioningly adopting "solutions" developed elsewhere, an emphasis on strengthening local capacity to generate, apply, and disseminate knowledge can help put into place an ongoing process of action and reflection; one which encourages respect of the existing knowledge base of a community, raises the community's confidence in its ability to devise, implement and assess solutions, and helps to systematize and expand local knowledge. HEI should exist for knowledge creation so as industries can adopt this knowledge. Knowledge and technology transfer between academia and industry is expected to spur innovation, as this kind of collaboration combines not only heterogeneous partners but more importantly, heterogeneous knowledge [1].

According to some studies, Companies in developed countries have clearly benefited from university-industry collaborations but emerging nations around the world have a different series of challenges and barriers to overcome in establishing strong university-industry collaborations [2]. To maximize the impact of innovation systems in a developing country context, innovation interventions (including ICT4D) must (a) facilitate shared, local ownership, with objectives driven by end-user community needs and taking account of previous interventions, good practices and socio-cultural norms; (b) be co-designed, co-created or adapted in consultation with key Innovation Stakeholders; (c) strengthen the capacity of local beneficiary and/or contributing Stakeholders and (d) address sustainability and wider socio-economic impact after the interventions ends[3].

Despite the fact that most of the policy level decisions in the context of innovation and entrepreneurship is required by the developing countries, most of the research is done based on developed countries. But education system and industries are having a significant difference between developed countries and developing countries. This emphasizes the importance of

literature addressing innovation and entrepreneurship in developing countries. Among developing countries, much of the literature addressing developing countries are China (e.g. [4]) and Africa (e.g. [5])

Product innovation has a positive impact on the geographical proximity to a university but is negatively affected by the amount of its codified knowledge production [6]. Degree programs in fields useful for local firms favor R&D collaborations but Academic policies that aim to commercialize research output negatively impact both product and process innovations of local firms [6].

II. METHODOLOGY

a. Approach for the Systematic Literature Review

The number of articles found prior to 2010 was considerably less in relation to the collaborations towards innovations and ICT entrepreneurship in many databases and therefore not considered for the systematic literature review. The systematic literature review was started by identifying all relevant articles produced from 2010 to 2018. The search strategy covered only peer-reviewed journal articles published in electronic databases, because they have more validity and are likely to cover the main contribution in the field[8]. A search of the following electronic databases for titles and abstracts of potentially relevant studies was conducted: Scopus, Web of Science, and Science Direct. These particular databases have been selected because they provide a wide coverage of the literature in the area under study. There was no restriction on country of origin or on source sector (e.g. academic, government, policy, etc.) or the type of industry. Only published work in the English language was included. Researcher searched these databases to identify initial relevant studies using specific combinations of terms, including: 'university' AND 'Industry' AND 'Collaboration' AND 'ICT' AND 'Innovation' OR 'Entrepreneurship'. Although using these terms was expected to initially generate a large number of studies, this was necessary to ensure that all potentially relevant studies have been considered. This procedure yielded more than 500 results, which was considered as my initial sample. At this stage, I removed other documents such as book

chapters and reviews and refined the result set only for articles. This refining process helped me to limit the number of articles in Scopus database to 36, ScienceDirect database to 10 and Web of Science to 15. Among these 61 articles, 6 articles are duplicated in these 3 databases. In order to study the research methodology used, articles not having the full text is also removed from the result set. Among these articles 15 articles were selected mostly relating to the research questions of my own study area, I set five questions which to be used as the criteria for inclusion and exclusion of studies in the review to determine the final sample. These questions are outlined below:

- Does the study address which factors will affect University-Industry collaboration to work as a source of Innovation and ICT Entrepreneurship?
- Does the study address which factors will influence industries to collaborate with Universities to make their graduates more innovative and entrepreneurial in ICT?
- Does the study mention what are the ways that University can collaborate with the industry to exists as entrepreneurial university?
- Does the study examine the factors impact on the current level of innovation and ICT entrepreneurial ecosystem in developing countries?
- Does the study address what are the perceived benefits, challenges and opportunities associated with supporting innovation and ICT entrepreneurship?

During the screening process of these articles majority of the articles were found having a qualitative approach. Fifteen articles were chosen for the full paper reading.

Following this stage, I employed techniques from the field of qualitative data analysis, mainly matrix method and tabulation technique on the full texts of the final selected articles. This aimed to compile evidence and information that primarily relate to the seven identified key aspects. I started the coding by reading through each paper, word-by-word, to detect parts in the text and attach them to relevant primary themes (i.e. the key aspects). Then moved to the second and third levels of coding by clustering relevant chunks of information together under specific titles, which latter constitute the sub-themes under each of the key themes. In addition, careful attention has been paid at this stage at

examining and highlighting divergence and convergence between the different paper and sought explanations for any inconsistencies. This aimed to better understand the nature of these key themes and their relevance to the University-Industry Collaboration.

b. Analysis

methodological analysis between qualitative and quantitative methods used in University Industry collaboration is significant. Qualitative research is concerned with finding the answers to questions which begin with: why? how? in what way? Quantitative research, on the other hand, is more concerned with questions about: how much? how many? how often? to what extent? [23] .

Some researchers have used a combination of action oriented research and case study research methods [11]. Case studies typically combine data collection methods, such as archives, interviews, questionnaires, and observations. Researcher triangulation was used to validate the interpretations made out of data gathered with various methods. The advantage of using triangulation is findings from one type of study can be checked against the findings deriving from the other type. For example, the results of a qualitative investigation might be checked against a quantitative study. In addition to that, since statistics are not used, but rather qualitative research uses a more descriptive, narrative style, this research might be of particular benefit to the practitioner as she or he could turn to qualitative reports in order to examine forms of knowledge that might otherwise be unavailable, thereby gaining new insight survey method has been mainly used in quantitative approaches in U-I Collaborations[18]. Hypotheses are developed and face to face surveys are done around 700 participants to gather data. Even though face to face survey is quite a difficult data collection method compared with online or postal data collection, this method has several advantages. One important advantage is accurate screening: The individual been interviewed is unable to provide false information such as gender, age or race. In other methods such as postal or online, informant may provide incorrect demographic information for gaining incentives. Another advantage is face to face interviews can capture emotions and behavior. But online and mobile surveys cannot capture raw emotions and behavior. As with any data collection method face to face interviews also provide some disadvantages. Cost is a major disadvantage of face to face interviews as it requires personnel involvement, which is the highest cost a business can incur, and another disadvantage is the quality of data will depend on the skills of the interviewer.

III. RESULTS

a. objectives and research questions

Two articles found addressing factors affecting University-Industry collaboration to work as a source of Innovation and ICT Entrepreneurship[14]. But innovation and entrepreneurship are addressed in other forms in few articles than ICT (e.g.). And six articles address which factors will influence industries to collaborate with Universities to make their graduates more innovative and entrepreneurial. Three articles mention what are the ways (forms) that University can collaborate with the industry to exist as entrepreneurial University. Four articles found examining the factors impact on the current level of innovation and ICT entrepreneurial ecosystem in developing countries while few other articles are limited their studies to developed countries. A large number of articles found addressing the perceived benefits, challenges and opportunities associated with supporting innovation and ICT entrepreneurship. Apart from the above main focused areas, some researchers have focused on patenting and commercialization of academic spin-offs in their studies.

b. Materials used

All types of materials generated and utilized in the scope of scholarly research are considered. In the sample of 15 articles researchers have commonly used audio recordings, video recordings, speeches, published books, government publications, oral histories, records of organizations, field notes, published journals mainly in the case study, survey and systematic review research designs. It was not possible to come up with exact percentage of usage of these materials as certain researchers have used one or more materials in their research work as a primary record of their research activity and obviously the 15 journal articles published can be considered as the final output material of the research.

c. Participants

Among qualitative studies majority of studies are conducted with the participation of 100 to 150 universities or industries but in the quantitative analysis, the numbers are substantially high and it was between 700 and 800.

d. Research design/ strategy

Seventy percent of the articles among qualitative analysis have used case studies with in-depth interviews and questionnaires. The case-study research method is usually used to contribute to our knowledge of individual, group, organizational, social, economic, and political phenomena. The case method allows the questions of why, what and how, to be answered with a relatively full understanding of the nature and complexity of the complete phenomenon. According to Martti Mäkimattila et al, The case-study method has been often misunderstood and criticized, but now it is better accepted as a tool for capturing important findings in complex systems. Case studies typically combine data collection methods, such as archives, interviews, questionnaires, and observations[11]. The questionnaires are typically derived from their research questions by addressing important keywords. These questions, therefore, concerned prior related knowledge, previous similar collaborative experiences, and comprehension of the partner's domain-specific routines, processes, aims, and perspectives, barriers, enablers, roles, and competence. The interview questionnaire needs to follow the logic of thematic questions, where each thematic set of questions are derived from the propositions to allow subsequent data interpretation. Further the questionnaires are prepared including a set of questions concerning the overall objective of the collaboration, characteristics of collaborating with a partner from another domain as such, their expectations towards the collaboration, why they had such expectations, both partners' activities in the collaboration, the role of project management and communication, their attitudes towards their partner's contribution to the collaboration, their openness, the initiation phase and the partners' perception of the success or failure of the project and reasons for these. According to the assessments of the partners themselves and the analysis carried out by the researchers, the approximate level (high, medium or low) of both preconditions for both partners are determined and subsequently, these individual levels were compared between partners. In most of the cases, interviews have been conducted in a conversational manner allowing the interviewer to ask additional questions. Adding follow-up questions, such as "Why did you do that?", "Who was involved?" and "How did you experience that?" during interviews will encourage the interviewees to reflect on their experiences related to the events that were mentioned during the interviews and to enrich the understanding of the unique process of collaborative interactions in every case[10]. The study on the time the interviews were conducted, many studies show that they have conducted interviews when all projects are finished or had undergone at least one implementation phase for the purpose of make it possible for the key informants to reflect on all the necessary aspects.

e. Data collection methods

In the case study methods, theoretical instead of statistical sampling has been used, and therefore, case selection followed a theoretical replication design in order to generalize to propositions rather than population. In almost all case studies the level of inquiry is individual and the data for each case is primarily collected from key informants

f. Measures and analytical tools

Many of the articles in qualitative studies, inductive thematic analysis have been used to identify various forms and motivations for collaborations. During this process, first interviews recorded electronically and transcribed. Then data were recorded and analyzed.

Quantitative studies used different analysis approach where analysis is mainly based on numeric values. In some studies, they have used descriptive statistics for the variables of entrepreneurial activities many studies used Mean, Standard Deviation, and Analysis of variance (ANOVA) for continuous and ordinal measures and Chi-square tests for nominal measures. In most of the cases, the data were analyzed using Statistical Package for the Social Sciences (SPSS, version 18, or 20)

g. Credibility and reliability

All the articles under review were published in scholarly journals and made available online by scientific publishers. Triangulation methods are used in all most all the naturalistic and qualitative approaches to evaluation [in order to] control bias and establishing valid propositions[24].

IV. DISCUSSION

Many of the researchers have been used a qualitative method. The advantage of the method is the researcher gains an insider's view of the field because of close researcher involvement. This allows the researcher to find issues that are often missed (such as subtleties and complexities) by the scientific, more positivistic enquiries. But the problem of adequate validity or reliability is a major

criticism. Because of the subjective nature of qualitative data and its origin in single contexts, it is difficult to apply conventional standards of reliability and validity. The time required for data collection, analysis and interpretation is also comparatively longer. And also the researcher's presence has a profound effect on the subjects of study.

Among the quantitative approaches the strengths are the precision that can be achieved through quantitative and reliable measurements, and the ability to produce causality statements through the use of controlled experiments. But the limitations are the complexity of human experience as it is difficult to rule out or control the variables. All human respondents do not respond in the same ways as inert matter in the physical sciences. Another limitation of quantitative methods on par with qualitative is, it fails to take account of people's unique ability to interpret their experiences, construct their own meanings and act on these.

In many cases rather than using only a qualitative or quantitative approach, they could also have used a mixed method such as findings from one type of study to be checked against the findings derived from the other type. For example, the results of a qualitative investigation might be checked against a quantitative study

Among the articles in quantitative approaches quantitative research readily allows the researcher to establish relationships among variables such as Universities and industries but is often weak when it comes to explore the reasons for those relationships. A qualitative study can be used to explain the factors underlying the broad relationships

The study reveals that the methodological approach for University Industry collaboration as a source of innovation and ICT entrepreneurship will require a mixed methodology. Face to face interview will be required for gaining a thorough understanding of the current level of collaborations between Universities and industries in Sri Lanka. Understanding future requirements by the industries and academia can be understood through the interviews. Informants' real perceptions could be better understood through an open ended questionnaire. A qualitative approach will better suit to understand the collaborations between Universities and industries. Qualitative data analysis is a complex and challenging part of the research process which has received only limited attention in the research literature[25]. When studying of the current level of ICT entrepreneurship and innovations among undergraduates data should be collected from a large number of informants and data analysis can be done with descriptive data analysis methods. The research is going to be an action research and therefore the societal implications will be an ICT based solution to mitigate barriers and enhance the current level of University Industry Collaborations.

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The Supremacy of Service Quality Factors of Course Organisation and User Skills in Open Distance Learning

M J R Perera
Department of Computer Science,
The Open University of Sri Lanka
Nugegoda, Sri Lanka
renukpousl@gmail.com

Nalin Abeysekera
Department of Marketing Management
The Open University of Sri Lanka
Nugegoda, Sri Lanka
nabey@ou.ac.lk

Abstract— **In the Open Distance Learning (ODL) environment it could be found critical success factors in different directions. Course Organization (CO) can be distinctly identified as the students' perceptions of the concepts and objectives of the newly registered courses to upturn their self-motivation, commitment and to boost minimal technological skills and experience need for continuation of the programme. The empirical literature has proven that the computer-literate users who are more likely to use e-services comfortably and confidently cover their assessments. The aim of this research is to identify the significant determinants of service quality factors which effect students' accomplishment. The conceptual framework was comprised with the independent variables of Course Organisation and User Skills and Experiences (USE) and dependent variable of Perceived Service Quality (PSQ). The study followed a quantitative approach and a self-administered questionnaire as the main research instrument. The primary data collection was done with the sample of 760 derived from the population of 40,000 undergraduate students. Statistical data analysis was followed by using Smart-PLS software which is based on Partial Least Square Structured Equation Modelling (PLS-SEM) path analysis. The results revealed Course Organisation and User Skills have showed statistically significant relationships with the Perceived Service Quality. The future research must be conducted in regional centers, island wide as longitudinal method as it will fulfil the knowledge gap by giving snapshot of the students' achievements and find out more dimensions of service quality which will tenacious the rate of the graduation rate.**

Key Words: Course Organization, User Skills and Experiences, Perceived Service Quality, Open Distance Learning (ODL), Regional Centers, Partial Least Square

I. INTRODUCTION

"Quality is a key factor to guarantee competitiveness and sustainability for both distance and traditional institutions" and the concept of services quality is abstract and is related to the individual attitudes, his/her satisfaction and experience with the service [1]. Hence, universities that move with distance learning must ensure that the service quality perceived by students is supported enough for students' retention. The institutions must be able to supply for the increasing demand while changing and understanding their opportunities and threats in their own area. The operational mangement must adopt quality process to provide qualty service for their students. They must monitor and analyse their Service Quality (SQ), which will further affect students' satisfaction [2] In 2011, Saheli, Fini, & Zainalipoor evaluated the development of the regional centres with sophisticated equipment by adding effectiveness to the DE environment [3]. In relation to student–student and student–teacher relations [4, 5] it would be strengthened through the development of the remote centers by giving more advantage to uneducated groups. The definition of Course Organization used in this research is "students' support covers all the facilities and instructions from beginning to start the course and continue as a face-to-face system for the success of its students". The definition of Computer Skills & Experiences used in this study as "The skill differences in terms of work with computers efficiently and their proficiencies". Open and distance teaching also represents a real challenge to the established educational culture in the higher

educational institutes [6]. The Orientation programmes can be considered as the key to university entrance process proposed to prepare new students for higher education background. In ODL it can be a key process for diminishing the challenges associated with the learner to teacher [7], learner to learner, learner to content and learner to technology interactions. An introduction which guide to new surroundings can be defined as an Orientation programme [7]. Dropouts may indicate a failure to prepare and shortage of support given to students [8]. This study was intended to find is there any relationship between the CO, Computer Skills & Experiences and Students' PSQ in ODL in OUSL.

A. Statement of the problem

The challenges ODL students have to undergo due to the loss of transactional distance which can be explained by the separation from their teachers and peers. Furthermore, ODL supported with the time and geographical distance by scheduling orientation programmes and limited day schools, in the regional centers which are not compulsory, but it would give away the advantages to get through their assessments and final exams successfully. It has been observed very poor attendance of the ODL students even for the orientation sessions and day schools. Consequently, the lack of service they perceived from the beginning of the course and they were unable to get hold of most important information related to their registration, new learning environment, lesson materials, assessment methods, the level of skills need for technology, tutors and their peers. This situation may possibly impact negatively on students' academic achievement, retention, and graduation rate. This study was attempted to uncover the Service Quality defects of Course Organization and User Skills and Experience in computer technology with contrast to Students' Perceived Service Quality in ODL

The Objectives of the Study

To find the significant impact of Course Organization and User Skills and Experience in computer technology with contrast to Students' Perceived Service Quality in ODL
The Research Questions

Is there any significant impact of Course Organization and User Skills and Experience with contrast to Students' Perceived Service Quality in ODL in OUSL?

II. LIERATURE REVIEW

In 2017 Onditi and Wechuli have reviewed a service quality in higher education and strongminded that higher education institutions need to be aware of the different angles of service quality dimensions that influence the satisfaction of their students and therefore it is important to note that the students are the primary recipients of the services provided by the institutions. They have discussed various education measurement instruments developed by different authors with different of service quality in higher education [9]. In 2018 higher education institutions in Riau provinces in Indonesia has indicated a positive influence of service quality on student satisfaction and further a positive influence of student satisfaction on student loyalty [10]. In 2015 the empirical study was done by Kajenthiran & Karunanithy in the private external higher education institutions in Jaffna, Sri Lanka was mainly based on Parasuraman's SERVQUAL (1985) [11] scale and have found strong positive association between service quality and student satisfaction with the variation of 49%. Furthermore, the independent variables of Assurance and Responsiveness were only contributed significantly to student satisfaction [12].
According to the Institute for Higher Education Policy (2000), before the start of a distance education course, students should be informed and "advised about the program to determine the self-motivation and commitment to learn at a distance, the minimal technology ability required for the course, providing all supplemental materials, learning objectives, concepts, deadlines for assignments and faculty response [13, 14] . Peltier, Schibrowsky, & Drago (2007) [15] introduced a Service Quality dimension as Course structure and the same understanding with same questionnaires. Mantovani (2012) [16] labelled its Course Organization. As reviewed by Peltier, Schibrowsky, & Drago (2007), Course structure has provided students with guidance in terms of topic coverage, rules of behavior, and expectations [17]. Peltier, Schibrowsky, & Drago (2007) revealed that Course Structure or Couse organization was statistically significant with instructor–student interactions, course content, and the perceived quality of the

online learning experience. Consequently, Mantovani (2012) exposed that the students' perceptions tend to be positive with the course Organization by performing descriptive analysis [16]. In the university registration process, academic advising is given to each and every student. The below hypothesis was tested in the context of OUSL in SL.

H[1A]: There is a significant impact of Course Organization on Students' Perceived Service Quality in ODL in OUSL.

Piccoli, Ahmad, & Ive (2001) defined learner attitude as "learners' impression of participating in e-Learning activities through computer usage" in an E-Learning or virtual environment [18]. Mainly, computers are the supporting or assisting tool. In the virtual learning environment, the course materials and tutorials are published, and learners participate through computer networks. When students are not afraid of the complexity of the computers and the network, learners will be more satisfied with an e-Learning environment. Furthermore, Althaus (1997) recommended that computer-mediated communication can boost the traditional classroom environment [19]. Also, this new medium results in capable learners and more critical thinkers while they use their skills and experience in software handling and using the internet. More skillful, tecnological people are having more ability to handle their enviornment [20]. The differences in acessing day to day used, popular softwares such as Microsoft Word, Excel, Power point and the Internet browsers mainly depend on individual skills and experience in technology. Moreover, the empirical results exposed that user satisfaction with e-services and user skills and experiences is statistically significant. The more favorable evaluation has been given by computer-literate users who are more likely to use e-services comfortably [21]. However, the significant relationship between individual computer skills and the convenience of the e-learning system could not be achieved. With the present study, the following hypothesis was derived for ODL in OUSL;

H[2B]: There is a significant impact of Computer Skills and Experience on Students' Perceived Service Quality in ODL in OUSL

III. RESEARCH METHODOLOGY

The selection of appropriate research methods to attain the effective results for the answers of the research questions. It outlines the research method used to empirically test the hypotheses and addresses the research questions [22].

A) The conceptual frame work and the research Hypotheses

The conceptual frame work of the present study (Figure 3.1) consists of dependent variable of Perceived Service Quality and independent variables of User Skills & Experience and Course Organization in ODL in OUS. Based on the Literature review there were two hypotheses derived to answer the research questions.

H[1A]: There is a significant impact of Course Organization on Students' Perceived Service Quality in ODL in OUSL.

H[2B]: There is a significant impact of Computer Skills and Experience on Students' Perceived Service Quality in ODL in OUSL
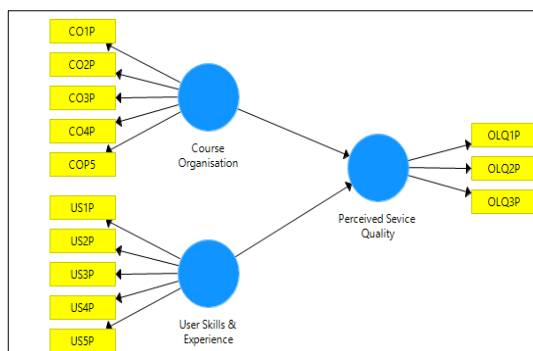

Fig. 1. Conceptual Framework

B) Sampling Process

Sampling is the selection of individuals that represents the underlying population [23]. Hence the size of this population and paticularly the variation of the variables under the research, affects the sample size. The Target population must be precisely defined to start the sampling process [24]. The OUSL provides the programmes and courses to students over the country through the eight (8) regional centres, seventeen (17) study centres and six (6) teaching centres. The primary population of the research study is based on 41,344 students enrolled for ODL programs for the academic year 2013/2014 which is the highest recorded student enrolment per one academic year over the last three

Concept	Source	Operational Component	Measurement Scale
Computer Skills and experiences: Individual differences in terms of computer proficiency and user experiences			
US1P US2P US3P US4P US5P	**[21]**, **[26, 27]**	Basic Computer Skills Ms-WORD Ms-EXCEL Ms-POWERPOINT Knowledge of Internet	Likert scale (1...5)
CO1P CO2P CO3P CO4P CO5P	**[14, 16]**	I was provided with clear statements of course objectives. Before starting the course, I was well advised about the technology I would need to fulfil my program requirements. Before starting the course, I was well advised about the skills need to fulfil my program requirements. Before starting the course, I was well advised about the commitment needed to succeed at distance learning.	Likert scale (1...5)
OLQ1. OLQ2 OLQ3	**[28]**Amended (Researcher) (Researcher)	Overall Service quality is excellent. Overall quality of the course content is satisfactory Excellent Service quality offered compare to other institutions	Likert scale (1...5)

TABLE I.　　SKILLS AND EXPERIENCES

decades and the derived sample size was 760. [25, 24]. Data collection was done by the self-administered questionnaire with the minimum interference of the researcher. The well-trained persons were occupied in the field to collect data specially on day school time.

C) Operationalization of the variables (Survey Instrument)

Table 3.1 shows the Operationalization of the variables of the study.

D) Statistical Techniques of Data Analysis

Multivariate analysis consists of statistical methods that can analyse multiple variables simultaneously. Multivariate methods are divided in to two generations.The first generation, confirmatory techniques are mainly based on the regression approach; multiple regression, logistic regression and analysis of variance. The second generation techniques are used to overcome the weaknesses of the first generation techniques [23, p. 2]. The main objective of multivariate techniques is to increase the researcher's statistical competence and explanatory ability [29, p. 729]. It is mainly useful in testing theories that contain multiple equations involving dependence relationships.

Constructs are unobservable or latent factors represented by multiple variables in the analysis [29, p. 735] and researchers are unable to incorporate unobservable variables measured indirectly by indicator variables [23]. One of the prime advantages of Structured Equation Modelling (SEM) is `the ability to include latent (unobserved) variables in causal models. Thus, the researcher may model abstract constructs comprised of many indicators (observed variables), each of which is a reflection or a dimension of the latent construct. Another key advantage of SEM is that it enables the researcher to estimate complete causal networks simultaneously [30].

The validity and reliability tests could be considered as the main evaluation methods of the measurement instrument and Cronbach Coefficient Alpha is the most widely used test for reliability analysis [31]. Validity is concerned to what extent an instrument measures that intended to measure and Reliability is the ability of an instrument to measure consistently [32].The pilot test was carried out with 50 students and Cronbach-Alpha and the sampling adequacy of the survey constructs (Kaiser-Meyer-Olkin (KMO)) values were more than 0.7 and can be considered as acceptable level of reliability and validity [29, p. 161].

IV. DATA ANALYSIS AND RESEARCH FINDINGS

There are two types of SEM; Covariance Based SEM (CB-SEM) and variance based Partial least square method (PLS-SEM). Covariance Based SEM (CB-SEM) is primarily used to confirm or reject theories in an empirical testing of systematic relationships between multiple variables. When working with the SEM, it is required to report the distribution of data whether the data set follows the normal distribution or not. When working with Covariance based SEM (CB-SEM), it must follow the normal distribution. However, with Partial Least Squares SEM (PLS-SEM), it does not follow the assumptions of normal distribution [23, p. 11].

The systematic evaluation process supports for two models. The measurement model or outer model which is used to assess the relationships between the constructs and their indicators and the Structural model (Inner Model) which access the relationships between constructs. Furthermore, the empirical measures will provide the support to test and compare with the theoretically established data and the reality of the structural model by using the sample data. "The goal of the PLS-SEM is to maximize the explained variance (R2 value) of the endogenous variables in the path model" [23, p. 105].

Majority of the respondents were male (481, 64.7%) and 263 (35.3%) were female. The educational levels of respondents are as follows. 9 (1.2%) were yet to sit for the Ordinary Level exam (O/L), 4 (0.5%) failed the O/L, 14 (1.9%) passed O/L, 23 (3.1%) failed Advanced Level (A/L), 633 (85.1%) passed A/L 41 (5.5%) obtained a diploma, while 20 (2.7%) had completed their degree. The majority of the respondents own a computer, that is 624(84%) while 120 (16%) didn't own a computer. The computer literacy level of the respondents who

have no knowledge were none, 10 (1.3%) had poor literacy level, 72 (9.7%) respondents were average, while 272 (36.6%) and 292 (39.2%) had good and excellent computer literacy levels respectively. As for the Computer type used by the respondents 204 (27.45%) students used desktop computers, 426 (57.3%) respondents used laptops, while 3 (0.4%) used other types of computers and 111(14.9%) were not using computers at all.

The five (5) questions were operationalized under the Independent variable of User skills and Experiences. The frequency distribution of the respondents for this variable was "Strongly agree" was 21% and "Agree" was 61%. Thus, 82% of the respondents agreed with their User skills and Experiences in the existing service. As same the five (5) questions were operationalized under the construct of Course Organization. The frequency distribution of the respondents for this variable was "Strongly agree" was 9% and "Agree" was 61%. As A Result, 70% of the respondents agreed with the existing service of Course Organization.

A. Assessment of the results of the Reflective Measurement Models

Measurement model was generated with constructs and related items. The evaluation was depending on relationships between the items and the constructs (Reflective or Formative indicators). The Model justification for reflective relationships are indicated by arrows going out from the construct to their items and formative relationships are indicated by arrows coming towards the constructs from the related items. Model generated for this study is a reflective model. It was tested for the outer loadings of the constructs, Construct Reliability and Validity and Discriminant Validity.

Outer Loadings

The outer loadings which are less than 0.708 should be removed by examining the effect of the item removal compared with the Composite Reliability (CR) and Average Variance Extracted (AVE). Generally, the outer loadings between 0.4000 and 0.7000 should be considered for removal from the measurement model when it leads to an increase of CR and AVE above their threshold values (CR; 0.60-0.90 and AVE>0.50). However, the items which are less than .4000 should be eliminated from the construct (Hair, Black, Babin, Anderson, &

Tatham, 2011, p. 801; Hair, Hult, Ringle, & Sarstedt, 2017,p.114).

TABLE 2 OUTER LOADINGS

Items	Course Orga.	Per.Ser.Qua	User Skills
CO1P	0.729		
CO2P	0.852		
CO3P	0.838		
CO4P	0.787		
OLQ1P		0.863	
OLQ2P		0.881	
OLQ3P		0.811	
US1P			0.854
US2P			0.871
US3P			0.851
US4P			0.816
US5P			0.794

The initial analysis of the Outer Loadings of 5th component of the Course Organisation was not up to the standard (COP5= 0.708) and it was removed from the model then the Average Variance Extracted Factor (AVE) was increased its' value from 0.579 to 0.645. The removal of the item was can be understood through this rational. [33].

Construct Reliability and Validity

All Cronbach's Alpha (CA) values for all variables are more than .700 and can be considered as "good". Internal consistency reliability is Composite Reliability (CR). The common minimum threshold value for CR is 0.700 but should be less than 0.95 [23, p. 124]. All values have exceeded the threshold value and have reached the required level of internal consistency reliability. Two ways of evaluating the convergent validity of reflective constructs are the outer loadings of the indicators and the Average Variance Extracted (AVE). The square value of the size of the outer loadings is called indicator reliability. AVE is equivalent to the communality of a construct. AVE value of .50 or higher indicates that the construct has explained half of the variance of its indicators.

TABLE 3 CONSTRUCT RELIABILITY AND VALIDITY

	CA	rho_A	CR	AVE
CO	0.815	0.818	0.879	0.645
PSQ	0.812	0.822	0.888	0.726
USE	0.894	0.907	0.922	0.702

Discriminant Validity

First approach of the discriminant validity is cross loadings. In the table 3 rows represent the values of indicators and columns represent the constructs. With reference to each and every construct, the values of the indicators show that loadings are exceeding the cross loadings. That indicates the Discriminant Validity has been established.

Cross Loadings

TABLE 4 CROSS LOADINGS

Items	CO	PSQ	USE
CO1P	0.729	0.314	0.287
CO2P	0.852	0.326	0.121
CO3P	0.838	0.303	0.154
CO4P	0.787	0.265	0.095
OLQ1P	0.358	0.863	0.209
OLQ2P	0.324	0.881	0.193
OLQ3P	0.279	0.811	0.174
US1P	0.235	0.224	0.854
US2P	0.174	0.205	0.871
US3P	0.161	0.190	0.851
US4P	0.148	0.166	0.816
US5P	0.134	0.147	0.794

Fornell-Larcker Criterion

The second approach of assessing the discriminant validity is the Fornell-Larcker criterion. It compares the square root of the AVE values with the latent variable correlations. The square root of the each construct's AVE values of each variable should be greater than its highest correlation with any other construct [23, p. 116]. Table 4 shows the square root of each construct's AVE values on the diagonal and other non-diagonal values which represent the correlations of other constructs. It can be compared with the same row or with the same column for the establishment of the discriminant validity.

TABLE 4 FORNELL-LARCKER CRITERION

	CO	PSQ	USE
CO	0.803		
PSQ	0.379	0.852	
US E	0.208	0.226	0.838

Heterotrait-Monotrait Ratio (HTMT*)*

The third approach of the assessing Discriminant Validity is Heterotrait – Monotrait ratio (HTMT) of the correlations, where the threshold value of 0.90 suggests lack of discriminant validity. In Table 5, the bootstrapping procedure is used to drive the distribution of the HTMT statistics. The confidence intervals (2.5% and 97.5%; lower and upper bounds) of the HTMT statistic and does not include the value of 1 for all combinations of constructs, so Discriminant Validity is established under HTMT [23, p. 122].

TABLE 5 HETEROTRAIT-MONOTRAIT RATIO (HTMT)

	CO	PSQ	CI		
			2.5%	**97.5%**	**Does not Include 1**
CO			0.375	0.540	YES
PSQ	0.459		0.149	0.319	YES
USE	0.234	0.260	0.167	0.346	YES

Summary of the measurement model analysis

The results have reached up to the standard. All Outer Loadings are > 0.708, Composite Reliability (0.50-0.90), Cronbach Alpha (0.60-0.95) and Discriminant Validity HTMT confidence Intervals did not include "1" in the confidence intervals.

Evaluation of the Structural Model

Structural model assessment procedure comprises of the bootstrap procedure (5000 samples) to get the significant results of the path co-efficients (P-values), assessment of Collinearity issues, R^2, Effective size (F^2), assessment of Predictive Relevance (Q^2). The Collinearity assessment is done with Variance Inflation Factor (VIF) (Table 4.6) and Tolerance value (1/VIF). The critical level of Collinearity is measured with VIF value above 5 and tolerance value below 0.20. All the VIF values of dependent and independent variables are below the threshold value of 5 and tolerance limit is higher than 0.20 and no multicollinearity critical issues with this structural model.

The R^2 value (Table 7) which represents the coefficient of determination use to measure the predictive power of the model. The R^2 value ranges from 0 to 1 and higher levels represents the high level of predictive accuracy. Since this study is a part of a research and considered only two independent variables the R^2 has given very less value of 17%.

The effect size (f^2 value) (Table 8) is used to check the impact on the endogenous construct or whether a predictor latent variable has a weak, medium, or strong effect on the structural model [34]. The guidelines for assessing f^2 are the values of 0.02 (small), 0.15 (medium) and 0.35 (large) respectively [23, 35, 36].

Construct Cross Validated Communality can get by the blindfolding procedure assesses of the predictive relevance with respect to each endogenous construct of the path model. The resulting output of estimates are tabulated in table 4.9 with SSO (Sum of the Squared Observations), SSE (Sum of Squared Prediction Errors) and the Q^2. The Q^2 values for all three endogenous values are above zero. (Hair J. F., Hult, Ringle, & Sarstedt, 2017).

TABLE 6 COLLINEARITY STATISTICS (VIF)

Construct	Perceived Service Quality
Course Organisation	1.045
User Skills and Experience	1.045

TABLE 7 R^2 VALUES

Construct	R Square	R Square Adjusted
Perceived Service Quality	0.166	0.164

TABLE 8 F2 VALUES

Indicator	Saturated Model	Estimated Model
SRMR	0.071	0.071

TABLE 9 CONSTRUCT CROSSVALIDATED COMMUNALITY

Cons.	SSO	SSE	Q² (=1-SSE/SSO)
CO	2,976.000	1,788.221	0.399
PSQ	2,232.000	1,285.098	0.424
USE	3,720.000	1,764.839	0.526

a. Model_Fit

The standardized root mean square residual (SRMR) (Table 10) is the difference between the observed correlation and the predicted correlation. It allows assessing the average magnitude of the discrepancies between the observed and expected correlations as an absolute measure of (model) fit criterion. A value less than 0.10 and of 0.08 are considered a good fit [23]. The saturated model is the model that assesses correlation between all constructs. And the estimated model is a model that is based on a total effect scheme and takes the model structure into account. The results indicate that the model is a good fit as SRMR is less than 0.08 [37, 38, 33].

TABLE 10 MODEL FIT

construct	PSQ
CO	0.138
USE	0.027

Final Structural Model

The path coefficients (Table 11) are the relationships between variables which are related to the hypotheses. The standardized values are between +1 and –1 representing larger to smaller respectively. The path coefficients which are closer to 0 are very poor, while paths closer to 1 represent strong relationships. The bootstrapping procedure was applied to identify the significant relationships between the constructs.
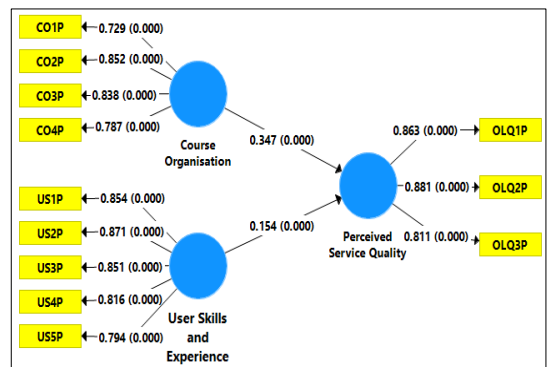

Fig. 2. Final Structural Model

TABLE 11 PATH COEFFICIENTS

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
CO → PSQ	0.347	0.349	0.034	10.095	0.000
USE → PSQ	0.154	0.157	0.036	4.286	0.000

The results of the hypotheses under the two (2) objectives are summarized in the Table 4.12.

TABLE 4.12 THE SUMMARY OF THE FINAL STRUCTURAL MODEL

Research Objective	Hypothesis	Path values Significant	Hypotheses support (Y/N)
To find the significant impact of Course Organization and User Skills and Experience in computer technology with contrast to Students' Perceived Service Quality in ODL	There is a significant impact of Course Organization on Students' Perceived Service Quality in ODL in OUSL.	0.347	Y
	There is a significant impact of Computer Skills and Experience on Students' Perceived Service Quality in ODL in OUSL	0.154	Y

V. CONCLUSION AND RECOMMENDATION

There is a significant impact of Course Organization on Students' PSQ. The Course Organization was introduced in some research work as Course structure and Academic Advising. In the study by Chaney, et al., (2007), it was found that there was a significantly positive relationship between the Course structure and Quality of the learning experience [14]. Consequently, Mantovani (2012) also explored Course Organization as only a positive relation with the institutional support. The results indicate that the 70% of respondents already ensured with the existing service of Course Organization process.

The SQ dimension of Computer Skills and User Experience showed a positive significant impact (0.154, p< 0.000) on Student's PSQ in ODL in OUSL. The result of this study is consistent with the Udo, Bagchi, & Kirs, 2008 [20] findings, which was in an e-learning environment. The explanation for this insignificant results show that the respondents have ensure their Basic computer skills, most frequent Software packages and knowledge of the Internet and it is evident as 82 % of the respondents agreed with this experience. The findings are consistent with the empirical research by Kuo, Walker, Belland, & Schroder in 2013 [39], which was a predictive study of on line courses. Internet self-efficacy, which is the user contribution to access the online courses is a good predictor of service quality for student satisfaction in online learning. Hong (2002) revealed the students who have Computer familiarity did not influence the attainment of the course but the users were more satisfied with the course [26]. Rakap, 2010 found there was a positive correlation between students' computer skills and knowledge gain and the influences of prior experience is very important for the students' success of the web-based courses [40]. However, these results are consistent with the current study results. Zhang, Prybutok, & Huang in 2006 have empirically revealed that User skills and their skill differences in terms of computer proficiency and user experiences are significantly associated with Student's PSQ toward e-services [21].

The staff who is conducting the Orientation programmes or academic advising sessions must be well equipped and well trained for ODL environment requirements. To strength the quality enhancement in to these programmes student feedback must be employed through the surveys and analyze for the findings and their importance. Decisions must be taken as strategically and implement very quickly.

Introduce Computer Literacy Certificate Program as a pre- requisite for the OUSL degree programs and must not mix with the degree subjects. Most of the programs are in hybrid version, a mixture of blended and limited face to face sessions. The students who have experience in computer technology will perceive the flexibility of the DE programs and will be more satisfied with their basic computer skills and internet browsing. Since the self-motivation and self-efficacy will reduce the student attrition and maintain the level of student persistence in all stages. The student's surveys must be done once the programme or course is over and as a regular practice element.

This study focused on the student perspectives only, but in the education environment, there are various groups that need to be satisfied, such as the employers, the government, parents, and the general public (Abdullah, 2006). Thus, this type of study has to be done with other perspectives also and it may be worthwhile to develop a measuring instrument from different perspectives as well.

Future studies must be done with a wider scope and broader geographical areas based on the Regional educational centers. The same study must be strengthened by using both qualitative and quantitative designs simultaneously to identify the gaps of the results and understand the reality of the situation.

Cross sectional and longitudinal studies can be done to enhance the quality of the data collection, as different data analysis for the same purpose may increase the accuracy of the findings.

Also, different direction of the research should be done in the students' angle. Focus should be given on how students are engaging their educational work, how much of time is dedicated for their studies, the learning outcomes, interaction with teachers and peers, additional readings and their disciplinary behavior in the institution

This study did not examine the financial benefits and losses of the figure wise data due to the dropouts and the attrition of the registered students. This was encountered as the one of the limitations of this study and a future cross-sectional study could reveal the findings for the organizational financial benefit.

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The Empowerment of Female Entrepreneurs using Social Media for Business: A Systematic Literature Review

Thilini De Silva
Faculty of Business
NSBM Green University Town
Homagama, Sri Lanka
thilini@nsbm.lk

Abstract— **Problem: Women entrepreneurship has grown significantly all over the world, and it is widely established that entrepreneurship is important for economic growth and wealth. Despite those facts, women's participation in entrepreneurship is lower than men's in almost all societies. Objective: This article aims at providing a systematic review and a descriptive evaluation of the use of social media to support women entrepreneurship. Methods: A systematic review of three databases covering technology, business and social sciences (Scopus, Emerald and Google Scholar) was carried out. Results: This article provides a methodological description of 15 studies about the impact and use of social media/ ICT on women entrepreneurship and a reflection on what approach or design will be suitable to researchers focused area. The following rubrics were considered for the analysis: research objectives/ questions, materials included, participants, research design/strategy, research methods, measures/ analysis, re-sults/conclusions and credibility and reliability. Conclusions: The systematic re-view demonstrated that most research in the area of women entrepreneurship and social media are conducted in a case study research design with a qualitative ap-proach. The overall research findings show that the social media and ICT related other services can be utilized for development of women entrepreneurship.**

Keywords— *Women Entrepreneurship, Social Media, Women Empowerment*

I. INTRODUCTION

Sri Lanka consists of 20.95 million of population and faces a huge problem in providing jobs for its people with an unemployment rate of 4.80% by year 2017. There are many causes behind the employment issue in Sri Lanka, such as the low education level, the lack of skilled workers, the unequal development in Sri Lanka's different regions, and so on. However, one of the main problems is the lack of available jobs to meet the needs of Srilankan citizens. Entrepreneurs create jobs. Entrepreneurship can be defined as the initiation of change through creation or innovation that usually bears risk. According to Shane[1] entrepreneurship is about discovering and exploiting opportunities. It is suggested that entrepreneurship research should deal with the phenomena of emergence, such as how opportunities are detected and acted upon, or how new organizations come into being[2]. The study of the entrepreneurial function and the creation of new business can be approached from varying theoretical perspectives (economic, psychological, institutional, and managerial). Therefore, entrepreneurship be an important solution to reduce unemployment rate and improve the economy of a country.

The Srilankan government has introduced several policies to encourage Srilankans to be entrepreneurs through the national policy framework for small and medium enterprise development by the Ministry of Industry and Commerce with the vision to create significant number of globally competitive, dynamic, innovative, technologically driven, eco – friendly and sustainable SMEs that contribute greatly to the national economic development and with the objective to support start – up SME enterprise,

strengthen the existing enterprises and extend nursing programmes for potentially viable sick SME's7. One group that becomes a target of these government policies is women, given the fact that most of the population in Sri Lanka is female.

Woman entrepreneurs generate income for themselves and their families, create jobs, and make significant contributions to the country's economy[3]. More than half the Sri Lankan population, 50.7 % consists of women, of the total employed population; female representation in the employer category is only 1%. (The Department of Census and Statistical Annual Report of 2017). However, latest available data for Sri Lanka indicates that out of the total 'economically inactive population' of the country, 75.8 per cent are females, and out of the total 'economically active population' (labour force) females account for only 36.7 per cent. This implies that there is a large untapped women population that could be utilized for the development of the country, while empowering the individuals (i.e., females) and benefitting society. On the other hand, attracting more women in to the labour force is of utmost importance, and given the fact that most of the population in Sri Lanka is female. Increasing female labour force participation can be done in two ways; first is by attracting more women in to the labour force as 'employees' and the second is by encouraging women to act as 'employers', i.e., more women entrepreneurs. Fostering women's economic development through enterprise promotion can have a positive impact in several areas. It enhances economic growth and provides employment opportunities; in addition, it improves the social, educational and health status of women and their families as women invest more in education, health and well-being of the family. Despite all these possible benefits to the economy and the society, gender biases against women are common in the SME sector, a sector in which women should ideally be able to start up their careers as entrepreneurs. As the National Policy on Human Resource and Employment observes "... there is a gender bias in SME employment. Workers employed in SMEs are predominantly men. Good equal employment practices are needed to correct the above bias ".8

The emergence of women entrepreneur in a society depends to a great extent on the economic, social, religious, cultural, and psychological factor prevailing in the society. In last decade, economic compulsion has led more and more young women to take employment and this change which is a structural change in the society from an agrarian society towards a service centered where the structure of the family is also adapting to the new economic arrangements in the environment is a slow process and is related to economic growth.

However, entrepreneurship can be potentially challenging for women. Considering their role as the main caregivers of the family, women might have some limitations in finance, business skills, mobility, and networks, to be able to run a successful business. Different research has found different challenges faced by women entrepreneurs. The challenges restricting entrepreneurial development and ICT among women in general are accessibility to support service[4], conditions of work in economic activity, consistently high level of activity and responsibility in home, dependency on family, family pressure, forces into the field of community development[5] formal political rights for women, formal socio cultural norm, gender based demands in ICT sector, higher Education related to entrepreneurship and business, household structure and control over resources, increased female participation in household activity, indefinite gender roles in the countries both inter and intra sectoral, inflow of skilled workers, informal credit systems predomination[6], irregular development for women in business sector to use ICT, lack of credit and extension services, lack of entrepreneurial activity, lack of investment in ICT inputs, improving practices or technology for women's, lack of involvement in welfare issues, lack of personal status law, lack of policy reforms, lack of women rights, lack of women's access to credit, low income[6], low level of access to land, low participation rates participation in economic activity[7], low reported statistics of successful female entrepreneurs, no independent women's activities, non-dependence of pragmatic practice, poor integration of financial markets[8], preference for white collar job, with its more benefits, flexible

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7 National Policy Framework for Small and Medium Enterprise Development, Ministry of Industry and Commerce (2017)

8 National Human Resource and Employment Policy (2012, p. 50)

hours, and security, in spite of relatively low wages, prominent activity for women in both rural and urban areas, restrictions and segregation, significant low female representation, slow demand for ICT, slowed or stagnated work force employment, social and family pressure, socio cultural dimensions toward ICT, specific and higher activity rates are concentrated among younger women towards other areas, statistical comparisons among the work activities, undermining the quality of girls' education, unorganized ICT sector, women appear to be underrepresented in the informal sector and women's work in the formal sector are restricted to particular spheres including ICT.

ICTs bring entrepreneurial opportunities that overcome limitations imposed upon women. A new kind of service made available by the Internet, which has gained tremendous popularity is social media. Following their introduction, social media such as MySpace, Facebook, Viber, Whatsapp and Twitter have attracted millions of woman users, many of whom have integrated these sites into their daily life.

The researcher intends to research on how female entrepreneurs can benefit from social medial in business specifically in beauty salons sector. Further the researcher aims to investigate how social media can boost women entrepreneurship by allowing them to improve their businesses and how these businesses contribute to their empowerment. Social media can be described as applications that "allow the user to articulate an egocentric network, anchored by a profile"[9]. One advantage of the social media is its ability to help users manage both their weak and strong ties. Especially on sites such as Facebook, "features to search people by name, region and school allows them to find and keep in touch with friends with whom they might have otherwise lost touch"[9]. At the same time, users can also connect to casual acquaintances that might have some similarities with them, such as similar hobbies, occupations, and so on. During the year of 2016, we Sri Lankan went on to subscribe to 1.5 million cellular mobile connections and over 300,000 broadband and dial-up internet connections, increasing Sri Lanka's internet penetration to a 30% and to our total internet users to a 6.1 million.9 This resulted in the proliferation of businesses using social media as its

communication platform, whether through sales offers or advertising. Women often take advantage of social media more than just to find friends. They can now use these media as a medium to support their financial independence. It is a growing trend to open business through social media. They can use these technologies, such as smart phones, while taking care of their children. They also do not need to have stores which can be costly since they only need to showcase their products in the virtual stores. The applications in computer are also easy since they can tag pictures and provide information to potential customers by a single click. Use of social media in business can support the Srilankan women to overcome many of the limitations they have in entrepreneurship.

II. METHODS

A. Systematic literature review approach

A literature review uses "a systematic, explicit, and reproducible method for identifying, evaluating, and synthesizing an existing body of completed and recorded work produced by researchers, scholars and practitioners."[10]. This approach was originally developed as a means of synthesizing medical research evidence, but is increasingly used in other fields, such as social, policy and business studies[10]. In contrast to other types of literature review (e.g. narrative reviews and scoping reviews), systematic reviews focus on specific research questions with narrow parameters; are guided by inclusion/exclusion criteria set at outset (e.g. topics, settings, study types); extract data only from included studies; evaluate the quality of those studies, and base their conclusions largely on the evidence relating to the initial research question(s)[10]. A systematic review of four databases covering technology, business and social sciences (Scopus, Emerald and Google Scholar) related to women entrepreneurship supported by ICT was carried out in order to obtain articles English, published during the last eight years. An analysis of the articles' references list found in the databases was also performed.

The keywords used were women entrepreneurship and social media. The keywords used to identify social media were; ICT, Internet, social media and

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9 Internet Usage Statistics of Sri Lanka, 2017

mobile applications. The search was limited to the abstracts, keywords, and titles of the articles.

B. Search strategy

Three international research databases, covering technology, business and social science disciplines (Scopus, Emerald and Google Scholar) was used for the search. The broad search query was constructed as follows: ("women entrepreneurship") AND ("social media" OR "Facebook" OR "Twitter" OR "ICT") AND ("women empowerment").

C. Article screening and selection

While all these articles refer to different factors, classifying them in one way or another, the review of the articles seeks to identify the single best way to organize them. Furthermore, some of the articles, in referring to the success of women's business ventures, proposed the use of qualitative indicators, while others favored the application of quantitative ones.

First the articles were sorted and screened independently, based on their titles and abstracts. Full text versions of articles appearing to meet the inclusion criteria were obtained for further screening. Then iteratively checked samples of the assessed articles to ensure consistency with the inclusion and exclusion criteria. This allowed for ambiguities or uncertainties to be discussed and addressed at an early stage, so that consensus could be reached between reviewers.

Inclusion criteria
Academic research with a primary focus on studies primarily focused on the use of social media or equivalent supporting the women entrepreneurship, studies published after 2010 were selected.
Exclusion criteria
Studies on social entrepreneurship have also been excluded to enable to consider only those whose target is to generate economic wealth.

D. Data extraction and thematic analysis

Extracted information from all eligible studies using a structured form containing the following fields: study authors, publication year; journal discipline; setting (type of organization, country/region in which the study was conducted and year when the study was conducted). The rubrics, as identified, are as follows were stated objectives, research purpose/questions, participants, study/ research design, methods, measures, results/conclusion and reliability and validity. Extracted study findings were firstly coded and it provided a convenient means of categorizing study findings according to their objectives and intended outcomes.

III. RESULTS

Scopus produced a total of 60 documents by using the search string. The following variables were studied: women entrepreneurship and ICT/ social media. The documents were limited to years from 2010 to 2018, document type to journal articles and language to English and filtered to 37 articles. In Emerald Insight 03 articles were found and from Google Scholar 04 articles were found. Many articles were not used as they did not use ICT/ social media supporting women entrepreneurship. But after filtering the articles as per the requirement specially taking the methods used into consideration finally 15 articles (Scopus 11, Emerald Insight 03 and Google Scholar 01) were selected for the systematic review. Out of the 15 articles filtered, screened and selected 10 ([11],[5],[12],[13],[14],[15],[3],[6],[16],[17]) were qualitative researches and 05 ([18],[12],[19],[20],[21]) were quantitative researches.

A. Outcomes of the Methodology Analysis

Research Objectives/ Research Questions

When reviewing the selected 15 research articles could identify the purpose/ objectives of research were focusing on 4 main areas. That is to explore how women use ICT and related services for entrepreneurship, how to implement agendas and policies by governments, non-government organizations to empower women through supporting them in ICT trainings, to compare men versus women entrepreneurs in usage and success of internet and related services and finally to explore internet as a new opportunity to women entrepreneurs. 5 researches or 33.33% of sample were focusing on how women use ICT and related

services for entrepreneurship, another 5 researches or 33.33 % were on how to implement agendas and policies by governments and non-government organizations to empower women through supporting them in ICT trainings, 4 researches or 26.67% on sample were on to compare men versus women entrepreneurs in usage and success of internet and related services whereas only one research to explore internet as a new opportunity to women entrepreneurs.

Research Materials Included

Research materials include all types of materials generated and utilized in the scope of scholarly research. In the sample of 15 researches they have commonly used audio recordings, video recordings, speeches, published books, government publications, oral histories, records of organizations, field notes, published journals mainly in case study, survey and systematic review research designs. It is not possible to come up with exact percentage of usage of these materials as certain researches have used one or more materials in their research work as primary record of their research activity and obviously the 15 journal articles published can be considered as the final output material of the research.

Participants/ Sample/ Location

The review of the participants, the sample or the respondents selected was interesting. Out of the 15 researches in 11 the participants were women entrepreneurs and in 4 quantitative research (out of 5) the researches have selected the participants as women entrepreneurs. In the 5 quantitative research the sample sizes selected was large and were more than 200 in every case and in one research all women entrepreneurs/ members of the National Association of Women Entrepreneurs in Malaysia were selected as the sample whereas the respondent rate was 62%, exceptionally in only one quantitative research 8330 adult women were selected as the participants and it was a longitudinal research conducted in India for 7 years. Other than that, for the research in which the objective was to implement agendas and policies by governments, non-government organizations to empower women through supporting them in ICT trainings the participants were women non-government organizations and incubation centers. There was

one research conducted with the objective to compare men versus women entrepreneurs in usage and success of internet and related services used existing literature and recent reports as the sample for the review. One research have used 200 women aged 16 - 60 in a broad sense yet the sample was a cumulative of women in different sectors in the society as small-scale traders (58: 29.0%): housewives/homemakers (48: 24.0%): farm employees (25: 12.5%): domestic workers (18: 9.0%): educators/teachers (16: 8.0%): students (15: 7.5%), entrepreneurs managing large-scale enterprises (3: l.5%): clerical workers (9: 4.5%): community development workers (6: 3.0%) and preachers (2: 1.0%).

The researches were conducted in different locations in the world namely Oman, UAE, Malaysia, India, Uganda, Jamaica, Brazil, Phoenix Metropolitan, Indonesia and Sudan and almost all the locations are from the upper and lower developing countries in the world.

Research Design/ Strategy

Different research has used different research designs/ strategies mainly aligning to the research objectives/ questions. In the review conducted 6 (40% of the sample) researches have used case studies, 5 (33.33% of the sample) researches have adopted surveys (4 manual surveys and 1 web survey), 3 (20% of the sample) researches have used experiments (1 field – quasi experiment and 2 normal experiments), 1(6.67% of the sample) research has used a systematic review and 1 (6.67% of the sample) research has used grounded theory.

All 5 researches design was surveys have used the quantitative approach whereas the rest of designs such as case studies, experiments, systematic review and grounded theory strategies have used qualitative approach. Analyzing further the experiments were used in order to align with the objective of how to implement agendas and policies by governments, non-government organizations to empower women through supporting them in ICT trainings and a rare design like grounded theory which are used to clarify concepts or produce new theories have used to achieve the objective to explore the role social media plays in the businesses.

Research Methods

Out of various research methods/ tools available the 15 researches selected for the review has used only interviews, questionnaires, secondary documents and focus group discussions. 8 (53.33% of the sample) researches have used interviews as the research method and out of that 5 researches have used interviews and 3 researches have used semi – structured interviews. 5 (33.33% of the sample) researches have used questionnaires as the research method and these researches specifically had surveys as their research design has used the quantitative approach. For the research design of systematic review, the researches have used secondary documents as the research method and there is one research which has used focus group discussions as the research method. The research methods have aligned mainly to the research design/ strategy adopted to the research.

Research Measures/ Analysis

As the sample of 15 researches selected for the review is a combination of qualitative and quantitative research approaches the research measures used for analysis can be divided pertaining to the 2 different approaches. In 5 quantitative researches they have used T tests, one-way ANOVA, repeated measure design, generalized estimating equations (GEE), NodeXL – social media research tool, regression and mean. In 10 qualitative researches they have mainly used thematic analysis (in 3 researches), NVIVO software (in 3 researches) content analysis (in 2 researches), social network analysis and data triangulation.

Results/ Conclusion

The results and the conclusions of the reviewed research articles were aligned to their research objectives/ questions. The researches which had the objective to explore how women use ICT and related services for entrepreneurship had the results as ICT will help the women in business and developing the activity to receive consideration in the society, the fact that personal traits such as innovativeness and risk-taking propensity are significantly correlated with usage of ICT and social media, there is a marked correlation between the respondents' level of education, type of ICTs'

accessed and information needs and purposes and social media has an overall positive impact on the lives of women entrepreneurs, both professionally and personally.

The conclusions such as to face the challenge and develop women and create entrepreneurial activities and support the economic development, an integrated platform built by combining social media features and feminist pedagogical techniques serves as one of the best tools for entrepreneurial training are the results for the objective how to implement agendas and policies by governments, non-government organizations to empower women through supporting them in ICT trainings.

The outcomes to the objective to compare men versus women entrepreneurs in usage and success of internet and related services was rather interesting. One research has concluded that ties to family and community, the amplification effect is such that the highest levels of entrepreneurial activity and success are observed among women with high centrality and ICT use—effects that increase over time. For ties to men in power, ICT use is associated with increased entrepreneurial activity only when these ties are low, but these interactive temporary temporal patterns do not emerge for profit and another research concludes normative representations and positioning of female traders can sideline entrepreneurial identity and over-validate gender identity.

Most research has found internet as a new opportunity to women entrepreneurs. It is proved by the results such as that female entrepreneurs are interested in using mobile phones. However, they have not yet realized the full potential of mobile technology in empowering them beyond its basic use, mobile phones can be used to overcome these challenges, ability to recognize opportunities and respond to technological change and social media have potentials to support women entrepreneurship by allowing them to open business from their homes. In addition, this type of business can also be seen as a solution to the dilemma faced by these women in managing their career and household responsibilities.

Apart from the above the researches reviewed has found commonly the barriers women entrepreneurs face namely, various o Gulf countries are facing socio cultural challenges which restrict women for doing business, the concern of female entrepreneurs from ethnic minorities in gaining

financial backing and recognition of themselves as committed and successful entrepreneurs and access and exclusion are still predominant issues, as while a meager average of 11 (5.5%) respondents use modern technologies such as the computer/internet, more than half (115: 57.5%) of the respondents surveyed face problems ranging from affordability, to distance and time.

Credibility and Reliability

Reliability is the degree to which an assessment tool produces stable and consistent results. In the sample researches reviewed where the research method was questionnaires the cronbach alpha was used to check the reliability of construct. The credibility is involved in establishing that the results of the research are believable. It depends more on the richness of the information gathered, rather than the amount of data gathered. There are many techniques to gauge the accuracy of the findings, yet the reviewed researches has used techniques like data triangulation, triangulation through multiple analysts and 'member checks'. In one research the authors have declared in a disclosure statement that no potential conflict of interest was reported by the authors and it is one of the examples. The participants/readers are the only ones who can reasonably judge the credibility of the results.

IV. DISCUSSION

In this systematic literature review, the researcher has reviewed 15 selected research articles with key words women entrepreneurship and social media setting various exclusion and inclusion criteria aiming at providing a systematic review and a descriptive evaluation of the use of social media to support women entrepreneurship, to gain insights on the current research work on the focused research area of women entrepreneurship and social media and to get a deep understanding on the set rubrics research objectives/ questions, materials included, participants, research design, research methods, measures/sis, results/ conclusion and credibility and reliability. According to the review of the research articles selected it is evident that research design and all other rubrics are aligned to the research question/ objectives. Research methods are selected according to the research

design and the research measures are decided according to the research methods.

As per the review done of selected researches (15 articles) and through the identified four areas of research objectives/ questions the most related objective/ question to my focused area of research is questioned to explore how women use ICT and related services for women entrepreneurship. The researches (5 out of 15, 33.34%) which had the same have mostly (3 out of 5, 60%) used qualitative approach and rest the quantitative approach. In those where the approach is qualitative, the research design/ strategy adopted were case studies and have used female entrepreneurs as the respondents and as the research method have used interviews, semi structured interviews and focus group discussions using mainly thematic analysis, social network analysis and NVIVO software for the analysis. In other 2 researches the research design was surveys and has used questionnaires as the data collection tool from women entrepreneurs and has used T tests, one-way ANOVA and regression. Reviewing in detail of the research articles I presume that my research focus area will mostly suit a case study design, interviews for data collection and thematic analysis conduct through NVIVO software.

Computer ad system sciences are concerned with the intersection of social behavior and computational systems. It is based on creating or recreating social conventions and social contexts using software and technology. My area of research in women entrepreneurship and social media specifically influence the society in a very constructive way. In many countries, social media can open up new opportunities for female entrepreneurs and encourage the creation of new businesses run by women, thanks to their flexibility and their attributes. The major implication is to advance knowledge and practice in the area of gender in management and use of social media by focusing on empirical research, theoretical developments, practice and current issues. Benefits are related to a better understanding of the debate on "gender and management" themes by reconsidering networking activities with social media. According to the authors, women entrepreneurs" ability to take advantage of social media could result from their greater propensity to adopt a community-based approach and to maintain social relationships, and from a greater predisposition to interact with customers and

perceive their needs. Therefore, social media exerts a particularly strong impact on women, since the latter are better able to glimpse potentialities of social media and to take advantage of them.

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Understanding and fostering creativity through nature inspired structures project

Upeksha Hettithanthri
NSBM Green University Town
Pitipana, Homagama
upeksha@nsbm.lk

Abstract—**Creativity is an amazing ability which is associated with human brain. Understanding creativity and how creativity could be utilized in creation is further explored in this review. Creative efforts and values of creativity can contribute largely in assessing creativity. Creativity can be identified as an extraordinary ability which has socio cultural, economic values. This study was conducted among 50 students of Interior Architecture degree program to understand how the nature inspired structural design project have been supportive in stimulating creativity of the design students. For this study qualitative methodology was adopted in collecting and analyzing data. The study is focused on investigating how students could foster their creative thinking ability through making nature inspired model making and prototypes and how the creativity levels could be differed from non-nature inspired theory based structural design project.**

Keywords—creativity,   nature   inspirations, prototyping

I. INTRODUCTION

What is creativity ?

Many philosophers have defined creativity in multiple ways. It can be defined as a procedure which increases the sensitivity or the thoughtfulness to a specific problem or to a sequence or a lost connection in an area of knowledge. According to Boden creativity has been explained as a capability to produce fresh and unique ideas in the process of problem solving [1]. Creativity is an extraordinary ability of human that supports to reach fineness in everyday, regular process of imagination, thinking and implementation. Creative thinking is associated with the improvements of several other transmit atypical thoughts. further it supports in generating insightful judgments , innovations and most importantly understand the reality in an unique way [2]. Creativity is usually associating with the ability of problem solving and this process of problem solving involves with many brain functions and linked with thinking. Creativity can be seen in different forms and creative individuals are having the ability to link their thinking process related to the problems raised to find best and newer solution. According to Christians , creativity can be measured and the measuring tool could be complicated and vary upon the perception , personality, choices and experience of the juror or the observer [3]. However, creativity can be finding in most of the humans and, sometimes it needs stimulations to bring newer ideas, majority needs creative sparks, inspirations and precedents to come up with newer ideas, but some extra ordinary personalities usually produce brand new thoughts, products and innovations and it is often true there are various levels of creativity with in individuals.

As explained by Cohen , creativity involves in producing something new or rare but still suitable and appropriate to the problem that is valued and accepted [4]. Westmeyer has described the creativity as a process which is socially constructed and the ability of showing neuronal functions through the thinking process [5]. According to Cohen social construction is depends on the culture. Culture itself inclusive of traditions, customs, values, believes and more importantly political and economic conditions of the place

based on and technology available in a given group or an individual in a particular time and place [6]. As depicted by Schon creativity requires commitment to the socio-cultural system but it should not be too alien, harmful or dangerous to that context. Further he has explained individuals specialized abilities and cooperate endeavors related to creativity. [7]. Boden has explained creativity as a skill rooted in everyday capabilities such as combination and newer ideas , perception , analogical thinking and reflective self-criticism involves in creativity [8]. Leonara believes that adaptation can support on creativity. Adaptation means limiting the environment that suffocate the creative abilities [4] .Demirkan highlighted once in his research , creativity as a natural component of the design process which occurs between problem and solution [9].

Creativity involves in problem solving and finding better and newer answers for complicated problems which enriches creativity. For problem solving process, needed two types of information, which can be elaborated as internal information and external information. As explained by the many philosophers' creativity can be considered as the major component in the design process.

Big "C" creativity and little "C" creativity

Creativity appeared in two forms. Big "C" creativity and little "C" creativity deal with individual creative domains. Big "C" creativity refers to outstanding creative abilities which requires unique abilities, specialized knowledge, personal commitment, enthusiasm and planning validated and appreciated by groups of experts and largely recognized. (Demirkan & Hasirci, 2009b). According to Laura D. high creativity (Big C) is rather rear and it is highly dependent on contextual values such as socio cultural and economic impacts [11]. Little "C" deals with usual abilities relates to creativity which is showcased at individual levels. Further little "C" involves in solving daily matters, facing life challenges in newer ways. In some situations little "C" reveals with spontaneous

creativity which doesn't need preparation and commitment [11].

Creativity is inherited in every human being and it may need creative sparks or stimulations to bring it forward and make it activated, but there are gifted personalities who were born with Big "C" [12]. Little "C" Creativity needs divine inspiration an continues motivation. However, classifying persons according to the creative levels rather challenging and it has been argued in many forums. Human mind is heavily associated with memories and links of past. Further it has a storage of recourses which could be utilize when needed and creativity can be identified as a solution-oriented brain process which deals with existing brain resources to find newer solutions. Being creative and to be labeled as creative is two different process. to be nominated as "creative" the particular person needs to have qualities related to big "C" of little "C". Creativity always associates with the power of brainstorming. The process involved in creative product is usually generated through a process which involves in many brain activities.

Creativity and giftedness is ofenly argued topics in various forums. Giftedness is directly relates with outstanding ,interlectual acedemic abilities which could be reflective in with in an individual from childhood. [6]

Reativity cannot sustain alonewith out creative capasity. Creative capacity is the potenial for creativity. It is influenced by following factors.

Inteligence
Mental ability
Opertunities with in the environment
Personality and security

Creative Thinking Process

It is important to question how creativity has been established in the thinking proces and how it could be utilised. There are plenty of literture available

for creative thinking process and this thinking process is changing from field to field. Being creative in the field of medicine and being creative in the field of advertising focusses on totaly differernt approches. However all oriented in finding solutions for problems raised and therefore creativeity can be recgnised as an ability to solve problems in newer ways. Ryan believes creativity as an ability to respond in unique ways which is largely inheritant[13]. Moreover , creativity encompasses two types of thinking paterns .

- Divergent thinking
- Convergent thinking

Divergent thinking is an ability to manipute ideas in a flexible , confidednt , inventive and elobrative manner. Divergent thinking of a learner can make a tremendes impact on the ability to think divergently and reflect their process of imagination [14]. Embeded inheritant creativity will not be usefull any more if it cannot be despalyed or expalined. Reflections of creativity is usually visible and it can be observed through the patterns of creative behaviour. According to Schon reflections of creativity can be observed in two major ways with in the creative process [7].

- Reflection in Action
- Reflection on Action

Creativity does not sustain itself. It has essiential components to support cereativity. As depicted by Simonton [15] there are 3 major elements.

- Product contains creative ideas
- Person who conceived those ideas
- Process thoses persons used to do

To judge the novelty of a product , quantity of creative ideas utilize will be observed. Here , the value of the product will be esablished through the uniqeness and the novelty, but not differently counting by the number of ideas , but value and the significance of the creative idea will be appriciated.

II. RESEARCH METHODOLOGY

This is a real-life experimental research conducted among university students who are in their first year first semester. For this study 50 students on Interior Architecture degree program has been selected and the participants were selected according to the convenient sampling method. To maintain the gender balance 25 girls and 25 boys were selected. Mean age of students was 21 years and there was no impact of the study for the non-selected students. To study students learning behavior, approvals has been taken from the respective authorities and the researcher has been conducted a participatory observation in understanding student's creative learning process[16].

Qualitative methodology was adopted in conducting this research. This is a 12 hours workshop conducted in two contexts. Initial nature inspiring process was conducted in a natural context and identifying and transferring inspirations into prototypes was conducted with in the design studio context. At the beginning, researcher demonstrate the task clearly at the classroom and then taken them outside the university where they could experience, observe and collect inspirations derived from nature. For this task the landscaped environment of the university was selected, and students spent first 3 hours at the site in searching inspirations. Students were assigned with a task of identifying unique patterns, structures of nature and as the initial step they have to record them in a way they could understand and express the inspiration. the identification and recording of the source of inspiration happened at the site visit and detailing the recording and transferring the inspiration into a design ideation to create new structures was happened during the studio hours allocated.

The final results of the students have been compared with the non-nature observed structure development project conducted with the previous batch students (n=50). And to understand how nature observation was supportive enough in stimulating creativity, researcher conducted interviews and observations while during the study.

Data Collection

Data collection was mainly done through semi structured interviews and observation notes made by the researcher. Students were interviewed during two stages; the first was at the end of the nature inspiration process and the second interview was conducted at the end of prototyping process. The interviews were recorded by the researcher and transcribed for the analysis. Field notes were taken by the researcher in three stages. Stage one is, during the selection of nature inspirations by the students and the second was during the recording process of the nature inspirations. The third was when students were transferring their inspirations into structural design ideations. The researcher has maintained a field diary and students' behavior and the tasks they engaged in were recorded hourly. Furthermore, photographs were taken during the intervals of one hour as a recording medium.

Data Analysis

Data analysis was done through six staged thematic analysis [16]. At the initial stage data gathered from the interview one has been sorted and for this, used affinity diagram. Following questions were asked in the interview one.

- Were the nature inspirations supportive in understanding structural patterns?
- How did you identify structural patterns?
- How did you record the nature inspirations?

These questions were asked to understand the observation behavior of the student and to understand their level of understanding on the task given.

The second stage interview was based on following questions.

- Was it easy to realize the structural patterns taught in theory after observing nature?
- How did you transfer the natural structural patterns into physical structures in built form?

III. RESULTS

The final structure project was assessed by two academics under the following marking criteria.

Understanding structural patterns – 20%
Recording structural patterns – 20%
Transferring structural patterns in to new physical form – 60%

Those results were compared with the non-nature observed structures development project conducted with the previous batch. 22% of students were able to identify newer structural patterns of the nature. 37% of students combined existing structural patterns with new natural patterns and created new, unique patterns, 26% students have been directly transferred the natural patterns into structural patterns, and 15% of students generate new structural patterns by combining many natural patterns together in one.

65% of students have scored above 60% for the task given and 10% students have scored not more than 50% and 3% students scored 45% and 15% students have scored up to 70 and 7% students have scored up to 80% for the given task which was significant. Students 'perception upon learning has been measured by the questioner conducted. It generated 5 main themes as "inspirational", "deep understanding", "see through the hidden anatomy", "being sensitive to nature" and "new dimension in learning". All those themes are reflecting positive attitude upon nature observation and how it has been supportive in stimulating students' creativity in a form of activity.

When comparing these results with non-nature inspired structural design project students 56% of students have been scored up to 45% and 35% students scored up to 55% and 6% students scored up to 60% and 3% students scored up to 65%. it was significant that students who went through nature inspired structural design process have been come out with novel structural patterns than non-nature inspired structural design process.

The thematic analysis conducted among non-nature inspired structural group of students generated following themes; "difficulty to get new patterns", "stuck in middle", "no new patterns available", "difference between drawing and creation".

IV. DISCUSSION

Creativity needs stimulants. When it comes to group of students divergent and convergent thinking levels will have varied each other. In the discipline of architectural learning, facilitators have to keep the creative motivation up and constant. The conventional architectural pedagogy will not be enough in catering this aspect. The studio and learning culture need to be restructured to get the maximum creative outcome of the students. This exercise done, by stepping out from the conventional design studio by giving students more opportunity to explore and understand which directly supports in fostering creative thinking abilities among them. Theory based education and student centric self-learning are two different extremes, however in architectural studies these two components have to keep in perfect balance in carving next generation designers. This study has shown that nature inspirations has broaden up the creative thinking ability of the students significantly higher than typical theory-based learning. This paper will be supportive in future studies on amending the architectural pedagogy according to the current learning needs of the students.

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Common Arduino Communication Platform

Isuru Sri Bandara Nishshanka
Faculty of Computing
NSBM Green University Town
Homagama, Sri Lanka
ibandara4@gmail.com

Chamindra Aththanayaka
Faculty of Computing
NSBM Green University Town
Homagama, Sri Lanka
chamindra.a@nsbm.lk

Abstract— **There is a huge development and implement in the Internet of Things dubbed "IOT." According to the recent data, it says there will be 1.5 billion IOT are been used by 2022. Although, many companies already built massive number of devices and sensors. Minicomputers and sensors are made for day today life easier and also, they have reasonable prices. According to these facts IOT has made a revolution in technology but because of some reason there is a small breakdown There are two major issues to have a breakdown in IOT technology. Such as, Having a great knowledge about computer programming and technological knowledge. So, to improve the IOT technology we should have found the answers for these issues My research based on addressing above mention problems and It will effect to the development of the technology directly, To address this problems best solution is Common communication platform which generalize communications and codes between IOT devices .This solution provides, IOT common communication platform, speed up deployment, and this is an Open source, not vender specific platform.**

This platform avoids the problem that need to code separately to each IOT devices because it's made general code format to the internal hardware and external plugged sensors which will help to users to understand and code to the system without having expertise knowledge of the language. This solution also allows to communicate with database in secure manner via HTTPS web server. This solution addresses major problems and it avoid obstacle which are affected to the development of IOT technology.

Keywords— Sensors, Node MCU, Interoperability, Security, Privacy, Network protocol, Wireless networks, Embedded Technology, Internet of Things

I. INTRODUCTION

IOT means the rapidly developing thing in today's world. The spreading speed of it is more than 19.2% per year. It is estimated that the spreading speed would be increased up to 8.9 tons by 2020.

However, it was 15 years ago that the term "things of Internet" was first used. There are several applications available in today's world. Though IOT is highly speeded and developed, there are several limitations in today IOT devices, such as:

- Power issues: Power assumption is really high.

- Capacity issues: Less capacity to store the receiving data.

- Processing issues: The processing takes lot of time and release the results with errors.

Because of these reasons, it made difficulties to bring them into a common system. The single chips which were developed in this manner have presented the solutions for the current problems in the computing field. The solutions are presented by considering current situations of IOT, internal capabilities, market environments, policy goals, multiple traffic types etc. The gained benefits of newly proposing platform can be listed out as follows:

- Open source: The source code is so easy and user friendly that any person can understand it even without basic knowledge.

- Not vender specific: This is not focused on purchasing and the users can access it freely

- IOT common communication technology: It's a common communication technology which helps on communication.

The proposed integrated IOT and Cloud computing application overcome all the existing barriers and turn a new chapter in the cloud.

II. LITERATURE SURVEY

Internet of Things is a new paradigm shift in the IT arena. IOT is a technological revolution that represents the future of computing and communications, and its development depends on

dynamic technical innovation in a number of important areas. IOT is an emerging technology ideal for influencing this field by providing new scalable data and IT resources required to create revolutionary applications. Presented here, there is a user-centric cloud-based model to address this goal through the interaction of private and public clouds. In this way, the needs of the end user are highlighted (Cavoukian, 2008). Given the flexibility to meet the diverse and sometimes competing needs of different sectors, the authors propose a platform for an evaluative cloud to provide the capacity to use IOT

In proposing the new platform, the associated challenges have been highlighted, ranging from appropriate interpretation and visualization of large amounts of data to privacy, security and data management issues that need to support such a platform, So that it is truly viable. The consolidation of international initiatives significantly accelerates progress towards an IOT, providing an overall view for integration and functional elements that can provide an operational IOT (Amato et al., 2013).

K. A Shokkumar, Baron Sam, R.Arshadprabhu, Britto proposes the advances in cloud computing and web of things have provided a promising chance to resolve the challenges caused by the increasing transportation problems. They tend to gift a unique multilayered conveyance knowledge cloud platform by exploitation cloud computing and IOT technologies to resolve the challenges caused by the increasing transportation issues. They present a novel multilayered vehicular data cloud platform by using cloud computing and IOT technologies. Two innovative vehicular data cloud services, an intelligent parking cloud service and a vehicular data mining cloud service in the IOT environment are also presented reviews (Sam et al., 2015).

Here are the basic elements of IOT Platform (Haller, S., Karnouskos, S. and Schroth, C.).

- **Sensors**: Sensor consists of a hardware component capable of acquiring information about physical environment. This acquired information is transmitted in form of electrical signals to the connected devices. Devices connectivity can be either wired or wireless.

- **Actuator**: It is a hardware component, which receives command in form of electrical signals from connected device and performs some kid of physical action. Like sensor, it can also be connected to device either in a wired or wireless manner.

- **Device**: A Device is a hardware component consisting of processor and storage. It is connected to sensors and actuators. By the help of software, it can establish connection to IOT Integration middleware.

- **Gateway**: Sometimes gateway is required to connect device to IOT platform. Gateway is an interface that provides technologies and mechanism to interconnect between communication technologies and protocols. All devices can access gateway if they are IP enabled. Gateway is also able to store, filter and process received data before sending to cloud.

- **IOT Platform**: Main responsibilities of this layer are:

  i. It integrates data received from different kind of connected devices.
  ii. Process the received data.
  iii. Control devices
  iv. Provide received data to various applications.

IOT cloud Platform can also directly communicate with device if both are using compatible technologies and protocols.

IOT Cloud Platform layer is also responsible for providing functionalities such as time series database or graphical dashboards, aggregation and utilization of data received from devices. Mostly, IOT platforms are accessed through HTTP-based REST APIs (Atzori, L., Iera, A. and Morabito, G.).

- Application: Applications are built on top of various IOT Cloud Platforms to provide services to some real-life scenario such as Smart Cities, Smart Healthcare, Smart Industry, etc.

Various IOT Middleware platforms can be categorized into following four categories namely Public Traded IOT Cloud Platforms, Open Source IOT Cloud Platforms, Developer Friendly IOT Cloud platform, End to End connectivity IOT cloud Platform. This section describes various popular

platforms in each of these categories (Zaslavsky,A. et al):

- **Publicly Traded IOT Platforms**: This category consists of platforms developed and maintained by large public traded companies such as AWS IOT Platform, Microsoft Azure IOT Hub, IBM Watson IOT Platform, Google IOT Platform, Oracle IOT Platform.

- **Open source IOT Platforms**: This category consists of platforms that provide data management services under open licenses such as Kaa, ThingSpeak.

- **Developer Friendly IOT Platforms**: This category of platforms is developer friendly and can be easily integrated with Arduino, Raspberry etc. to develop users' applications. Some of the platforms belonging to this category are CarrIOTs, Temboo.

- **End to End Connectivity IOT Platforms**: Platforms designed based on supplied hardware and required solution such as Samsara, Particle Cloud.

There is a strong motivation to find approaches to improve and enhance the security and privacy of the IOT. Many IOT projects use existing platforms, also known as middleware, to build upon. The Oxford English Dictionary (2017) defines middleware as: Software that acts as a bridge between an operating system or database and applications, especially on a network. If the platform is built with privacy and security in mind, then such systems can embed best- practices and enable system designers to rapidly create secure systems. If platforms are built without security, or security is added as an after-thought, then it is possible that not only does the platform encourage the creation of insecure, privacy-negating systems, but also that it may make it more difficult to add security when problems are found. The creation of systems with security and privacy as a key design principle is known as Privacy by Design (Wei, 2016).

III. History of IOT

The Internet of Things (IOT) got its start in.1999 with the founding. of the MIT Auto-ID Center The goal of the Auto-ID Center was to develop a broad class of dentification technologies for use in industry to support automation, reduce errors, and increase efficiency. The cornerstone of this technology was the Radio Frequency Identification (RFID) tag. The RFID tag allows one to uniquely identify any tagged object and discover details regarding the object via a centralized service. Besides using RFID, the tagging of things may be achieved through such technologies as near field communication, barcodes, QR codes, Bluetooth, and digital watermarking. In past, there were lot of problems in IOT devices, such as:

- Earlier the IOT were large in the size: They were really large in size; As an example, computers were so big that people. wanted a whole room. to keep them. Mobiles were unable.to carry as they were too big in size.

- The capabilities are limited: The functionality was less. and no any smart functionalities are available.

- The power usage is high.

Today the world is moving fast towards the. IOT devices which is really helpful for us to do works very easily on daily basis and also, to find solutions to different types of problems which are occurred in day today life. So, the IOT plays a significant role in our lives and serve as an ecosystem which. Interconnects physical. objects and systems in order to perform task smartly. As an example, suppose that we are wanted.to monitor the room. temperature. Programmer to programmer. the coding. style is different. So, it's difficult to understand the source code of other programmers. Our main objective is to create a common platform so that every programmer can understand. In addition. to that the other important thing is having a good network communication with devices. It's rather difficult to achieve it because of the reasons which have been mentioned above. Because of these kinds of reasons, a slowdown in the IOT flied is clearly visible.

These are some of the main obstacles in IOT field:

- Does not need a vast range of knowledge

- Not running on standardized platform

- Not having a Common platform

- Not having a platform to do public coding

- The system which I am introducing is capable of avoiding these obstacles and this is how it works

By now, the field of IOT has been developed a lot. Earlier there was an end to end developing communication but it has been changed. Now It tends for reusability. But there is no proper reusability for IOT at the movement. The technology is standardizing with the time.

So, the IOT is also the same and standardizing is needed for the sustainability of IOT. This system gets all the things to public system and it's also secures the data transfer (HTTPS). Due to this problem, for each sensor code need to be rewritten as fit for new IOT device's firmware. Which comes to market. Due to the demand of the not having any common communication platform we face many difficulties. This common problem can avoid by creating a common communication platform to communicate with different device's firmware by using common format focuses to build a common communication platform for these IOT devices. Today there are many types of IOT devices in the market and that devices manufactured by different companies with their own expertise therefore, there are many different firmware for each device.

In Internet of Things (IOT) connectivity scenarios, the IOT Device, IOT Device Application and Communications Modules play a significant role in determining the overall performance and behavior of the IOT service on the mobile network which the device is trying to connect to. When it comes to people day today life, they are really busy. Therefore, they have tended to automation side to make the life easy. Earlier, the automation side was talked only under computer side. But now it is talked outside of the computer field. By today, IOT devices are affordable and available in the market to purchase. Here are the features:

- Less power requirement

- Build in large scale

- Therefore, single music chip computing concept came to the world.

- Single chip comping means:

- Inbuild computer power

- Inbuild chip storage

- Graphics

That's why IOT developed immensely. Because of these things IOT field has been developed so that it can do automation independently. Currently there are many types of devices, manufactured by different companies. These manufactured devices have their own style of communicating internally but they have common language to communicate with developers. However, for each device developer or user needs to study all the details related to that device. Actually, this is very complicated because reading each and everything related to the device takes time and most of the time no one will understand the "manuals due to its heavy load. Most of the manuals shows the basic commands to collect data from connected sensors to the board. To understand the basic piece of code it is needed to read whole the manual of the device. But this code made it easy. This effects to the growth of the IOT industry because if we take 10 different devices to develop, we need to read and study 10 manuals to understand how these devices are going to work with pin settings of their devices and it will make more difficult to the client" does not need a vast range of knowledge The system which is introduced is simple and very comprehensive as all the codes are simple and easy to understand. The code can be easily customized even from a long distance through a software and it's does not require a vast range of knowledge. Coding according to a public coding platform There are different types of programmers and they are coding styles are different to each other. Most of the time their codes are very complicated. The system which is introduced makes this process really easy. External communication is not common, and it can be done by using different types of devices; as an example, WIFI, GMS, Bluetooth etc. People are used to have their own ways on data communication. Actually, it more difficult to get a clear idea about the system because the external communication coding is different and complicated than the internet communication coding and it is different from person to person. These are some of the current IOT platforms

- Amazon Web Services (AWS) IOT

- Microsoft Azure IOT

- Google Cloud Platform (New)

- Thing Worx IOT Platform

- IBM Watson

- Cisco IOT Cloud Connect

- Salesforce IOT Cloud

Here are some of draw backs of currently available IT platforms:

a. Not Customizable

It closely relates to flexibility of integration APIs, louse coupling of the platform's components, and source code transparency. For small- scale, undemanding IOT solutions good APIs may be enough to fly, while feature-rich, rapidly evolving IOT ecosystems usually require developers to have a greater degree of control over the entire system, its source code, integration interfaces, deployment options, data schemas, connectivity and security mechanisms, etc.

b. Closed Source (CSS)

There many advantages of having open source IOT platform (OSS) "Community - Open source solutions geared toward the enterprise often have thriving communities around them, bound by a common drive to support and improve a solution that both the enterprise and the community benefit from (and believe in). The global communities united around improving these solutions introduce new concepts and capabilities faster, better, and more effectively than internal teams working on proprietary solutions." "The power of the crowd - Many hands can deliver powerful outcomes. The collective power of a community of talented individuals working in concert delivers not only more ideas, but quicker development and troubleshooting when issues arise." "Transparency - Open source code means just get full visibility into the code base, as well as all discussions about how the community develops features and addresses bugs. In contrast, proprietary code produced in secrecy may come with unforeseen limitations and other unwelcome surprises. With open source, people are protected against lock-in risks and can see exactly what they are getting." "Faster time to market - Because open source solutions are openly available and can be explored for free, it's often much faster to investigate options and get solutions off the ground." "Cost effective - Although open source solutions should be thought of as more than just free software, the fact that they require no licensing fees remains a decisive advantage when looking at the total cost of deploying a solution."

c. Issues Data Security

"Another disadvantage of IOT platform is based on the security. With everyone of this IOT platform information being transmitted, the danger of losing protection increments. The data security involves encryption, comprehensive identity management, and flexible deployment. End-to-end data flow encryption, including data at rest, device authentication, user access rights management, and private cloud infrastructure for sensitive data – this is the basics of how to avoid potentially compromising breaches in the IOT solution." Data cannot be transmitted to databases as it needs "Data-management Challenges By knowing the purpose of IOT and the type of devices used in the IOT following are the data management challenges." "Data diversity: Internet of Things involves weaving together multiple connected devices, the data requirements are defined by weaving together disparate data sources. It requires the integration of customer data, billing information, device data, web services data (e.g. Weather and traffic data), and more." "Data volume and velocity: The two primary characteristics of the data flood are volume and velocity. Devices generate a flood of data that must be ingested, evaluated for trend data and anomalies, and used to trigger various actions. The velocity challenge puts a massive load on data management technologies, because the data may be pouring in at a" 12rate of millions of elements a second. The data must be stored to provide a historical context for evaluating trends over time. Different types of companies are producing different types of IOT devices if those devices are is standardize then it causes the slowdown of the IOT flied so then what we can do then.

The development of the IOT flied can be speeded up by communications visa unified method Getting to a standardized infrastructure Example for above points: People made hardware to run on android O/S then hardware manufactures were able to make hardware as independent of O/S. "This system keeps track on the parameters such as moisture, temperature, humidity, rainfall, gas content and earthquake intimation with the help of the real time sensors. These parameters are continuously monitored by an open source platform for an interval of every time. The data can be viewed in any one of the three formats such as JSON, XML and CSV. The sensors collect the data such as the temperature, humidity, soil moisture, pollution level, rain water level and movement in the earth surface."

"The Wi-Fi network helps in the process of sending the collected data to the open source platform. Alternate to that, an app is made for the purpose of viewing the collected data in even easier manner. Through the application, the user will be able to know about the status of his/her own agricultural land and countermeasures can be taken after the keen observation of the parameters of the land." The following categories of existing IOT platforms were identified:

- Domain-specific platforms are the IOT platforms which facilitate specific domain scenarios. Often, these platforms are built on the top of the generic M2M connectivity providers.

- Technology-specific platforms are the platforms which consider only specific set of devices.

These platforms are sometimes closed, in the sense that they are based on the devices with proprietary technology. "Most of the works for IOT connection may include the usage of Arduino with the help of Ethernet boards for Ethernet expansions, but the problem that arises is that the communication of Ethernet shield and the Arduino takes place with the help of SPI buses and some of the digital pins are engaged when an Arduino is connected to an Ethernet shield and if one of the pins get damaged, it ceases the execution of the program. "

"IOT allows communication between devices, commonly referred to as Machine to-Machine(M2M) communicate on. At the consumer level, the Internet of Things is being developed in the form of home automation. Through this technology, individuals will be able to create efficiencies based on information that typical home appliances generate. There is almost unimaginable potential for the sensing, processing, informing, and decision-making power of the Internet of Things. All of these combined technologies maximize revenue by cutting cost of in capability within the business."

IV. EXISTING TECHNOLOGIES

Today, the IOT field has obtained a massive progress in the technology field. But it is sad to mention that the software supportive are still developing. Lot of IOT devices, designs are done by their own styles. As a result of that people have faced difficulties to read and understand the manuals and identify what they have mentioned. Here are the basic problems which occurs under such kind of situations:

- Difficult to understand by others (The person who developed knows the source code of the application and others are difficult to understand it. Even the professional software engineers face problems when they match the system.)

- Require a vast range of knowledge to understand what actually happens.

- There is no common communication method.

It arises several problems as mentioned above. Therefore, the requirement of a common communication platform has been arisen. Currently there are several IOT companies and they have introduced various kinds of IOT platforms. Those platforms can be listed as follows:

a. Google Cloud Platform

This is introduced as the currently existing best platform. This supports to do required analysis and it is able to handle a large number of devices. This is a service which provides as a combination of Google company and the cloud. In here there is a huge tendency
on analysis side and the cloud. The data is saved in the cloud.
The advantages and disadvantages of Google Cloud can be identified as follows.

Advantages:
- Huge support on analysis

- Free service gives only up to a certain limit.

- The capability of handling large devices

- Closed source code

- Directly interact with the cloud.

  - **Disadvantages:**

- Cannot insert data to the user required databases.

- Does not educate regarding the communication methods.

- Cannot create applications as the user wants.

- Google company provides its service only up to a certain limit. To go for advanced features, it's needed to purchase their pro packages. The services/features which receives for those packages are various and people have to bear lot of cost. In addition to that it gives priority for Google services and the "firebase" receives the priority of databases. As the source code is unable to change as we want, it directly impacts the production of identical parts. It is the main problem that the user has to face. Therefore, people have to bear a big cost and purchase the source code according to their requirement. When it comes to communication methods, Google does not give details of their communication methods. Therefore, it is difficult to keep trust on data which comes through Google cloud platform. It's not sure whether those data go to third parties. Because of this reason there is a burning problem regarding the data security. Specially the main reason which exists is the user doesn't want to connect with the invention cloud and this Google IOT platform does not execute without the cloud. Therefore, if a user uses this platform, he should have the internet connection. Normally it is true that if a user connects with lot of unnecessary services there is a risk on hacking.

Example: Think there is a water tank system and a user want to filter the necessary data in to the database and display them.

Actually, such kind of process really expensive and it is a problem as there is an unnecessary communication. The main problems of using this system is:

- There are no details of the communication method.

- Bear expensive cost.

- Unable to customize the source code as per need.

Microsoft Azure IOT An IOT platform is introduced from Microsoft as well as the Google. This is one of famous platforms which executes through Microsoft Azure. This platform executes through Azure cloud service. Here are the features of this platform:

- Cannot execute independently.

- Customizable application

- Open source code (OSS)

Providing open source is a special feature of this platform. As this is providing as a free software the changes can be applied as per need. But this platform also needs internet as it executes through cloud service. Furthermore, there are pro packages which includes many features and those packages need to be purchased. The advantages and disadvantages of Microsoft Azure can be illustrated as follows.

Advantages:
- Huge support on analysis

- Open source

  - **Disadvantages:**

- Free versions do not include all the features and pro versions need to be purchased.

- Using cloud service is essential

When comparison with other platforms, there is a high quality in Microsoft Azure cloud platform. But the problems are it is required to use cloud and have to execute it by using a local server.

b. Oracle IOT Platform

This platform is introduced by one of the world biggest software company called Oracle. It is introduced by focusing the business field. This platform is best suitable for business areas as it has been included advanced features. The free service is not proving many features and have to purchase the pro version to do lot of tasks. The main features can be listed as follows:
- Advanced database management

- Cloud computing

Oracle has focused on the database as they are the company who has the best knowledge regarding the database. In addition to that they are capable of processing large IOT databases. Furthermore, Oracle has provided external treats protection for IOT. The advantages and disadvantages of Oracle IOT platform can be illustrated as follows.
- Advanced database system

- It is focused for businesses.

- High security

- Have to spend large amount of money.

- It is not an open source.

- Need to pay for getting more facilities and more features.

It has provided a large contribution on database side. With that support it is capable of handling large chunk of data easily. But it is difficult to find the internal process as this is the closed source application. Not only that but also, we have no chance to know how far the communication is secured and what kind of methods are using for communication. It is essential to interact with oracle cloud to have a communication. This platform is not matching with small applications as it is too much expensive and need an expert knowledge to manage.

c.   IBM Watson

IBM Watson platform is developed by Watson company. This is already used and this works interacting with IBM's Hybrid Cloud Paas (Platform as a Service). This platform also works by using cloud and it supports for data analyzing. Moreover, it includes, data storage and device management facilities. In here also, the free service is provided only up to a certain limit and the pro version should be purchased for getting more services. The advantages and disadvantages of IBM Watson platform can be illustrated as follows.

Advantages:
- More supportive on analyzing

- Able to handle large amount of data.

Disadvantages:
- There is no transparency on communication method.

- Closed source code.

- Cannot work without executing cloud.

- The data cannot be taken to the database according to the user's choice.

When it comes to communication methods, it is important to know which technology is used for external communication.

Example: How the technologies like GSM, WIFI interact with the database and the application.

But, the IOT platforms never supplies information on how the communication happens by using technologies as this is a closed source code. Because of this reason it is difficult to take the details on communication system and no any code can be edited. The other major thing is that give the details for the servers through communication methods and display them in web interface or analyze them. Likewise, they continue the business. They never outsource them as it may lead to block the income. If this is no longer exists, there will be no income. Therefore, they never outsource them. In addition to that, the user has no chance to involve with other services than they have provided.

Using internet is an essential factor for almost all the existing platforms. It happy to say that internet is no longer wanted in consuming   our productions, but if you are connecting with cloud, internet is wanted as the implementation happens when it is connected with the cloud. Therefore, this system cannot be run by using a server of local network and a database. When comparison with previously mentioned platforms, it's clear that there are lot of problems. This can be listed briefly as follows.

- Have to pay money.

- Not customizable

- There is no open source

- Communication closed source

A successful IOT platform is developed to overcome all the existing barriers.

V.   THE SOLUTION

All the problems that we have talked about before mostly affected to the development of IOT field as a better solution IOT common communication platform. "Develop Common Communication platform to facilitate vender independent solution" Basically, what happens here is, input the user required common system to our production and communicate through a unified method. Simply what happens here is to analyze below facts:

- Identify what sensors are connected to the IOT device?

- At what time the reading should get?

- Where those should be sent?

By providing this information we can easily get readings. The specific thing here is that getting external communication to a common format. The reason for this is there are different types of applications in the world and it helps to get data easily in a common way. Solution uses HTTPS XML format to communicate because It's already applied in the field. Even underlaying platform is not sure platform will not crush because it's adjusted with these problems. So, we don't have to worry about communication because error correction is end to end handled.

- In XML format it's self- descriptive so we will have idea about the data which comes in.

- Here it's use layers approach that means IOT device doesn't communicate with database directly because intermediate layer is applied (WEB Server) So communication path will communicate with this web server to transfer data It is very ideal when it's comes to an upgrade of the database because we don't need to put database connection details to each and every IOT device and specially we can develop layers independently because each layer only affected by other layer's data.

Example:
- Software Side: OSI, TCP also use this layer's technique

- Hardware Side: 3 layers (on network)

The operation of this is (communication)
1st step: Call the connectivity function of the Node MCU
2nd step: Establishing a HTTPS request through the connectivity function and the web server
is making a secure connection through this.
3rd step: Passing the data through that connectivity (Node MCU –> web server)
4th step: The web server is extracting data and passes relevant data to databases.

As it says the web server is connected through the Node MCU and HTTPS request. The data exchanging process is begun after that and the data is handled by the web server. An intermediate server is expected by using a web server. Suppose the user connects the Node MCU directly with the database connection and database is needed to replace. Then, all the devices which uses the old database needs to be updated with new database details. So, the intermediate layer is used to prevent that, and it does not call the database directly. It always connects with the web server. The platform can be changed as per need because it includes below features:

- An open source codes

This platform is an Open Source Platform (OSC). So, you can customize the platform as per your requirements
- Any network communication

Communication is most important part in any project development. Basically, in this you can communicate with web server (using HTTPS) in secure manner (one can use variety of communication method to communicate externally)
- No limitations to use.

Since it is Open source you can manage platform as per your wish the applications can connect easily as it is a unified communication. Platform makes system unified system so anyone can easily understand and useable.

VI. CONCLUSION

The Internet of Things is still growing and expected to change the way devices are connected and embedded into environment. Various models, platforms and applications are proposed and designed in such a way to benefit society. The progress of information technology in IOT development is very influential on the various aspects of human activities. The paradigm of the IOT provides a reference to connect all physical objects in the global Internet base as well as the existing infrastructure for information and communication exchange. IOT aims to support rapid and precise identification such as location tracking, monitoring and management. Today's IOT platforms are typically cloud based, delivering PaaS (Platform-as-a-Service). Communication with devices is made by installing or developing light clients, which only purpose is to facilitate connectivity to the central platform. Pervasive (over any communication channel, including cellular, WIFI and satellite) and reliable (where connection quality is considered as a primary criteria) connectivity is a key feature. Typical

features of IOT platforms are connectivity as a service, monitoring and maintenance of devices (including firmware updates), data visualization, data analytics, basic application logics through alerts and triggers. Connectivity as a service is achieved by enabling the unconditional (with installed client) access to devices. The cloud-based platforms are needed to store, process and manage data. These platforms are known as IOT Platforms. The capabilities of a typical IOT platform includes data storage, sensor or objects management, data handling and processing. It also ensures security, event processing, interface for administration, elements for application development, users and developers. Existing platforms of IOT seriously vary in pricing formula, performance, limitation and functionality. The data is collected by the devices and transformed by analytical tools. Such development is possible by using integrated development environments (IDE), API's or even language interpreters. These are the introduced solutions for existing draw backs in the IOT:

- Customizable the source code which is introduced for IOT platform is available for all the users which is fully customizable.

- Open source: The source code is available for everyone and anyone can be used it free of charge.

- Having a better data security In the IOT platform that is introduced transmits data from the Node MCU to the database through Hypertext Transfer Protocol (HTTP), so the data is secure.

- Data can be transmitted to any databases as we need: The data can be modified, filtered and transferred as it is wanted.

It is not a secret that the newly proposed cloud-based application will handle a major role in IOT field by overcoming the existing applications.

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Web-Based System for Manpower Management in Sri Lankan Context

Hansini Weerasinghe
Department of Information Technology
General Sir John Kotelawala Defense University
Rathmalana, Sri lanka
hansinee.nawanjana@gmail.com

Yasith Fonseka
Department of Information Technology
General Sir John Kotelawala Defense University
Rathmalana, Sri lanka
yasithfonseka123@gmail.com

Rajintha Sheran
Department of Information Technology
General Sir John Kotelawala Defense University
Rathmalana, Sri lanka
rajinthasheran@gmail.com

Abstract—**The traditional method to find manpower is that customers must find people who are good at their work and have to get the conclusion based on comments of other people. Resources to respond to their populations' demand for services are often inadequate and the distribution of human resources is generally poorly balanced between urban and rural areas. Manpower is an essential fact in the modern world. People need various kind of manpower such as masons, plumbers, landscape architects, carpenters etc.in order to fulfil their daily needs. The shortcoming of manpower repulses the people from day to day activities. People in Sri Lanka face the challenge of finding human resources for manpower. In this fast-paced society, the hectic lifestyle has disrupted the work-life balance. There is no systematic process of manpower management and selecting manpower to get the things done.**

The aim of this research is to provide a solution for manpower management. The proposed solution is focusing on implementing the web-based system for manpower management to solve the issues with searching human resources. This web-based application can provide details of employees in different work fields such as masons, plumbers, housekeepers, landscape designers, electricians etc. It allows the customer to check the employees' details in order to book them and workers would be able to get the customer details through their profiles on the proposed system (Bass.lk) Also the system provides eligibility check past projects of employees. The rating system of customers and workers provide support for decision making before making an appointment. The web-based solution is suggested to provide location-based appointment service in order to witness the cost of effective technological advantages in their decision-making activities.

Keywords—*Manpower, Manpower Management, Human Resources, Web based*

I. INTRODUCTION

With increasing occurrences of difficulties in recent times finding manpower to get their phrase achieved the development of a source which will deliver the opportunity to discover the human beings as they want in a one region has emerge as extra relevant. Primary benefit of this task is they can discover their needs inside range of subcategories. Therefore, they'll get the maximum applicable character to get their work finished. Intended system (HodaBass.lk) is introduced in order to overcome the prevailing issues of the manual system of manpower management.

The employees who are seeking the opportunity and the customers who are involving in the section of employees are beneficial with the web-based system development. The system helps to find the most suitable people to get their work done from nearest area or any area in sri Lanka. Facilitate the users to register with the system customers will be able find the employees they need for their work just being in the home. they don't want to go

around finding people. It will save their cost. Reliability is one of the major benefits we can acquire through this manpower management system. Since the system request the NIC number as a major requirement of login both parties cannot give details which cannot be validated. Also, the rating the users will give a clear idea about the how reliable their work and payments.

A. Objectives

- Critically study the current practices an issue in manpower management in Sri Lanka and existing information and technology-based solutions.
- Conduct a study of feasible technologies which can be used to utilize the research
- Analysis of features which can be use in this System.

II. LITERATURE REVIEW

Manpower Management defines that the control and ensure the manpower in a most efficient and economical way.Manpower Planning which is also called as Human Resource Planning consists of putting right number of people, rigt kind of people at the right place, right time, doing the right thingsfor which they are suited for the achievement of goals of the organization. [1]We need the support of thousands of services to solve the problems we come across in our day-today life. This extends from household to administration of institutions. No matter how many service providers are available; it will be pointless, if they cannot be found when needed &if there is a gap between the clients and the service providers.

We have provided a simple and quick solution for customers to locate services/providers and for service providers who have a relatively low capacity on promoting their services. We also provide a tool to reduce unemployment and poverty in the country and a social service to service providers by allowing them to publish their advertisements free of charge on our site. (hodabass.lk)

A. Existing systems

This section will provide a review on the areas covered in the world components related with the manpower management. Existence of manpower management system explored, which are implemented nationally as well as internationally. Most of the systems developed in Sri Lanka are developed based on the domain of just viewing only the details of the employee. The systems which are developed based on the domain of categories and payments are prominently found with the international system developments.

- Nationally- Hondabass.lk, Wadabima.com
- Internationally-Manpower.com,Mon Manpower

Hondabass.lk: Hondabass.lk is just a web site with the information. It does not provide ability to book a worker or communicate with a customer. Just the contact details only.

Wadabima.com: Wadabima.com is just a web site with contractor details with several categories.

When considering existing systems there is no system which can provide a sufficient service. When considering internationally;

Manpower Meca : Manpower Meca is a system which based on United Nations of America.It comes as a mobile application.But it also provide limited features using just a one category.it is more like a job portal.

Mon Manpower: Mon Manpower is a system which based on France. This application provide ability to login both customers and workers and request the service and communicate via application. But it does not cluster the requests according to location.

TABLE 1. COMPARISON OF SYSTEM FEATURES

Features	HondaBass.lk	Wadabima.com	Bass.lk(Proposed System)
Workers can create accounts	x	x	
Customers can create account	x	x	
Able to send a request through account	x	x	
Email and Message Notifications	x	x	
Able to view previous projects	x	x	
Able to rate the work	x	x	
Able to rate the payment satisfaction	x	x	

B. Technologies Incur with the Existing Systems

Implementation of the manpower management system is identified with different modes of accessing. The technologies used in the development
are as follows

- Visual Studio - asp.net web application.
- C# Language.
- PHP language.
- CSS language
- HTML
- MySQL 2008

III. METHODOLOGY

A. Data Collection

Qualitative and quantitative data required for designing the requirement specification for the new system were gathered by conducting a survey. Questionnaire was conducted among 50 workers and 50 Customers

B. Data Analysis

The data which were gathered during the data collection phase described were analyzed by using charts and presented in this section. Through analyzing the data, was able to reveal the need of a proper web-based manpower management solution for Sri-Lanka.

C. Approach

The users of this system are Candidates and Admin. There are five major different types of inputs from the candidates including Personal Details, projects, Experience, payments and ratings. The outputs from the system are basically appropriate matches with location details, Admin will generate user reports based on these details.

D. Technology Adopted

The input processing has been implemented using selected programming languages Html, CSS, JavaScript and Python. The technology that suits for the system development should be decided by considering the domain and the requirements for the system. It is important to identify most appropriate technological methodologies to satisfy the functional requirements and the non-functional requirements of the system in the system development procedure.

Proposed manpower management Solution is a web-based system. Time for the production, Efficiency and the performance of the system, Usability and Flexibility of the system and functionality of the system should be considered in developing the system. Programming language is the most important technical factor that should be focused in implementing the system. The programming language should in compatible with the development tools that are used in implementing the system. HTML, CSS, JavaScript were employed to develop the front end and C# and php was used to develop the backend. JAD framework can be used to implement the system.

E. Proposed Design

The architectural perspective of the developed system breaks into four main components as; software design, database design, module design and the interfaces. The gathered data from the analysis phase was used in creating the system's design.
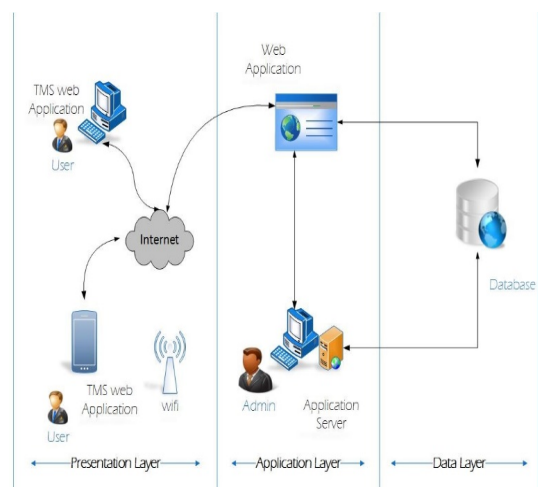

Fig. 2. System Architecture

1. Overall System Architecture

Client layer**:** The user accesses the application through the client layer. The developed system provides access for the users in different user levels and each hold the interfaces which satisfy the requirements of each user type.

Application layer**:** Web Application belongs to the application layer. Including all the algorithms.

Database Layer: Database layer is responsible to manage the entire database of the system. The database will store the data enters to the system by the web application after the manipulation of the application layer.

2. Modular Architecture

The discussed modules in the software architecture will be elaborated in this section to show how the modules will be dealing with the users' actions in each layer. The main modules and their sub modules are given below.

Login and Authentication Module:
Only the authenticated users can access the system. There are two user levels namely users and admin.

User Registration Module:
Both Customers and Workers can register through the User Registration Module. Registration Module will be divided into five sub-forms namely Personal Details, projects, Expected Partner Details and Horoscope Details.

Matching Process:
This module includes a clustering algorithm. Appropriate matches will be displayed to the user using Location.

Message Sending Module:
The derived users can be able to send messages and interact with each other.

Feedback & Success Stories Module:
Users can submit feedback. Once a customer meets a worker through this solution once the work is over customer can rate the worker and worker can rate the customer according to reliability and satisfaction of payments.

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Email Notifications and message Module:

A trigger will be fired at the end of the day and the matches derived from the clustering technique will be sent to the user as email notifications and direct messages to their phone numbers.

Reporting Module:
Admin will generate reports based on the user data. A dashboard will be generated.
The developed Machine Learning Based Web Solution is
comprised of two main interface categorizations (user-levels) namely interfaces of customer and worker.

IV. RESAULTS AND DICUSSION.

Questions asked to selected samples Circulated questionnaire was based on close-ended questions. For further evaluation and assistance to research, we gave optional open-ended questions.

- Compatibility with the web browser

The techniques use for the development of the proposed system may not compatible with some internet browsers. As proposed system is a web based one, for the awareness of browsers that users use, a question was asked in the given questionnaire. When analyzing the answers got most of the users use Internet explorer, Chrome and Firefox according to the following diagram. These browsers are compatible with the proposed system. So, there will not be any issue when running the system for the end users of the system.

- Use of Computer in daily routine

This was one of very important questions asked in this questionnaire since the proposed system is a web-based system. User needs to be engaged with the system in order to get the maximum benefits of this system. As this is a web-based system not only in their daily work routine but also in their day today life whenever necessary they should be able to log in to the system. Majority of them use mobile phones in their daily work routine always. Even they don't use, now their family members have the literacy.

V. CONCLUSION

The proposed Manpower management system can be developed for efficient manpower power handling. Current process includes finding manpower by word of mouth

There are two types of users of the system who are directly beneficial with the system implementation customers who are seeking the employees and employees who are seeking

opportunities.

Manpower is an essential fact in modern world. Houses and other buildings are built By Manpower such as masons, plumbers, landscape designers and other related employees. People need various kind of manpower in order to fulfill their daily needs when living. They are busy with their work loads. Therefore, people have to go here and there to get work from different employees for different kind of needs. Traditional method to find manpower was meeting the worker and makes an arrangement. This system is a solution to this traditional method.

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Current Context of Information and Communication Technology (ICT) Usage and Its Issues and Challenges in Public Sector Organizations in Sri Lanka

P.M.T.S.K. Liyanage
National Productivity Secretariat,
10th Floor, Sethsiripaya Stage II,
Battaramulla, Sri Lanka.
tilani.sugandika@gmail.com

P.D.D.M. Wickramasinghe
National Productivity Secretariat,
10th Floor, Sethsiripaya Stage II,
Battaramulla, Sri Lanka.
dminoly@gmail.com

G.P.P. Gunatunga
National Productivity Secretariat,
10th Floor, Sethsiripaya Stage II,
Battaramulla, Sri Lanka.
gayanigunatunga@gmail.com

Abstract - **E-Government is defined as the use of Information and Communication Technologies (ICT) to deliver government services more effectively and efficiently to citizens. United Nations measures e government index (EGDI) once in two years based on three dimensions. Sri Lanka jumped forward its rank in 2014, but there was a drawback since then. It was not found much research on ICT applications in the public sector in Sri Lanka. Therefore, identifying current context of ICT is essential. Main objectives of this research are to identify use of ICT in public sector organizations and to identify the issues and Challenges. Data were collected through random sampling method using a structured questionnaire and interviews and analyzed using descriptive methods. Results revealed that government institutions use IT applications mainly for personal administration and accounting purposes. Most of administrative software are in house built while accounting software are outsourced. Transport, performance management, customer feedback, marketing are lack of ICT involvement. Emails and social media are the mostly used tools. Considering the investment, hardware cost accounts more than other costs software, maintenance and training. Lack of ICT training is the most common issue in public organizations. Issues related to software and hardware, internet problems, data protection are other key considerations. Lower number of IT literate employees, maintenance and financial constraints are the major challenges identified. Introducing a common software platform for all administrative work, proper procedure to enhance IT literacy of public employees and quality assurance for in-house built software are put forward as key recommendations.**

Keywords: ICT usage, Public sector, Issues and challenges

I. INTRODUCTION

Service delivery is an essential function in relation between government bodies and citizens. The government as the key public service provider, citizens have a right to demand quality services fast and easy at moderate cost. The image of government depends on service delivery with quality services at affordable prices to its citizens [1].

A worldwide revolution in Information and Communications Technologies is occurring. The internet, the personal computer, and the mobile phone are fundamentally changing our lives affecting the way we work, learn and interact. Governments around the world are recognizing the value of e-Government. Properly designed and implemented, e-Government can improve efficiency in the delivery of government services, simplify compliance with government regulations, strengthen citizen participation and trust in government, and yield cost savings for citizens, businesses and the government itself. Therefore, policymakers and managers are looking to adopt e-Government in countries around the world - ranging from the most developed to the least developed.

Various countries record different results in adopting e government based on ICT implementations. According to Chandio [2], countries are facing several multifaceted hindrances concerning with socio-economic development, ICT ineffectiveness, and execution difficulties to meet e-project goals. Recording the rank of 94 out of 193 countries in United Nations e government development index (EGDI) in 2018,

Sri Lanka has initiated and fasten using ICT applications in government services delivery since last decades. Sri Lanka's EGDI rank in 2014 indicates improvements in service delivery through ICT. In 2010, a research has been conducted on implementing e government in Sri Lanka, identifying issues and challenges in comparison with the UK. Lack of ICT literacy, inadequate ICT infrastructure, inability to access e government services using local languages have been identified as more specific challenges for Sri Lanka. Since then, ICT applications in the public sector in Sri Lanka has been increasing rapidly however no evaluations or measurements could be found in this regard.

We must identify to what extent ICT has been penetrated in public sector in current context and whether the issues and challenges have been renewed from the past. Therefore, it is essential to carry out a survey to identify current status of ICT diffusion to find out the drawbacks and to seek solutions. This research is focused on identifying the current context of ICT in key public sector service delivery organizations in Sri Lanka while identifying the issues and Challenges for ICT diffusion. It is also expected to recommend suitable measures to overcome them and to identify the opportunities for e-government.

II. DATA COLLECTION AND ANALYSIS

Primary data were collected using a survey questionnaire and interviews based on main objectives. Meanwhile Secondary data was taken from the other sources such as websites, articles, books, newspapers, magazines and so on. Random sampling method was used to collect data through a google form. Questionnaire was forwarded to 100 randomly selected public sector organizations. Data were analyzed mainly using descriptive statistics.

III. RESULTS

a. Basic Information

More than 98% of the respondents were fully government organizations while others represent semi government category. Out of the total 60% of the respondents were divisional secretariats. Number of employees from each organization vary from 7- 160,000. Nearly 85% of organizations have won a productivity or a quality award.

b. Details of IT Applications, Tools and Software Used

A. IT Applications

More than 50% of the responding organizations use IT applications for personal/administrative functions as well as for accounting purposes. 47.5% of respondents use ICT for postal/mail management. Only 37.5% of organizations use ICT for stock/inventory management while 15% use ICT for transport management. Performance management, feedback, marketing /sales purposes involve lesser IT engagement.

Seventy three percent (73%) of accounting applications are outsourced while most of the other applications are in-house. For example, nearly 90% of personal and administrative software and 85% of inventory management software used are in house built.

B. IT Tools

Emails are the mostly used tool in organizations. Almost all the organizations use it. More than 85% of organizations use Facebook while Google Drive and Google Forms are also used by nearly 50% of the organizations.

C. Software

According to the respondents, Windows 10 is the mostly used operating system software. PHP, HTML, SQL are the mostly used programming languages. Kaspersky, Avast, SmadAV are used in most of the organizations as antivirus software.

D. IT and Non-IT Employees

Nearly 15% of organizations do not have any IT employee. So, they manage their ICT work with non-IT employees. Most of the other organizations have less than 10 employees for ICT related work. When looking at Non-IT employees engaged in IT work, it is observed that more than 60% of organizations have fewer than 10 of them.

E. Investment on IT projects

There was a drawback in providing investment details on IT by responded organizations. Though we had asked separate costs for hardware, software, application development, manpower training and maintenance, most of the organizations have mentioned a total cost for all. Out of the respondents nearly 43% of the organizations have spent between RS.500000 - Rs.5000000 in total for outsourced projects. When considering separate costs hardware accounts for highest cost and manpower training and maintenance bear lowest costs.

F. Issues and Challenges

Among listed issues in implementing ICT tools and applications, 80% of the responding organizations pointed out lack of training as a major issue. Software and hardware issues have been listed by 70% and 60% of organizations respectively. Other common issues include internet problems, data protection and security problems and deficiency of staff. Only 12% of the population have mentioned lack of support from administrative staff as an issue. Nearly 75% of the respondents listed low IT literacy as a major challenge in public organizations More than 70% of them identified financial constraints as a key challenge. Maintenance issues, lack of coordination is among other challenges and most interestingly 43% mentioned "not using existing IT applications" as a challenge.

G. Other Areas in Which ICT Applications Should be Implemented

Following is a list of the respondents' ideas when asked about other areas in which ICT applications should be implemented in organizations. It should be noted that these are individual organizational ideas, because each organization has different kind of applications. What is available in one organization may not be available in another. In addition, transport, health, agriculture, Department of Motor Traffic and Inland Revenue Department had been specially mentioned as important areas in which ICT applications should be introduced.

- Customer services
- Online complaint handling system for relevant staff officers

- Online meeting system using Skype and other communication software
- Project management
- Data analyzing
- Knowledge improvement
- Stock management
- Reception counter
- File record system
- Duties, programs of field officers & development officers
- Personal file database
- Land database
- Video conferencing
- Record room
- Supplier service monitor system
- Application which collect staff feedback in online
- Barcode system
- Feedback rating software system
- Unit wise computer system
- Scanner system
- Hospital website system
- Human Resource Management (HRM) & Financial Management (FM)
- Online Tax Payments

Though the question does not ask about those areas, some organizations have highlighted their needs in ICT training for service delivery improvement. Nearly 80% of the organizations have mentioned the need of training opportunities in ICT sector. Following are some of the other requirements indicated.

- ICT infrastructure, Strong networks
- Speed internet services
- Increase online service facilities
- Introduce new software
- Involvement of Social media networks

There was an interesting suggestion to promote all ICT graduates in government to executive category to make them decision making professionals in public institutes.

IV. DISCUSSION

It is an enduring request to reform and advance the quality of governmental systems according to the needs of society and economy. Some of the most critical tools for this purpose are

the information and communication technologies [3]. Information and Communication Technology refers to technologies that provide access to information. It is primarily concerned with the storage, retrieval, manipulation and transmission of digital data. These digital data management systems are used to provide services to clients which paves the way for e government or digital government. It plays a vital role in the daily life of individuals, offices and government to achieve its goal with minimal inputs like money, human resources, etc [4]. Information and Communication processing technologies are developing faster than ever before and these aid the process of development and good governance [5]. The capacity of internet and web technology has changed traditional paper (manual) driven organization to information driven internet enabled digital organization. In digital organization, most of the things are electronic, uses digital technologies and work on database, knowledge bases, directories and document repositories [6].

In pursuit of growth and sustainability, countries continue to equip themselves with tools and resources to facilitate a clear-cut Information Communication Technology Diffusion. Diffusion here entails the implementation of essential measures that facilitate a country's network readiness where readiness is considered on the basis of adaptability and efficiency of countries' productivity [7]. "ICT diffusion" is defined as a process in which an ICT application is adopted and implemented by an organization until expected users within that organization accept and transfer their knowledge of using these ICT applications throughout the organization [8].

According to the results obtained through this research on current context of ICT usage in Sri Lanka, following conclusions can be made.

When considering the operating system software, public organizations in Sri Lanka use windows applications in common. Availability and user friendliness of this operating system can be identified as major reasons. But there are issues in upgradation of these software due to the disingenuous versions used in most public organizations. The same issue appears in antivirus software upgradation.

According to the results, presently public institutions use IT applications mostly for personal administration and accounting purposes. This survey also revealed that most of this administrative software are in house built and the accounting software are built by outsourcing. Further interviews revealed that the administrative and HR applications used in public organizations are made through databases using excel or access. There are some other applications as well. However, it is suggested to have quality assurance for this software in order to maintain the sustainability. When reviewing literature, it was found that in Tanzania, public staff management is one of the main focuses of public organizations in order to improve their performance in service delivery [9]. The adoption and implementation of e-public staff management in Tanzania brought up notable achievements and some challenges in the public administration. In many cases the E-public Staff Management reform intervention is successful, at least in the short term. Many of the successes seem to be short lived due to the inability of the bureaucrats to contextualize these reform interventions. Among the notable positive changes include; automation of public employee's data, increased access to staff information, and reducing the cost of processing HR related matters and time on service delivery. All these achievements to some extent have improved organizational efficiency and effectiveness of the public service. They have also improved the quality, capacity, productivity and performance of the civil servants. This system enabled public service to modernize and strengthened its administrative systems and procedures for personnel recruitment, deployment, grading and promotions; as well as personnel training and discipline. Sri Lanka also needs such a human resource management system equipped through ICT in a common platform for all public employees.

Another major finding of the research was that in the public sector, areas like transport management, inventory management, postal/mail management, performance management, customer feedback, marketing are lack of ICT involvement. Transport management is a very difficult subject to handle even manually given its dynamic nature, misconducts and corruption of related employees. ICT involvement in transport division of an office might lead to severe resistance from employees.

Same situation could be observed in inventory management in public sector where theft and other misconducts happen. In case of postal/mail management, employees including upper management as well as clients still trust on tangible evidence in government procedures. They need some hard document to prove, may be because their poor IT literacy and low trust on technology. In the absence of trust, people demotivate and avoid from e-government websites and move to traditional brick and mortar government services [10]. Ranaweera [11] has identified trustworthiness as one of the issues causing the less adoption and use of e-government services in Sri Lanka. People sometimes use the failures of technology as a weapon to give reasons to not to do something (ex.: Machine breakdown, internet break down). These issues could be higher in a postal management system. In order to address these problems, attitudinal changes need. In Kenyan context, Ntulo and Otike [12] identifies that e-government has the potential to greatly improve how government operates internally and how it serves its customers. E-government is much more than a tool for improving cost-quality ratios in public services. It is an instrument of reform and a tool to transform government. Thus, e-Government is not primarily about automation of existing procedures (which may or may not be effective), but about changing the way in which government conducts business and delivers services. According to Kihamba [9], the challenges associated with the adoption of electronic public staff management in Tanzania results from inherent weaknesses in the administrative structures and culture of public service employees. Many of them have failed to adapt and contextualize e-service provision as they remained applying tradition mode of personnel management and service delivery. Considering the current context same concept can be applied to Sri Lanka. It is not all about ICT and new technology. Much attention on attitude change is needed in public sector employees in order to apply technology in areas like transport and inventory management.

Through this survey, it was revealed that the software used for the same purpose in public sector organizations differ from one organization to another. For example, the software used for administrative purpose in one institute is not the same in the other. It is recommended to build a common software platform for all organizations which leads to reduce the cost born for software development individually by public sector organizations. This common platform can be customized according to the type and the requirements of each organization. This would be beneficial especially in administration, HRM, finance administration and accounting, inventory management, transport management etc. This will be useful in using one common database for organizations like Immigration and Emigration department, Registrar General Department, Customs etc.

It is concluded that emails and social media networks are the mostly used tools by public organizations. E mails which is used by all most all the responding organizations make manual procedures easier and quicker. However, language barrier might become a problem in this case. Social media like Facebook have been used by the public sector from the recent past which helps in popularizing organization's activities among its clients and communities. So, it carried government services to the people. But we must understand that internet access is not available to all citizens, especially in rural areas. Social media's role becomes less important in such cases. Interviews revealed that government officers in field work use social media like WhatsApp and Viber for communication among groups. Monitoring becomes easier using these applications and it also makes team work more organized and stronger.

Considering the investment for IT projects hardware cost accounts more than other costs like software, maintenance and ICT training. Most of the public organizations have in house applications or software built by themselves, therefore the cost for software becomes low. But they still need hardware. That is how hardware cost becomes the highest cost when considering the investment for ICT.

Lack of ICT training is the most common issue in public organizations. Number of IT literate employees are also lower in public organizations. It has been identified as a major challenge as well. ICT was introduced as a new service category to the public sector in Sri Lanka very recently in 2014.Until then the public sector had a huge deficit in IT professionals and even now complex IT

related projects are outsourced which means that public IT employees need training and skill development in their careers. The results revealed that there are public organizations in which IT employees are not available. In this case non-IT employees who engage in ICT work essentially need training. According to literature, countries like India, Pakistan and Nepal face with the same issue. Weerakkody [13] revealed that lack of training in ICT as a major issue in 2009 as well. Therefore, as the issue remains similar in current context, it is suggested to implement a policy and procedures to enhance the IT literacy of public employees. As the number of IT literate employees are lower in government and even the ICT service was started very recently, existing employees need to improve their knowledge. A training policy can include trainings for both IT and non-IT employees. IT literacy must be considered as a qualification in all types of recruitments in the public sector. In addition, there should be essential requirements to fulfill in ICT literacy for them like including IT proficiency in efficiency bar examinations which they have to complete for salary increments and promotions.

Issues related to software and hardware, internet problems, data protection are the other key considerations. When detailing these issues, they include hardware breakdowns which results from low quality purchasing. This issue should be addressed through proper procurement procedure without the involvement of intermediaries. Another reason for hardware breakdown is not handling equipment with care. Respondents have rated maintenance problems as a major challenge and this handling with "not my property "attitude is the major reason for the huge repair cost of hardware. Internet issues include breakdowns, exceeding quota etc. Information and Communication Technology Agency (ICTA)has launched LGN 2.0 to overcome this quota issue, however it does not cover all public sector organizations. Allocating a quota for each individual employee provided the solution for misuse of internet for private gains to a certain extent. In the current context, data protection and security in public sector essentially need the involvement of private sector due to unavailability of required professionals in the public sector, high cost, regulatory problems etc. Therefore, still sensitive public sector information might be at risk in the hands of outsiders. A proper

policy framework to invest and attract skilled professionals to the public sector is essential.

Financial constraints and lack of coordination have been identified as other major challenges in public organizations. According to the literature, countries like India, Pakistan, Nepal face the same issues. Weerakkody [13] describes the similar issues and challenges for government in Sri Lanka. Therefore, it can be concluded that even after a decade the issues and challenges for e government and ICT diffusion remain unchanged. This would be one of the reasons for backward move of Sri Lanka in EGDI.

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An Investigation into the Facilities Management Service Industry of Sri Lanka: A Preliminary Study

Damitha Rajini
Faculty of Graduate Studies
University of Colombo
Colombo, Sri Lanka
damithar@uom.lk

K.A.S.P. Kaluarachchi
Faculty of Management and Finance
University of Colombo
Colombo, Sri Lanka
samanthakaluarachchi@yahoo.com

Abstract—**Facilities Management (FM) has been widely recognised as an organisational function which enables the organisation to create an optimum functional environment that supports its business processes and human resources. With the increasing demand in the industry, FM has gained a huge popularity all over the world and made outsourced FM supply inevitable. However, FM is a young and growing profession in Sri Lanka, and the researches into the supply side of the FM service industry in Sri Lanka is limited. Thus, the extant literature does not provide a clear picture about this industry in Sri Lanka. Therefore, this study aims to fill both literature and empirical gaps mentioned above by investigating composition of the FM service industry of Sri Lanka and current practices of the industry. To achieve this aim, semi structured interviews were conducted with FM experts selected from key FM service providing organisations in Sri Lanka. The findings revealed that the supply side of the FM industry of Sri Lanka is composed of single service providers, multiple/bundled service providers and total/integrated FM service providers. There are few total/integrated FM suppliers in the industry compared to single or multiple service providers and most of them are international organisations. In addition, the provision of FM services in the industry are mostly done for commercial and residential properties. Moreover, while the provision of janitorial and security services still dominates among variety of FM services provided by Sri Lankan organizations, the findings identify a considerable increment in hard FM services and other soft FM services provision during the last few years.**

Keywords—Facilities Management (FM), FM Outsourcing Services, FM Service Providers, Sri Lanka

I. INTRODUCTION

Facilities Management (FM) is an organisational function which integrates people, places and processes within the built environment with the purpose of improving the quality of life of people and the productivity of the core business [1]. It encompasses a wide range of areas to ensure the functionality of the built environment including real estate, building maintenance, domestic services, utility supplies, health and safety, etc. [2]. Further, FM enables an organisation to meet all requirements, and optimize the costs and performance of its assets and services, by employing a proactive approach [3]. According to Copenhagen Institute for Future Studies [4], FM form the cornerstone of a business by providing strategic support with respect to real estate and support services. Hence, FM is acquiring an increasing popularity all over the globe [5]. both as a profession as well as an important service sector [6]. With this recognition, FM outsourcing has gained a huge popularity all over the world and made outsourced FM supply inevitable. FM is a novel service sector to Sri Lanka and therefore, researches which address the supply side of the FM service industry in Sri Lanka are no or less found. However, the recent developments in FM industry have heightened the need for analysing FM market in Sri Lanka which has not paid attention by the recent researchers yet [7]. Therefore, this study aims to fill the above-mentioned literature and empirical gaps by investigating the nature of the FM service industry of Sri Lanka and the current industry practices.

The rest of the paper is structured as follows. The next section reviews the literature related to FM service provision. Later, research methodology is explained in the next section followed by findings as well as a discussion of findings. The paper concludes with implications of the findings at last.

II. LITERATURE REVIEW

This section presents the literature related to this study under three main sections namely, Overview of FM, FM services and FM service market.

a. Overview of Facilities Management

FM is an integrated approach for operating, maintaining, improving and adapting the buildings and infrastructure of an organisation in order to create an environment that strongly supports the primary objectives of that organisation [6]. FM is based on the grounds that the efficiency of any organisational operation is linked to the physical environment within which it operates, and that environment can be improved through proper management to increase efficiency [8]. Therefore, focusing on consistency, continuous improvement and reliability through time, cost and quality control [9], FM allows organisations to communicate and maintain a quality work environment for human resources and physical needs in a way that effectively accomplish organisations' core business objectives [10].

The discipline of FM first originated in real estate sector and then inflated to the areas like infrastructure and construction. The origins of FM can be traced back to the era of scientific management and the subsequent explosion in office administration [11]. it gradually received more recognition and gained a foothold as a discipline and a profession since late 1980s [12]. This was mainly happened due to the huge competition, globalization, development of information technology taken place within the industry and the associated demand received for well managed facilities [13]. Further, this FM movement gathered pace in a truly international sense due to its links to the scope and success criteria of businesses. Hence, from its North American origins, the profession has now spread to the Europe, Australia and all Eastern countries including Middle Eastern countries to all over the globe becoming one of the most rapidly emerging disciplines acquiring increasing popularity [5]. Though FM is relatively young profession which is rapidly evolving in developing countries [14], in developed countries, FM sector contributes to 5-10% of their Gross Domestic Product [13].

b. Facilities Management Services

FM covers a wide range of activities involved in the effective management of built assets. It involves the total management of all services that supports the core business of an organisation [11]. There are different views on the functions coming within the FM scope. As Atkin and Brooks in 2002 mentioned in an article written by Kwok and Warren [9], the discipline deals with more wide area including property management, financial management, change management, human resources management, contract management as well as health and safety in buildings, engineering services, maintenance, domestic services and utilities, etc. However, the management of infrastructure facilities such as estate and property, structure and fabric, water supply, electricity and telecommunication management referred to as hard FM functions while management of support services such as catering, cleaning, waste management, security and laundry services are referred to as soft FM functions by the researchers Liyanage and Egbu in 2008 [15]. Accordingly, FM comprises of two types of services namely hard FM services and soft FM services. However, the most recent classification of FM services can be found from a survey conducted by Frost and Sullivan [16] and it includes range of FM services which have been categorised into five groups namely; building operation and maintenance, property management, support services, IT and telecommunication and environmental services as shown in Figure 1.

Although a generic list of FM functions can be identified, through the available literature, the requirement of FM in an organisation can be vary from one organisation to another depending on the nature of core business, relationship of facilities to the core business the organisation, nature of stakeholder requirements and level of requirement, etc. Therefore, the scope of FM in one organisation can be different and therefore, FM is adopted differently in different organisations [17].

Fig. 1. Five Main Service Spheres of Facilities Management (Source. Adapted from Frost and Sullivan [16])

c. Facilities Management Service Market

An organisation can procure the above-mentioned FM services through either in-house, outsourcing or combination of both approaches [2]. In-house approach involves performance of FM activities by organisation's own staff, while outsourcing of FM involves performing the complete management and decision-making of an operation by an outside organisation [8]. However, among these procurement options, outsourcing procurement approach is considered by a number of researchers and practitioners as an effective and efficient approach for FM [18],[19].With this recognition, FM outsourcing has gained a huge popularity throughout the world and now, FM has established itself as a key service sector, with a diverse and a highly-competitive market [12].

Different typologies of providers related to service outsourcing can be identified from the literature. As per De Toni and the researchers [20]. FM service providers can be classified as specialised providers and integrated providers. According to their elaboration, specialised providers deliver a single FM service while integrated providers supply different FM services in an integrated manner [20]. The companies concerned with the single service contracting, concentrate on delivery of one type of FM service whereas the provision of variety of types/ range of service is called a packaged service [21]. In addition, when all the FM services are contracted to one provider, Integrated Facilities Management (IFM) providers who supply different FM services, in an integrated manner are chosen by the client organisations [20]. As Global FM Market Report [22] stated, the IFM provider may either deliver the FM services to the client organiation by its own employees or outsource to sub-contractors/ single service providers and manage them in a way that they fulfil the FM service requirements of the client organisation. Apart from these parties, as Varcoe [23]. mentioned, niche FM consultants and niche suppliers can also be seen in FM market, who provide FM consultancy services and operational services to the client organisations.

A market analysis conducted by Frost and Sullivan [16]. identified that the total worth of global FM market in 2016 was $780.04 Billion. It composed of single service outsourcing, bundled service outsourcing and integrated service outsourcing markets which were $565.65 Billion, $138.73 Billion and $75.66 Billion of value respectively. Further, as Frost and Sullivan have predicted based on previous market data, the total worth of the global market in 2025 will be $955.11. Moreover, there will be a higher increment in bundled service outsourcing compared to single services. However, as the survey findings show, there will be a rapid increment in IFM market with compared to both single service and bundled service FM markets.

According to Singh [24], Sri Lankan firms understand that outsourcing FM can assist them in tackling the challenges of operating in Sri Lanka's changing business landscape while mitigating significant risks and improving the company's overall image and credibility. Hence, the concept of outsourcing FM is emerging in Sri Lanka and numbers of local and global FM service providing organisations are evolving in the FM industry [7]. Since most of the organisations historically adopted an in-house FM model while outsourcing single services, such as cleaning, catering or maintenance to external providers, there are only a handful FM and property management companies in the market [24]. However, literature, does not provide a clear idea of the composition of FM market and the services provided by these organisations. Hence, this paper attempts to fill the above gap by investigating the nature of FM service industry of Sri Lanka.

III. RESEARCH METHODOLOGY

To achieve the aim, a qualitative approach was selected, and interviews were conducted covering three FM experts selected from key FM service providing organisations in Sri Lanka. In selecting the experts, their field of expertise and the industry experience in FM service providing organisations were considered. Participants had a minimum of ten years' experience in the FM industry and at least five years' experience in service providing organisations. Semi structured interviews were used for data collection and manual content analysis was employed for analysing collected data.

IV. RESAERCH FINDINGS

As all the experts interviewed in this study revealed, the role of FM in achieving business success has been increasingly recognised by Sri Lankan business community during the last decade and therefore, FM can be identified as a fast-growing profession in Sri Lanka. Historically, all the FM operations of organisations had been carried out through traditional in-house method, in which, organisations' all the FM functions are got done through organisations' own employees. Further, with the emergence of FM as a service sector in the country, the awareness among the organisations on outsourcing of FM functions and their benefits have been enhanced and thus, the organisations have largely moved to outsourcing of FM functions from historically adopted in-house FM operations. The interviewees also mentioned the same fact cited by Singh [24] that first, organisations started with individual FM services outsourcing and therefore, the FM industry in Sri Lanka had been initially composed of different service providing organisations whose service provision had been limited to single FM service. However, with the increased demand received for outsourcing, especially for services such as cleaning, catering and security, organisations which provide other FM services too emerged in the industry. Further, this motivated the single service providing organisations also to expand their scope for provision of several FM functions, establishing as bundled service providers. New bundled or packaged FM service providers also entered into the market with the aim of obtaining this business advantage. The interviewees stated that, due to the numerous benefits that they could yield through outsourcing, client organisations started to totally outsource the operation of non-core FM functions so that the management could fully concentrate on the core business. The outsourcing procurement option provided the client organisations with the opportunity of transferring the FM operations which they considered as a huge burden. The risk also could be transferred with the responsibility so that the client was free of risk of improper management of facilities and associated negative impacts. Further, outsourcing option provided the FM clients with the opportunity to procure expertise knowledge and competencies which were not available within the organisations. In addition, the benefits such as cost savings, improved service quality and increased flexibility supported the achievement of primary objectives of the organisations as discussed by Barrett and Baldry [6], and this further encouraged organiastions more towards outsourcing. Thus, once a huge demand for FM outsourcing generated with these benefits, the concept of Total FM (TFM) or IFM started to be practised. Accordingly, the findings revealed that the supply side of the FM industry of Sri Lanka now is composed of single service providers who provide a single FM service, multiple/bundled service providers who provide several FM services together, and TFM/IFM service providers who provide the total FM scope of business organisations to cater the FM demand. Apart from these parties, niche FM consultants and niche suppliers can also be seen in Sri Lankan FM market, who provide FM consultancy services and operational services to the client organisations, complying with the FM industry arrangement in UK in early 1990s, where FM profession was well established by that time [23]. Based on the above discussion, different types of FM service providers that can be identified in relation to FM service provision in Sri Lanka are presented in Figure 2.

While such combination of providers is available in the FM market, as per the findings, there is a smaller number of TFM/IFM suppliers in the industry compared to single or multiple service providers, and most of them are international organisations which are based on countries such as United Kingdom, United States of America, Australia, Singapore and India. Moreover, as per experts' views, emergence of few local IFM companies during last few years is a good implication that there would be more such companies in Sri Lankan industry in near future. Another positive implication for the development of

FM service industry is that rather than just responding to a Request for Proposal (RFP) that is incurred from client's side, the service providing organisations are actively engaged in sole negotiation as well. Sole negotiation is a business effort taken by the service providing organisation in order to enhance their business and establish in the market [25]. In sole negotiations, the service providing organisations in Sri Lanka either through their own staff or through research companies, look for potential clients, visit them, come up with FM solutions/ proposals for clients and finally tries to enter into FM service agreements with client organisations emphasising the benefits that they can gain through outsourcing, after successfully going through the discussions.
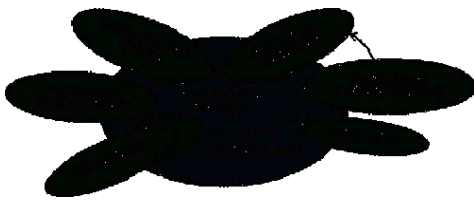
Fig. 2.   Different types of service providers in FM market in Sri Lanka (Source. Developed based on Varcoe (1993))

The findings of the expert interviews further revealed that the services provided by the FM service sector of Sri Lanka include operation and maintenance of mechanical, electrical, plumbing and critical systems; maintenance of the building structure, interior and external facades; security, janitorial, cleaning, car park management, pest controlling and other relevant soft services; service strategy design,   implementation and service performance management; energy consultancy, green   building   consultancy,   sustainability programmes   and   other   consultancy   services; customer   relationship   management/helpdesk/ reception and concierge services; financial and accounting services; supplier contracts management /and supervision of contracted service providers; environment and health and safety management; emergency   preparedness/business   continuity planning; compliance and regulatory management, etc. Among these variety of individual FM services, the provision of janitorial and security services can be identified as FM services with highest demands. However, the findings indicated a considerable increment in the other FM service provisions as well, especially both soft and hard FM services as well as operational and management FM services

during the last few years. Hence, as per the research evidence, the current FM industry in Sri Lanka provides all the FM services found through a global survey report of Frost and Sullivan [16], which is a good implication of the present FM industry of Sri Lanka. As the experts pointed out, establishment of internationally recognised FM organisations in Sri Lanka can be identified as a major reason for such coverage   of   FM   service   requirements.   The internationally   recognised   best   practices   are adopted by these organisations and as per the experts, this acts as a major factor that enhances the quality of the FM services provided even within Sri Lanka. In order to be competitive in the market, the local companies will also need to reach such standards and indirectly this will enhance the overall quality of the FM services provided in the Sri Lankan market.

Another important finding of the study is that the FM service provision can be seen in almost all the   sectors   including   hotels   and   hospitality, logistics, commercial, residential, industrial, retail and healthcare, infrastructure etc., while the highest demand for FM services can be seen in commercial and   residential   properties.   Hence,   the   highest provision of FM services in the Sri Lankan FM industry is mostly done for those two types of facilities.

As Global FM Market Report [22] stated and as per Figure 2, TFM or IFM companies may involve their own employees or sub-contractors to provide FM   services.   When   FM   service   provision arrangements in Sri Lanka are considered, the experts mentioned that the oraganisations which provide IFM services and bundled services in Sri Lanka either provide all the FM services of a particular   project   by   their   own   staff   or subcontracting some of the FM functions to third party service providers. Moreover, as the experts mentioned,   the   services   provided   by   these organiastions by their own staff mostly involve professional management services whereas third party providers are hired to provide operational services related to the FM. Therefore, depending on the number of projects in hand and depending on the scale/scope of those projects, the service provision arrangement as well as the number of staff members employed by a FM organisation for a particular project can be different. This proves that though common list of FM functions can be identified in general, in practice, depending on the nature of

business and the scale of the project, there can be differences in FM service requirements and therefore FM services need to be provided differently to different organisations [26].

Hence, according to the experts' views, Sri Lankan FM service industry is at a satisfactory level and it is at a growing state with adequate coverage of FM services to cater the FM demand. However, the biggest challenge faced by service providing organisations is the lack of skilled labour in operationalising the service requirement. Moreover, since there are handful of FM and property management companies in the Sri Lankan market [24], as the experts highlighted, emergence of more such IFM and TFM companies is essential to ensure a faster growth in the industry, eradicating the currently available industry barriers.

V. CONCLUSION

According to the findings, the FM service industry is composed of both local and international organisations which fulfil the FM service requirement in all the sectors. The representation of single, multiple and TFM/IFM service providing organations can be seen in the market which shows a considerable development in the industry within last few years. However, the major disadvantage is that still there are few IFM and TFM companies in the market. Since the IFM and TFM companies in the market have a higher capacity for the development of the FM service industry compared to single FM service providing organisations, establishment of both TFM and IFM companies need to be more encouraged by identifying the barriers and eliminating them.

This research is a preliminary study conducted as a part of a large study intended to investigate the success and failure of outsourcing projects in Sri Lanka. The research findings provided an insight on the FM service industry in Sri Lanka and its composition. The findings of the study will fill the existing empirical and literature on FM service industry of Sri Lanka and the future researches can be built upon the background understanding provided through the study. This study is a qualitative study and a further research can be suggested to investigate the FM industry using quantitative measures which would strengthen these findings and provide a clearer view of the same context.

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Repatriate Adjustment Among the Academics in Sri Lanka

D.G.M.P.M Menaka Gamage
Faculty of Business
NSBM Green University
Sri Lanka
menaka@nsbm.ac.lk

R. H.G.W. Pradeep K. Henegedara
Department of Business Administrations
University of Sri Jayewardenepura
Sri Lanka
pradeepk@sjp.ac.lk

Abstract -problem among the academics, where the academics find difficulties in adjusting back to the local context after the international academic assignments. Although this is a pertinent issue, in the extant body of literature investigations are lacking. This paper aims to investigate the factors affecting the repatriation adjustment among the academics in the Sri Lankan context. In addition, this paper investigates whether the proactive personality of academics moderate the impact of the factors affecting repatriation adjustment. For this purpose, 120 academic repatriates have been considered from the Sri Lankan universities. Structural equation modelling has been used to test the hypotheses through AMOS statistical package. Findings of the study suggests adjustment of the academic repatriates to the local context is affected by the individual factors, organizational factors and other factors. Further, personality moderates the impact of these factors on repatriation adjustment. This suggests that, presence of proactive personality facilitate academics to perceive the individual factors, organizational factors and other factors in a favorable manner which would smooth their adjustment process in the local context. The findings provide significant insights for the university administrators to facilitate smooth adjustment of academics to the local context after their foreign assignments. The originality of this paper is on its contribution to the literature by examining the repatriation model of Black et al. that has not been thoroughly analyzed before as a whole. Further, the extension introduced for the model through incorporating personality as a moderator provides a significant contribution to better explain repatriate adjustment phenomenon among the repatriate academics.

Keywords—component, formatting, style, styling, insert (Repatriation, adjustment, repatriated academics, university)

I. Introduction

Repatriation can be considered as a transition from a host country to one's home country after living overseas for a significant period [1],[27]. In the process of repatriation adjustment, repatriates attempt to reduce uncertainty and achieve a degree of fit with the different aspects of the home or organization context [6],[26]. Despite the importance of managing repatriation, it is identified that high percentage of repatriates who return from the foreign assignments find difficulties and remain with low motivation and low performance [5],[49]. Upon repatriation, repatriates find the home context as unfamiliar [1], [29]. Literature points out that repatriates encounter certain difficulties when they return back to their home country [40].

Academics are given opportunities to engage in foreign assignments based on teaching and research for a specific time period in overseas [25]. They are given leave with pay during their stay overseas [25]. This is a common practice in the academia in Sri Lanka as well. In order to obtain higher world rankings for Sri Lankan universities, and to make the Sri Lanka the knowledge hub in Asia, Sri Lankan government invest more on the development of human capital in academia [23],[45]. However, upon return to their home university, academics in Sri Lanka encounter adjustment issues [25]. The survey of [25] involving 63 Sri Lankan academic repatriates revealed that repatriation adjustment is a significant issue among the academic repatriates in Sri Lanka. Academics upon return feel less fit to the university [25]. During their foreign assignments' academics engage in teaching and research [20]. Academic expatriates live and work in new cultural and organizational settings; they adopt new cultural and organizational values and norms to perform well

[42] [43]. However, during the process of repatriation academic repatriates may establish unrealistic repatriation expectation and experience reverse cultural shock which creates academic repatriates to feel uncomfortable and mismatch with their home context [25].

Although repatriation adjustment issue among the academics is significant, it has not yet been sufficiently discussed in the extant literature [54] [20] [25]. Particularly, this lacuna exists in the Sri Lankan context [25]. [23] emphasized that there is a higher need for enhancing the understanding of the repatriation issues. In response to this present study investigates the factors affecting the repatriation adjustment process among academic repatriates. In addition to the factors which are already present in the model proposed by [7], this study extends the model by incorporating repatriate's personality as a moderating factor which has an impact for individual's adjustment in the repatriation process. Such an investigation is demanded in the extant literature where [25] highlighting the unique findings of their study regarding adjustment of repatriate academic, demands that further studies need to be carried out to find how individual factors such as personality would influence the adjustment process of repatriates.

II LITERATURE REVIEW

Academic repatriates

Expatriate academics are defined as professors and non-professorial staff who are part of the research and teaching profession' [30]. They have been employed in an educational institution outside of their country of origin for five years or less and intend to live in that country at least until the end of their working contract [44]. However, [25] identified academic repatriates as academics who had been attached to a foreign university or academic institution for more than one year, had been involved in academic activities and, at the survey date, had returned within the past two years.

Repatriation adjustment

Repatriation is considered as an intra-organizational transition [46] and the developments of conscious and unconscious anticipations about the new setting [31, , p. 336]. Repatriation adjustment is the experience of reintegrating their earlier accustomed environment having stayed in different surroundings for a considerable period [1],[27]. Certain studies refer repatriation adjustment to the process of attitude and behavior modification in which the experience of the individual is adapted to match the accepted behavior of the host culture [4]. Also, it is defined as the degree of a person's psychological comfort with various aspects of a host country [5]. Work of adjustment theorists of relocation [37] and expatriation [8] provides the theoretical underpinning for repatriation".

Factors affecting repatriation adjustment

There are four main factors which influence individual's repatriation adjustment process. Individual factors, job factors, organizational factors and other factors [7] as cited in [52]. In the repatriation adjustment process individual factors facilitate to understand the new situation. Characteristics relating to individuals and their foreign assignment comes under these individual factors. Particularly, factors such as self-efficacy, social capacity and perceptual capacity help individuals to understand and adjust according to the new situation [52]. Effect of job factors comes from four main factors. Mainly from the clarity of the tasks to be performed after repatriation, level of freedom or the autonomy in their job after repatriation, to what extent the organization values their international exposure after returning back to the home country and the expected promotions in the job after repatriation [52],[22],[40] [11]. Organizational factors also determine the level of repatriation adjustment and the key factors under that are repatriation policy, compensation and the training provided upon repatriation [52]. Impact of these factors are empirically validated by several [7],[9],[11]. Apart from the individual, job and organizational factors there are some other important factors which would impact the adjustment in the repatriation process. Particularly, spouse adjustment, housing condition and the social status matter in fitting to the environment in the home country [52].

III MODEL OF THE RESEARCH
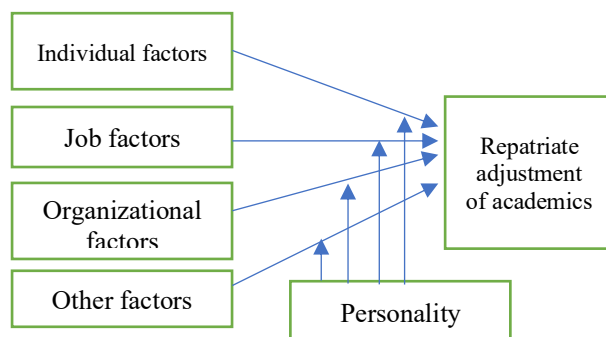
III DATA ANALYSIS AND DISCUSSION

The data was analysed using the structural equation modeling approach to examine the model and test the hypothesized relationships with AMOS. Goodness of measures was performed to test the validity of measurement instruments, and a structural model was analysed to empirically establish the relationships between the constructs and test the model fit of the hypotheses. Construct validity, convergent validity and discriminant validity was assessed and assured in the present study to ensure the goodness of measures. Cronbach's alpha was tested to ensure the reliability of the measures.

The overall structural model was assessed for the model fit, and it produced the following value indices. Some researchers [39] allow values as high as 5 to consider a model adequate fit [34]. Therefore, the structural model in the present study indicated a moderate level of fit.

TABLE 1: GOF INDICES FOR THE STRUCTURAL MODEL

Incremental Fit		Parsimony-Adjusted measures				
CMIN/ DF	GFI	RMSEA	IFI	TLI	CFI	PRATIO
5.635	.669	.126	.703	.774	.702	.938

Source: Survey data
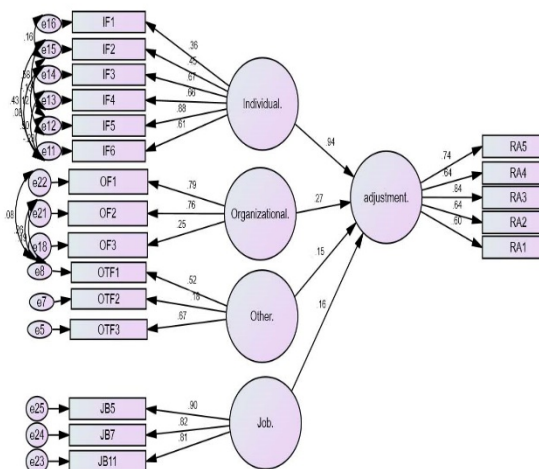
Figure 1 Structural model for the direct relationships

Source: Survey data

TABLE 1: HYPOTHESES (H1-H4)

Hypotheses	Beta Value	P value	Decision
Individual factors have a positive impact on repatriation adjustment of academic repatriates (H1)	0.94	.000	Supported
Job factors has a positive impact on repatriation adjustment of academic repatriates. (H2)	0.16	0.214	Not Supported
Organizational factors have a positive impact on repatriation adjustment of academic repatriates. (H3)	0.27	0.000	Supported
Other factors have a positive impact on repatriation adjustment of academic repatriates. (H4)	0.15	0.000	Supported

TABLE 2 HYPOTHESES (H5-H8)

Hypothesis for moderator effect	Beta Value	P value	Decision
Personality of academics moderates the impact of individual factors for repatriation adjustment of academics (H5)	0.32	0.000	Supported
Personality of academics moderates the impact of job factors for repatriation adjustment of academics(H6)	0.09	0.143	Not Supported
	0.15	0.021	Supported

Personality of academics moderates the impact of organizational factors for repatriation adjustment of academics (H7)	0.34	0.000	Supported
H8: Personality of academics moderates the impact of other factors for repatriation adjustment of academics. (H8)			

Source: Survey data

Findings of the present study relating to the impact of individual factors on repatriation adjustment confirms previous empirical evidence [52],[7],[9],[21],[49]. As confirmed by previous studies in the repatriation adjustment process, individual factors facilitate to understand the new situation. Particularly, factors such as self-efficacy, social capacity and perceptual capacity help individuals to understand and adjust according to the new situation [52]. Thus, the finding of the present study suggests that academics with favorable individual factors such as high self-efficacy, high perceptual and social capacity would enable them to better understand the local situation upon their return and would make the adjustment process much smoother.

Impact of the organizational factors on repatriation adjustment is also empirically validated by several scholars [7],[9],[11]. It is identified that organizational factors such as repatriation policy, compensation and the training provided upon repatriation determine the level of repatriation adjustment [52]. Thus, the finding in the present study suggests that academic's expectations about the compensation and training that they would receive upon their return would facilitate in adjusting for the local situation upon return.

Finding of the present study related to the impact of other factors on repatriation adjustment also confirms previous empirical findings. It is identified that other factors such as spouse adjustment, housing condition and the social status matter in fitting to the environment in the home country [52],[7],[9]. Thus, in the context of the repatriate academics, the other factors influence in adjusting to the local context.

However, impact of the job factors on academic's repatriate adjustment was not supported in the present study. Although previous empirical evidence confirms that job factors have an impact on the employee's repatriation adjustment [52],[22],[40],[11], it can be said that in this context of academics the impact of job factors is not influencing for their adjustment to the local context. This finding can be attributed to the nature of the job of the academics where, throughout their career they enjoy a very high level of independence and autonomy [31]. Thus, it can be interpreted that academics do not have to worry about the influence of the job characteristics upon their return. Further, as stated by [52], these factors would vary depending on the context particularly in non US context. Since the present study investigates the factors affecting the repatriation adjustment of academics in Sri Lankan context, job factors may not have any impact for repatriation adjustment due to the contextual differences.

A unique finding of the present study is the moderating effect of personality on the repatriation adjustment. Although personality has not been investigated as a moderator of repatriate adjustment, it is stated in the literature that certain individual characteristics such as personality may result in better repatriation adjustment [16]. Thus, according to the findings of the present study it can be identified that proactive personality may strengthen the impact of individual, organizational and other factors on the repatriate adjustment. Based on the findings of the present study it can be reasoned out that proactive personality would enhance the individual factors such as self-confidence, perceptual capacity which is required for better adjustment to the local context. Further, based on the findings it can be reasoned out that proactive personality would make the repatriates to perceive organizational factors such as university policies in a favorable manner which makes their adjustment process smoother. Moreover, personality enable repatriates to perceive other factors such as spouse adjustment and social status in a more favorable manner, thus making the adjustment to the local context much easier.

However, according to the findings, personality does not moderate the impact of job factors on repatriate adjustment. This suggests that having a proactive personality would not have any influence on strengthening the impact of job factors on their adjustment. This can be reasoned out based on the nature of the job of academics explained above and the contextual differences.

IV Limitations, Implications and Future research

The results of the study must be interpreted in light of its limitations. Since the present study is a cross-sectional study, findings must be interpreted cautiously as repatriation adjustment varies as time passes. In order to overcome such limitations, it is suggested for future researchers to consider a longitudinal study. Further, a significant finding of the present study is the moderating role of personality in repatriation adjustment process of academics. However, further investigations are required to understand why job factors do not have any impact on the repatriation adjustment of academics. It is suggested to conduct a qualitative study to understand how proactive personality moderates the repatriation adjustment and why the personality do not moderate the impact of job factors on repatriation adjustment of academics.

This study contributes to the extant body of literature in several ways. First, present study extended the repatriation model proposed by [7] by introducing personality as a moderator. As stated by [52] and [47] the model proposed by [7] should not be considered as it is and introducing any moderators to it would enhance the predictive validity of the model. Thereby study provided a better understanding on how the impact of individual, job, organizational and other factors would vary when repatriates have positive personality. Secondly, this study contributes by investigating the repatriation adjustment process as it is identified that there is a lacuna in studies which investigates how academics adjust when they return back to their home country upon completion of foreign assignments on research and teaching [25]. Thirdly, this study addressed one of the main limitations of the initial model proposed by [7]. As emphasized by [52] this model is not that valid for non-US contexts, and further research is demanded in non US context. Since the present study investigated the repatriate adjustment model in Sri Lanka, the findings of the present study contribute to enlighten the understanding on what factors impact for the repatriation adjustment in non-US context. The findings of the present study has significant managerial implications. Particularly, for the university administrators to facilitate for a smooth adjustment for academics upon their return after a foreign assignment. The study shed light on shaping academic's individual factors upon return so that they would understand the local environment

much better. Thus, university administrators need to enhance the individual factors of academics such as self-efficacy and social capacity. In addition, university administrators need to focus on redesigning the university policies, promotion systems and shaping the academic's personality to facilitate the adjustment process upon return after a foreign assignment. Further, the study provides significant insights for university administrators, heads of faculties and departments to provide more opportunity for academics to balance out their personal life and family life upon return. So that academic repatriates would perceive spouse adjustment, housing conditions in a more favorable manner which make the adjustment process smoother. Further, promoting positive personality and shaping them is much essential as it influence the way the academics perceive the influence of individual, organizational and other factors.

V CONCLUSION

The findings of the study shed lights on the factors affecting the repatriation process of the academics. Accordingly, it can be concluded that adjustment to the local context upon return after a foreign assignment is affected by the individual factors, organizational factors and other factors. Further, these factors are moderated by the proactive personality of the academic repatriates. Which suggests the presence of proactive personality would facilitate academics to perceive the individual factors, organizational factors and other factors in a favorable manner which would smooth the adjustment process. However, the presence of proactive personality would not have any impact on perceiving the influence of job factors in a favorable or unfavorable manner which in return would not have any impact to make the repatriation adjustment process smooth. This paper suggests the need for rethinking and demands further investigations why the personality would not have any influence for the impact of job factors on the repatriation adjustment process. The findings of this study are much significant as the factors affecting repatriation adjustment of academics have not been sufficiently investigated, even though adjusting back to the local context after a foreign assignment is a pertinent issue among the repatriated academics in Sri Lanka. This study has significant managerial implications particularly, for the university administrators in redesigning the university policies, promotion systems and shaping the academic's personality to facilitate the

adjustment process upon return after a foreign assignment.

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Erica: A Virtual Assistant for Private Universities

Dilshani Costa
School of Computing and Engineering
Informatics Insitute of Technology
Colombo, Sri Lanka
dilshani.2015219@iit.ac.lk

Shyani Siriwardene
School of Computing and Engineering
Informatics Insitute of Technology
Colombo, Sri Lank

Abstract— The initial interaction between a student (customer) and a university is the most crucial in the customer conversion process, where an unregistered student converts to a registered one. However, the competitive landscape that private universities are in adds more complexity to the conversion process as students have a plethora of options to choose from. For universities to compete, it entails that a strong engagement strategy should be in place to appeal to the young minds that makes up their target audience.

Traditionally, initial interactions are driven through channels that are unable to provide timely responses and the digital experience that students seek. Furthermore, human personnel having to monitor these channels closely ties them to repetitive, boring work that ultimately leads to poor performance.

This research focuses on the issues that students face with the current forms of engagement channels offered and its wider implications on the human personnel tasked with monitoring. Using existing literature, a thorough analysis was conducted into the research area and findings validated through industry surveys involving universities and students.

It was observed that there is a pressing need in universities to leverage technology during the initial interactions. Technology-driven interactions can improve customer experiences and better engage customers, which in turn will ensure successful enrollment. This paper presents, the recommended solution, the virtual assistant, that uses natural language processing (NLP) technology to catalyze the conversion process by managing initial conversations and providing timely responses.

Keywords— *customer engaement, students, private tertiary education providers, virtual assistants, chatbots*

I. INTRODUCTION

All activities that an organization runs with the aim of forming connections and engaging existing customers or potential customers, can be defined as customer engagement strategies. Furthermore, this defines the emotional connection an organization can make with its customers [1].

Before pursuing tertiary education in private universities, students engage with these universities through different channels, to get information. With the rise in technology and self-service channels, interactions are initiated with sales after considerable prior engagement with the brand [2]. The initial process of "engagement" begins when the students search for information to find what is relevant to them. This is the initial impression; the place where customers get their first impression of the university and therefore, it is vital for customers to have a seamless experience at this initial engagement. Ten years ago, personal and telephone consulting were typical means of communication with universities, however, today the target demographic is born into a digital world, making artificial cognitive systems a high priority [3].

For better engagement, companies need to consider the implications of customer experience. It is important to identify perspectives of the customer and find opportunities to create experiences that are most relevant to the target customer [1].

With the dawn of the digital era, the value that customers are looking for has changed drastically. Customer experience and engagement is becoming more complex, and is "impacting not only customers, but also companies' strategies, processes, operations and employees" [4]. Companies must embrace technology to radically

change the customer experience and engagement they offer [4].

The following key focal areas where students find relevance of university offerings, during the initial stages of interaction, have been analyzed along with the role that technology plays in this regard.

1) How universities interact with students
2) How university employees are affected within their job roles
3) How processes can be re-engineered using technology

Universities and its prospects

Student recruitment in private universities should consider a competitive edge to thrive in this dynamic market [5]. As competition to recruit students intensifies, universities are pushed to find new ways to engage and retain prospects by providing them with quality services.

Times have changed, and technology has created new opportunities by raising standards for engaging prospects. In the late 1990's, prospective students had to go through brochures or catalogues to gather information; during this period, universities employed "letters, campus visits or viewbooks," which formed their strategy to reach out to students. Although this process remains with variations; students, nowadays, prefer self-service means, altering the strategy that was once leveraged by universities [6].

The proliferation of media channels has created an environment where customers are approached through dialogue as opposed to the conventional mass communication approach [7]. Social networking has scaled up the choice of the customer. With easy access to technology, anytime and anywhere; engaging customers require considering building effective relationships with customers through the experience that is provided [8].

Reference [7] states that prospects are no longer looking forward to just reading content but are rather looking for an enriching experience through interactions with organizations. Reference [9] highlights the importance of focusing on relationships that are formed through digital touchpoints such as websites and social media.

Digital experiences should be a consideration of organizations to build better customer relationships.

To achieve strong customer experience, it is important that organizations start focusing on the digital customer experience. Digital customer experience defines everything that a customer experiences through a digital interface. Though digital is just part of the customer experience, it is the one which requires the most attention and investment [10].

In this technological era, a simple click can determine a customer's perception of a channel. A ten second wait for a page to load can make 50% of consumers leave [10]. This makes customer experience complex and important. With the technological changes that are happening, organizations are looking at augmenting or replacing manual interactions with digital ones like artificial intelligence (AI) and virtual reality.

The higher education sector has room for improvement in the digital world; to keep up with the latest trends that are available and adopt effective technology to its activities – reaching prospects and engaging them. Digital communication has paved the way for greater visibility and availability of information, in a timely manner, for prospects to see. Focusing on customer touchpoints and creating an environment for seamless customer interaction with the brand will build strong customer relationships. The effective use of digital technology, at these touchpoints, drives engagement between the customers and the organization - prospects and the university [8].

Universities and its employees

In the work setting, employees are sometimes constrained to situations where leaving a repetitive task and doing something satisfying is impossible. This has a detrimental effect on the performance of the task that is been done. Psychologists have been conducting research to understand the implications of repetitive work. The result that is most stressed on is dissatisfaction, which is closely tied to effects such as absenteeism, higher turnover and thereby poor employee performance results [11].

Repetitive, simple tasks that require attention are mostly categorized as jobs that are low challenging; jobs that easily induce boredom. These jobs require less attention or very high attention without requiring any reward in return. The job characteristic theory suggests that jobs that have less need for skill, variety, task identity and task significance are very unlikely to bring about motivation or interest in employees. However, even jobs that have potential to be interesting will lead to

boredom if performance is prolonged and repeated [12].

Fredrick Herzberg was a researcher whose area was job redesign and motivation [13]. Herzberg realized that employees were satisfied with experiences that were tied with factors such as "achievement, recognition, job, responsibility, advancement and growth." This further implies that boring and monotonous jobs reduces performance by stifling motivation. To add challenge to the job, variety, autonomy and decision authority are said to be factors to consider [13].

In universities, marketing personnel responsible for keeping students engaged during the information-seeking stage are tasked with routine, monotonous work of answering these inquires [14]; [15]. According to a survey that was conducted, it has been noted that 40% of workers spend a quarter of their week doing manual, repetitive tasks. Where 60% say that a saving of six or more hours could be made, were these tasks handled by efficient IT [16].

The tasks that are related to these information workers can easily be re-engineered so that these personnel can focus on tasks that are more rewarding and which require actual human expertise.

Business process re-engineering

The process of creating value from an organizations' intangible asset is known as knowledge management. Knowledge management strategies look at building structures of knowledge and make it available through an interactive method to anybody who can benefit from this knowledge [17].

Chief Executive Officers around the world debate that the competitive advantage they have is their "human capital", due to the knowledge they possess. Leveraging knowledge that an organization has can help it gain a competitive advantage. Universities are knowledge-based institutions, where management of knowledge is at the core of its business growth. Incorporating knowledge to develop new solutions to cater to its customers will augment processes; it is in this regard that knowledge management infrastructure should be developed [18]. Expert systems can be used to drive business efficiency using knowledge management [19].

The development of expert systems that leverage knowledge management to communicate through natural language, has been a topic of interest since the 1950's. These conversational agents were built to imitate human conversations. With the development of AI, chatbots have been used as a communication channel that is able to provide automated services. Siri and Cortana are strong success stories that show how these agents could be used in customer services [20].

There is a growing interest for chatbots; machine/virtual assistants that provide data and services through user interfaces. Companies such as Google, Facebook and Microsoft have identified these agents as the next disruptive technology. The main motivational factor for the use of these virtual agents is its productivity that allows users to get timely and efficient information [21]. These real-time dialogues are said to be more efficient and effective as opposed to other communication channels (such as email and frequently-asked-questions) to develop and strengthen customer relationships; and improve satisfaction [22].

Reference [23] says that "harmony, fluidity, synchrony", known as rapport, are traits of an engaging conversation, and that these virtual assistants can build conversation through the "simple contingent nonverbal behaviour" that they communicate with. The development in technology has allowed developers to build bots that are able to communicate effectively and learn from experience. Research highlights the characteristics of these conversations as being more persuasive, engaging, fluent; thereby reducing user frustration. As a result, jobs that were performed by humans are being replaced by these intelligent agents. From simple rule-based chatbots to ones incorporating AI, performance keeps improving; increasing the value of these agents to businesses. In 2016, the time people spend on messaging apps has increased by 394%; and the shift towards conversation to get answers is driving changes in ways that companies communicate with their customers [24].

Leveraging the ability of chatbots to message allows companies to engage with their customers, making it a powerful tool for customer service and marketing. Chatbots are considered an alternative to traditional customer service, as it helps customers to interact with the brand and easily obtain prompt answers; which is convenient [21]. Even through these technological advances, it must be understood that human agents cannot be completely replaced, due to the knowledge factor they possess over these virtual agents [25].

MATERIALS AND METHODS

Non-probability sampling was used to identify the members to take part in the study, as it considers the impracticability of reaching out to all possible members of the study. Therefore, a sample group of members were chosen to take part in the research. Within this sampling technique, purposive sampling was used due to the greater chances of data being accurate. Convenience, self-selection and snowball sampling were used when identifying members for the questionnaires and interviews.

118 replies were received for the questionnaires that were sent out. For the interviews four distinctive marketing personnel were selected to obtain an in-depth understanding of the perceptions of the stakeholders for this IT solution and to validate the findings from literature, from local and foreign universities. Further, interviews were conducted to gather knowledge to create the knowledge base of the bot.

Results

The key findings following the interview and questionnaire stage are as follows:

• Inquiry stages are of high importance. The efficiency of the university is gauged by prospects at this stage. If responses are not timely, professional and adequate, students might not want to pursue ahead. Timely responses are critical.

• Inquiries are routine, and the work is highly monotonous for employees; with less time to spend on anything else.

• Customers gave an average rating of "efficient" to the current channels employed by the university, across a scale that ranged from highly insufficient to highly efficient.

• The high level of digital experiences that customers are looking for is not present in the current forms of engagement channels. The biggest pain point marked by customers was the inability to find required information on time and the long waiting times to reach the university.

PROPOSED SYSTEM

Following a review and analysis of existing channels, Table I shows the analysis, and the information gathered, a chatbot was considered an effective technology to manage these initial interactions, as disadvantages identified can be negated.

REVIEW OF CHANNELS

Channel	Advantages	Disadvantages
Self-service channels (website, social media)	• Ability to reach a wider audience • Can be accessed at any time of the day • Self-service channel; convenient • Digital service caters to the digital generation	• Bad design; bad user experiences • Inability to find the information that is required • Having to scan through pages to find required information • Information need to be updated regularly
Personnel-involved channels (phone calls, emails, online chat)	• Ability to clarify and ask questions easily • Caters to customers that are traditional • Can build relationships with customers	• No replies on non-working days • Long waiting times on call and email • Questions not been answered clearly • Hassle of having to deal with a human

As part of this research a customer facing virtual agent (chatbot) was developed to provide personalized content according to questions that are being asked. This self-service channel will drive conversations by interacting with the students according to pre-defined rules that govern the conversational flow. The chatbot has been trained with a training set of sample questions and answers that is characteristic of initial conversations; this makes up its knowledge base. Furthermore, if the chatbot is unable to match responses with that which is found in its knowledge base, capabilities have been built so that it can route to human personnel, which can then take control of the situation.

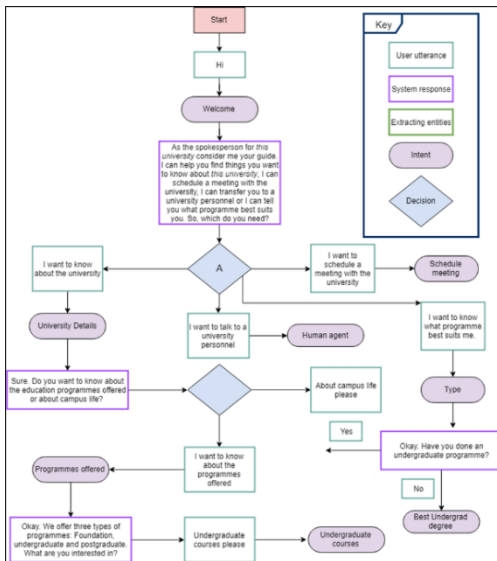Fig.1. shows the high-level architecture of the proposed solution.

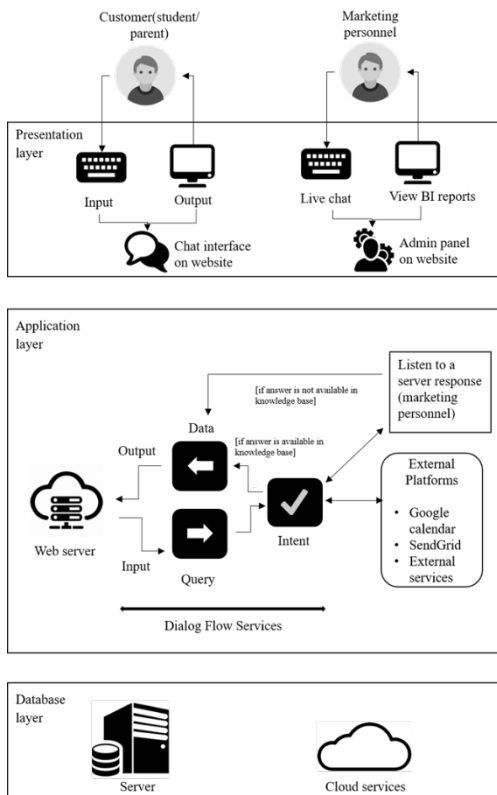Fig. 1. High level architecture diatram

Fig. 2. Communication flow

RESULTS

The proposed solution was developed as a virtual assistant that can provide responses based on the questions that are asked by the students. The system can route to human personnel if it is unable to answer and provides reports based on the conversations that it had with the customers.

The conversational flows were designed based on data gathered during the interview stages. Fig.2. is a sample design of a conversational flow that was implemented in the solution.

Finally, based on the conversational flows the virtual assistant was developed using the natural language processing engine provided by Google, DialogFlow. Fig.3. shows the screenshots of the solution.

CONCLUSIONS

The "Erica" virtual assistant is an IT solution that can be effectively used to manage initial communication with customers and guide them through the process, allowing university marketing personnel to concentrate on work that better requires their attention. This addition to the university customer-facing solutions will kick-start the journey of incorporating technology into the customer conversion process. The faster universities start embracing the potential of technology and the promises it offers, the easier it will be to adopt to new technology that could be developed on existing solutions.
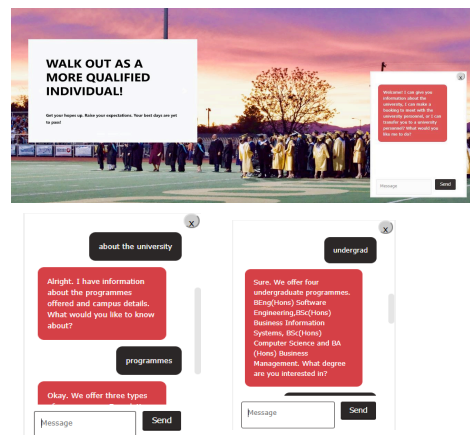

Fig. 3. Screen shots

For future works, the virtual agent can be developed so that it is able to monitor conversations with human personnel and grow and develop on its own. Furthermore, a hybrid solution could be developed by combining the search forms of a

conventional system with the natural language input of the current system – gives more flexibility when querying.

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3D Walk-through at NSBM

D Manujaya
Faculty of Computing
NSBM Green University Town
Homagama, Sri Lanka
dulan69@gmail.com

D J Jayamanne
Faculty of Computing
NSBM Green University Town
Homagama, Sri Lanka
dileepa@nsbm.lk

Abstract— **In this work, a 3D Virtual Walk-through of NSBM using the Unity Game Engine is presented. The walk-through includes real life and detailed 3D models of buildings and objects. The buildings are modelled using SketchUp including the interiors. All buildings and objects are approximately modelled to scale. Objects are also modelled using SketchUp where possible. All other models which require more details are modelled using 3Ds Max and Blender. As the walk-through is started, a user is dropped in front of a building. Then, the user can control the camera using the mouse. The arrow keys are used to move forward, back, left and right in the virtual environment. Also, the user is able to navigate inside the buildings, walk into rooms and open doors. The light source above the ground that imitates the sun provides lighting and shadows for the buildings and trees. There are separate light sources inside each room to model the actual lighting conditions we observe in real life. All lighting is handled using the Unity Engine. In this work, the user has the freedom to move the camera wherever the user desires in the given area as there are no fixed cameras, predefined paths, and environmental hotspots. However, the user is able access any part of the model if it is physically possible.**

Keywords— 3D Walk-through, Unity Game Engine, SketchUp

I. INTRODUCTION

There are countless virtual tour platforms and 3D visualizations to be found on the internet [1], [2] and [3]. None of these programs/projects provide a completely immersive experience. Most of them are video walk-throughs of pre-rendered models with a fixed camera moving on a predefined path. Some lets the user navigate the environment using the mouse. The user points and clicks on the desired destination. The user will then be moved to the hotspot closest to the point where the user clicked.

In this work, we propose a 3D Walk-through at NSBM. The Walk-through will include buildings that are modelled approximately to scale. The user

is able to virtually walk at NSBM without having to physically be at the location. This type of an application is beneficial to any stakeholder who has an interest in NSBM to get an idea about the place prior to the actual visit. There are several environments that feature a different time of the day with lighting to match the environment. The included Graphical User Interface (GUI)/Menus provide the user with an intuitive method to select and navigate between different environments and levels.

LITERATURE SURVEY

In the real world, there are many experiments that cannot be run on a system, simply because they are either expensive or impractical to run. The effective way to test these scenarios on a system would be to run simulations. They will provide users with analytical and practical feedback based on the simulation which is simulating a real-life scenario. Architecture Visualizations is the graphical representation of a model [4] used to simulate. It can be represented either physically or digitally. It is mainly used to showcase the attributes and practical application of principal of content of a proposed building. For example, Architectural Visualization includes design sketches and blueprints.

A game engine is the software provides the necessary tools and set of features required by the users to build simulations quickly and efficiently [5]. Game engines provide the necessary framework to bring together several core aspects of game development: Graphics; rendering engine used to generate 3D/2D graphics, Audio; audio engine which contains algorithms related to sound and audio, Networking; Application Programming Interfaces (APIs) which allows players to connect with each other in a network but not used in this work, Physics; engine that lets the game implement the physical laws of nature, Graphical User Interface (GUI); tools to design a 2D interface which the user will interact with, Scripting; scripts

that holds all the logic in the game. Out of the 3 main Game Engines available for public namely Unity, Unreal and Game Maker Studio, the Unity Game Engine is used in this work since it is the easiest to work with and has a very simple user interface which is more user friendly for anyone who wants to dabble in the arts of game development.

In this work, a 3D Walk-through of NSBM is proposed. This allows a person to virtually be at a specific location, move around and experience the feeling of being physically present at the location. The proposed Walk-through includes buildings that are modeled close to scale as possible. The 3D models of the buildings are built using SketchUp. The player is able to move and look around the buildings virtually. The player can control a humanoid 3D model called Ellen. Ellen contains all the necessary cameras and audio sources required for the game to properly function. The player is able to control Ellen using the keyboard and the mouse. The model contains openable doors with animations done in real time. Every Game Object obeys the laws of physics in the system, meaning that movement and collisions are realistic. There are several environments for the user to choose and play on. Each environment features a different time of the day with lighting to match the environment. The included GUI/Menus will provide the player with an intuitive method to select and navigate between different environments and levels. The night environments are unique since they have a different lighting scheme than the reset.

II. METHODOLOGY

Modern game engines can help create games with stunning graphics. They also help import models/assets from other programs and platforms thus eliminating or drastically reducing the waiting time for each import. The game engine used in this project is the Unity Game Engine. Unity is a real-time cross-platform engine and is one of the most popular game engines available in the market.

The 3D modelling tool used in the project was SketchUp, formerly known as Google SketchUp. Sketchup is a 3D modelling program that is being used in a wide range of applications. A tape-measure was used to get the dimensions of the desired building. There was no practical way to measure the heights of the walls accurately since the necessary instruments/equipment was not readily available. These height dimensions were approximated using the average human height and then these were marked on some on-site sketches.

The Way-finding map was added to SketchUp and a line was drawn along the wall of the measured section. The length of this line was the same as the dimensions recorded from the tape measure. The photo was then adjusted/scaled so that the measured wall matched the length of the line. The end result was that now there was a base which is almost exactly to scale for the model to be built.

The main character model used in the project is called Ellen. This rigged character model is available in the Asset store. Ellen is the most important Game Object in the entire project. It is the parent object for the two cameras and multiple essential scripts and audio files. Ellen is rendered using the mesh renderer component with the materials and provided with the asset when downloaded from the asset store. To make sure Ellen obeys the laws of physics of the system, the RigidBody component is used. Ellen is controlled using keyboard and mouse and is capable of opening and closing doors with animations done in real time. The Use Gravity option is used for an attached object to move/fall realistically in the scene. Rotation on all axes were locked so that it doesn't fall off balance when moving or in collisions. Ellen uses a capsule collider since the capsule shape approximates the shape of Ellen's body better than other collider shapes.

Every scene contains the default main camera and a secondary camera which is used to change view mode. The main camera is used to render the game in first-person view and the other camera is used for third-person view. The cameras are attached to centre of Ellen. Each camera contains an Audio Listener by default. This component is used to listen to sounds in the environment and play it back to the user through speakers or headphones. Ellen has two Audio Sources attached: Walk Sound and Jump Sound. They are played when the specific keys are pressed. Walk Sound is played when W/A/S/D keys are pressed. Jump Sound is played when Space is pressed. This logic is handled by scripts. An Audio Source object with the relevant script attached is made child of Ellen. Once the positions are reset, audio source should move everywhere with the player just like the cameras.

There are 6 different scenes implemented in the project: Morning, Midnight, Daytime, Afternoon, Cloudy and Dusk. Each of these scenes have the same model building and characters.

• Morning: Contains the Morning skybox. Directional light used in the scene has a light

yellowish color to match the mood and the sky/environment. Its direction is also set to look like it's just risen so that the object shadows corresponds accordingly.

• Midnight: Contains the Midnight skybox. Directional light is set to dark gray so that it simulates moonlight. The light provided by the skybox is also extremely dim. This scene also contains several other light sources. These were used to replicate light bulbs placed in rooms, stairs and gardens. Together, these light sources provide a realistic night atmosphere that matches the mood and the overall environment.

• Daytime: Contains the Daytime skybox. Directional light is brighter than all the other scenes and the color Is set to pure white as well to brighten up the environment. There are no artificial light sources since it would be unrealistic for light bulbs to be turned on in the middle of the day.

• Afternoon: Contains the Sunset skybox. Directional light used in this scene has an orange color since the color of light in sunset is usually orange in real-life. The direction of the direction light is also rotated so that it looks like light is shining from the horizon at the objects. All of this helps in providing a realistic atmosphere for the scene.

• Cloudy: Contains the Cloudy skybox. This scene is extremely grim and moody. The sky and the dim lighting provide an atmosphere which makes the player feel like a storm is on its way. The color of the directional light is set to gray.

• Dusk: This scene is very similar to a night scene. The dark starry sky brings out the cold, silent atmosphere. The directional light and the light from the skybox are like the lighting in the midnight scene but here it's a bit brighter. The same artificial lights are also used in the exact same positions as the midnight scene.

In this work, the direction and point lights are used. Directional light is a light that represents sunlight. The source position of directional light doesn't matter since the distance of the light is not defined whereas Point light emits light rays in all directions in the specified range. We used Point lights as outdoor lights.

Scripts are an essential aspect of game development. These files contain the core logic of the components and even the game itself. Scripts in

Unity are written in C# using Microsoft Visual Studio. Following scripts are used in ths work.

• CameraCycle: Used to change the view-mode from 1st person to 3rd person. Assigns 2 cameras and uses a simple bool variable to switch between the two cameras when a key is pressed.

• CamMouseLook: Enables the player to control the attached camera with the mouse.

• CharacterController: Enables the player to control the attached object using the keyboard. The script is also used to hide and lock the cursor at the start of a scene.

• Headbobber: Simple script which bounces a camera along a fixed midpoint to give realistic headbobbing effect when moving.

• Jump and Walk Sounds: Plays a sound when a specific key is pressed. While these are two different scripts attached to 2 different audio sources, the logic in the scripts are more less the same.

• OpenableDoor: Holds all the logic for opening/closing of doors when a button is pressed. Can be attached to any set of doors to add the openable door functionality.

• JumpScript: Allows the user to jump up when a key is pressed. Provides an upward force to the attached RigidBody and pushes it to up few units.

• PauseMenuScript: Contains all the functions to restart and load environments. It's also the script that hides/shows the attached Panel. This script is attached to an empty GameObject, and then its referenced to from multiple buttons and menus.

• RestartScripts: Restarts the current scene on key press.

• StartMenuScript: Very similar to the PauseMenuScript but this script refers to start menu instead.

III. RESULTS AND ANALYSIS

In this work, the proposed 3D Walk-through of include buildings that are close to scale as possible. Fig. 1 and Fig. 2 depict the 3D sketches that are used to build 3D models through SketchUp. The user moves and looks around the buildings as if a player in a simulator. The user controls a humanoid 3D model called Ellen. Ellen contains all the necessary

cameras and audio sources required for the game to properly function. The user can control Ellen using the keyboard and the mouse. The model contains openable doors with animations done in real time. There are several environments for the user to choose and play on. Each environment will feature a different time of the day with lighting to match the environment. The included GUI/Menus will provide the player with an intuitive method to select and navigate between different environments and levels. The night environments are unique since they have a different lighting scheme than the reset. This work is built using the Unity Game Engine and all scripts are written C#. Scripts are an essential aspect of game development. These files contain the core logic of the components and even the game itself. Scripts in Unity are written in C# using Microsoft Visual Studio that define the logic in the game. Figures 3 and 4 below show few screen shots of the developed 3D game.

IV. CONCLUSION

The project will allow any interested stakeholder to have a virtual walk in NSBM without having to physically be at the location. A person will be able to feel the premises and experience the real sensation of actual walk-through. This can also be used as a marketing material to attract more foreign and local potential students who are seeking higher education in Sri Lanka. Furthermore, this platform will continue to promote education at NSBM in foreign communities.

As for future work, we are planning to model the buildings using the official/genuine floor plans owned by NSBM. The floor plans would provide all the necessary details for the 3D model to be completely modeled to scale. Also extending this work to complexly model the outdoor environment of NSBM will complete this project. We are also planning to model the interior of the building with the accurate dimensions and to further allow a user to walk inside the buildings as well.
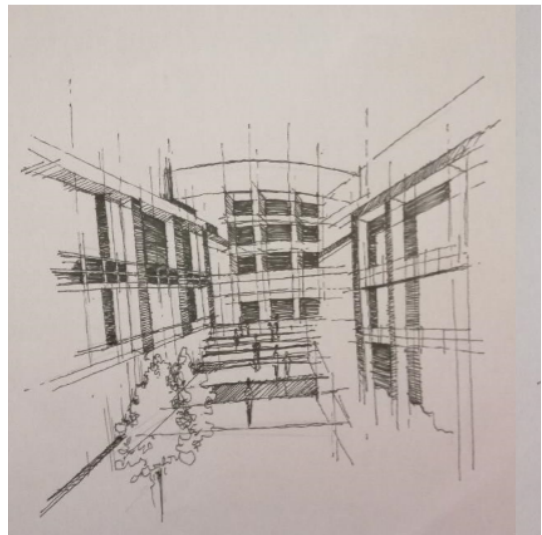

Fig. 1.   A 3D sketch of a building

Fig. 2. Screenshots covering different views and environments.

Fig. 3. Screenshots covering dusk and night environments

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Fair Price Prediction System for Used Cars in Sri Lanka Using Machine Learning and Robotic Process Automation

T P Jayadeera
Faculty of Computing
NSBM Green University Town
Homagama, Sri Lanka
tharusha.pasindu@ymail.com

D J Jayamanne
Faculty of Computing
NSBM Green University Town
Homagama, Sri Lanka
dileepa@nsbm.lk

Abstract— **The prices of most of the brand-new cars are rapidly increased by car manufacturers due to the increment of prices in raw materials and inflation rates. Also, the taxes for importing brand-new cars have been rising consistently during the last decade in Sri Lanka. Due to these factors, most of the time Sri Lankan middle and lower-class people tend to buy used cars (Toyota Corolla) rather importing brand-new cars. With this increment of demand in used cars, some of the used car sellers take advantage of this scenario by listing unrealistic prices for the used cars and most of the used car buyers getting caught on this. This work focuses on creating a used car price prediction system for Sri Lanka using supervised learning techniques. For the study, Analysis with different suitable machine learning models is performed using an online data set to discover the best suitable regression models. The selected models are trained using an actual Sri Lankan used car data set which is expected to be extracted from online car advertisement websites with the help of Robotic Process Automation (RPA) technology. In the end, a web application will be presented to the users (Used car buyers) which accepts features of the car as inputs and provide a predicted fair price for the expected particular used car as the output.**

Keywords—Price Prediction, Used cars, Random Forest, Multiple Linear Regression, Robotic Process Automation

I. Introduction

The price of a brand-new car is announced by the car manufacturing company itself when the car is released to the market. But if the buyer of the car is not living in the manufacturing country, all most all the time they have to pay taxes for importing and abide by other government regulations. The tax depends on the car they import, and it is a fixed amount. So finally, with the calculations of these fixed amounts (Actual Price + Taxes), the buyer can exactly get to know

that how much will it cost to buy a brand-new car. When it comes to Sri Lanka, this scenario is the same for a brand-new car buyer.

But with the decrement of the rupee during the past decade in Sri Lanka and increment of brand-new car prices by the manufacturers and the increased tax rates by the government, the ability to buy a brand-new car by the middle level or lower level class people has declined. So, these people always attempt to buy a used car which they can afford. In this situation, the seller of the car is either the person who used the car or a car sale. Therefore, the price of a used car is varying upon different conditions and situations of the car. Sometimes, customers are exploited due to fixing of unrealistic prices for the used cars and many falls into this trap.

Therefore, it raises the absolute necessity of a used car price prediction system for Sri Lanka to effectively determine the worthiness of the car using a variety of features. This work focuses on creating a used car price prediction system for Sri Lanka using supervised learning techniques. Analysis using various machine learning (ML) models and selecting the best model with the least error will be discussed with justifications. To collect the test data set for the prediction system, this work proposes an automated solution to extract car details from online used car sale websites in Sri Lanka using Robotic Process Automation (RPA) technology.

II. Literature survey

Predicting the price of used cars has been studied extensively in various researches. Researchers more often predict prices of products using some previous data. Pudaruth predicted prices of cars in Mauritius and these cars were not new rather second hand [1]. He used multiple linear regression, k-nearest neighbours, Naïve

Bayes and decision trees algorithms to predict the prices. The comparison of prediction results from these techniques showed that the prices from these methods are closely comparable. However, it was found that the decision tree algorithm and Naïve Bayes method were unable to classify and predict numeric values. Pudaruth's research also concluded that the limited number of instances in the does not offer high prediction accuracies [1].

The multivariate regression model helps in classifying and predicting values of numeric format. In [2], it shows how to use this multivariate regression model to predict the price of 2005 General Motor (GM) cars. The price prediction of cars does not require any special knowledge. So, the data available online is enough to predict prices. The author of the article [2] did the same car price prediction and introduced variable selection techniques which helped in finding which variables are more relevant for inclusion in the model.

In 2019, Pal et al [3] discovered a methodology for predicting used cars prices using Random Forest. The paper evaluated used-car price prediction using Kaggle data set which gave an accuracy of 83.62% for test data and 95% for train-data. The most relevant features used for this prediction were price, kilometer, brand, and vehicle type and identified by filtering out outliers and irrelevant features of the data set. Being a sophisticated model, Random Forest provided good accuracy in comparison to prior work using these data sets.

In [4] it shows that, to build a model for predicting the price of used cars in Bosnia and Herzegovina. They have applied three machine learning techniques namely Artificial Neural Network, Support Vector Machine and Random Forest. However, the mentioned techniques were applied to work as an ensemble. The data used for the prediction was collected from the web portal autopijaca.ba using web scraper that was written in PHP programming language. Respective performances of different algorithms were then compared to find one that best suits the available. The final prediction model was integrated into a Java application. Furthermore, the model was evaluated using test data and the accuracy of 87.38% was obtained. In 2019, Dholiya et al have presented an automobile re-sales system using Machine Learning [5]. The objective of this system is to let the user have a fair idea of what the vehicle could cost them. The system is a web application which could also provide the user with a list of choices of different types of cars based on the details of the car the user is looking for. It helps give the buyer/seller with substantial information based on which they can make the decision. This system uses Multiple Linear Regression as the algorithm to make predictions and this model has been trained using historical data that was gathered over a long period of time. Based on the KDD (Knowledge Discovery in Databases) process, the raw data was first collected. It was then preprocessed and was cleaned in order to find useful patterns useful in order to make some meaning out of those patterns. This data was then used to train the model using Multiple Linear Regression in Java as well as in Python. Gonggi proposed a new model based on artificial neural networks to forecast the residual value of private used cars [6]. The main features used in this study were mileage, manufacturer and estimated useful life. The model was optimised to handle nonlinear relationships which cannot be done with simple linear regression methods. It was found that this model was reasonably accurate in predicting the residual value of used cars.

Richardson researched on the assumption that car companies are more willing to manufacture vehicles which do not devalue rapidly [7]. In particular, by using multiple regression analysis, he showed that hybrid cars are more able to keep their value than traditional vehicles. This is likely due to more environmental concerns about the climate and because of its higher fuel efficiency. The importance of other factors like age, mileage, make and MPG (miles per gallon) were also considered in this study. He collected all his data from various websites.

Listiani presented another similar research that uses Support Vector Machines (SVM) to predict the prices of leased cars [8]. This research showed that SVM is far more accurate in predicting prices as compared to the multiple linear regression when a very large data set is available. SVM also handles high dimensional data better and avoids both the under-fitting and over-fitting issues. Genetic algorithm is used to find important features for SVM. However, the technique does not show in terms of variance and

mean standard deviation why SVM is better than simple multiple regression.

III. METHODOLOGY

The first phase of carrying out this study is to train various ML models using a suitable data set and analyze most suitable ML models from those for predicting used car prices. For this, by referring online machine learning data set repository (Github) a suitable data set has been found on used Toyota corolla cars and it consists of 39 parameters and 1019 records [9]. Therefore, according to the data set obtained, the study has been totally about predicting the price of used Toyota Corolla cars. The parameter names (fields) of the selected data set are Record ID, Model Description, Offer Price in EUROS, Age in months as in August 2004, Manufacturing month (1-12), Manufacturing Year, Accumulated Kilometers on odometer, Fuel Type (Petrol, Diesel, CNG), Horse Power, Metallic Color, Color (Blue, Red, Grey, Silver, Black, etc.), Automatic, Cylinder Volume in cubic centimeters, Number of doors, Number of cylinders, Number of gear positions, Quarterly road tax in EUROS, Weight in Kilograms, Within Manufacturer's Guarantee period, BOVAG (Dutch dealer network) Guarantee, Guarantee period in months, Anti-Lock Brake System, Driver Airbag, Passenger Airbag, Air-conditioning, Automatic Air-conditioning, Board computer, CD Player, Central Lock, Powered Windows, Power Steering, Radio, Mist lamps, Sport Model, Backseat Divider, Metallic Rim, Radio Cassette, Parking assistance system and Tow Bar. This data set covers a wide range of features of a used car which needs to be considered when someone is going to buy a used car. Steps performed after finding a suitable data set in the 1st phase, shown in Fig 1.
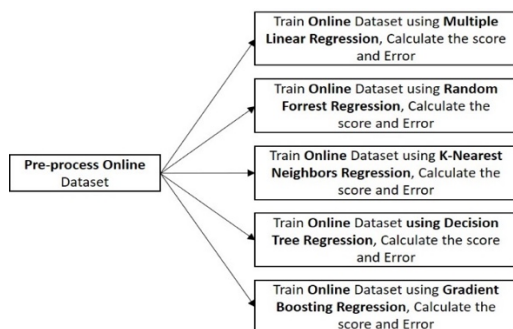

Fig. 3. Steps in Phase-1

According to Fig. 1, first, the online data set is preprocessed by removing outliers, removing empty valued fields, dropping fields with the same value for each record, bit map indexing and removing other unnecessary fields. Then, five machine learning algorithms are selected for modelling the online data set namely Multiple linear regression, Random Forrest regression, K-Nearest neighbours regression, Decision Tree regression and Gradient Boosting regression.

Multiple Linear Regression algorithm is a statistical technique that uses several explanatory variables to predict the outcome of a response variable. The goal of the algorithm is to model the linear relationship between the explanatory (independent) variables and response (dependent) variables.

$$\hat{y} = h_\theta(x) = \theta_0 x_0 + \theta_1 x_1 + \theta_2 x_2 + \cdots + \theta_n x_n$$

When it comes to Decision Tree Regression algorithm, it breaks down a data set into smaller and smaller subsets while at the same time an associated decision tree is incrementally developed. The final result is a tree with decision nodes and leaf nodes. In Random Forrest Regression algorithm, it builds multiple decision trees and merges their predictions together to get a more accurate and stable prediction rather than relying on individual decision trees. K-Nearest Neighbours Regression algorithm is a non-parametric method whose input consists of the k-closest training examples in the feature space. In Gradient Boosting Regression algorithm, it produces a prediction model in the form of an ensemble of weak prediction models.

After training and modelling the online data set using above ML algorithms, overall prediction score, mean absolute error, mean squared error and root mean squared error are calculated to evaluate the performance of each algorithm with the online data set for predicting the price of a particular Toyota Corolla car. Below Fig. 2 shows the steps performed in the 2nd phase in this work.

After training the above mentioned 5 regression models in the 1st phase using the online data set for predicting used Toyota Corolla car price, the necessity of a Sri Lankan actual data set arises to predict Sri Lankan used car market real prices. To collect real Sri Lankan data set, an automated process is introduced where it extracts

actual Sri Lankan car selling data from ikman.lk (Car advertisement website) using RPA technology (UiPath) without human intervention. Refer Fig. 3 for the automated process flow.
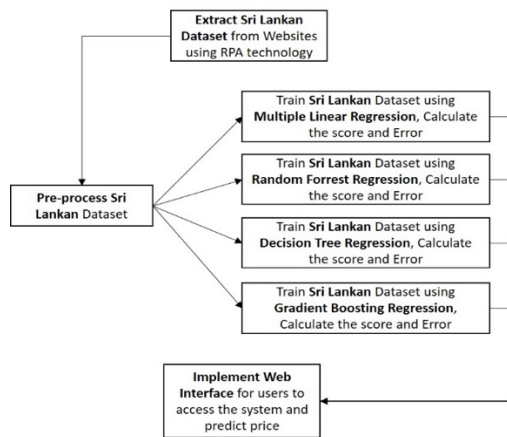

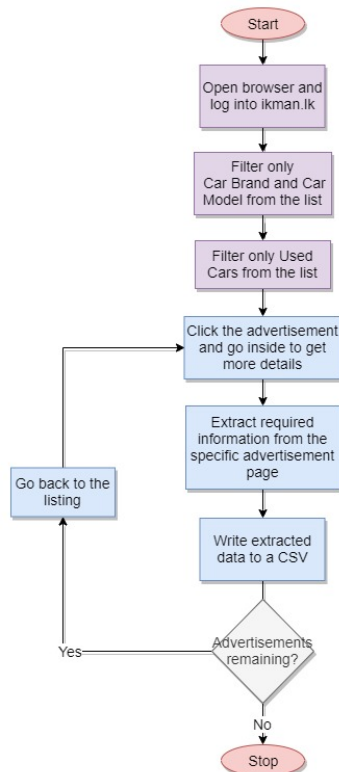Fig. 4. Steps in Phase-2

Fig. 5. Automated process flow.

The extracted Sri Lankan data set of about 200 records was first preprocessed as in Phase-1. Then

the extracted Sri Lankan data set is used with selected regression algorithms (Multiple Linear Regression, Random Forrest Regression, Decision Tree Regression, Gradient Boosting Regression) for the actual Sri Lankan Toyota corolla used car price prediction system. The car Model year, Condition, Transmission, Body type, Fuel type, Engine capacity and Mileage are the parameters which have been included in the Sri Lankan data set to use to predict the price.

After training and modelling the extracted Sri Lankan data set using ML algorithms, again the performance of each algorithm is evaluated using same measures used in phase 1 such as calculating overall prediction score, mean absolute error, mean squared error and root mean squared error.

Finally, by considering the above algorithms, a web interface is developed as a system to generate the price of a particular used car, when the user enters the features of his/her expected car such as Model year, Transmission, Body type, Fuel type, Transmission, Engine capacity and Mileage.

IV.RESULTS AND ANALYSIS

In this work, a used car price prediction system for Sri Lanka is proposed using supervised learning techniques.

Fig. 6. Scores for used Toyota Corolla cars

Fig. 4 shows prediction score results obtained using the 5 regression algorithms used to process the Online data set. All algorithms have been able to score above 0.8 scores except K-Nearest Neighbours algorithm. If an algorithm's prediction score is above 0.8, generally we can assume that the predictions made using that particular algorithm is accurate. Therefore, Multiple Linear Regression, Random Forest

Regression, Decision Regression and Gradient Boosting Regression algorithms are valid algorithms to predict used car prices.
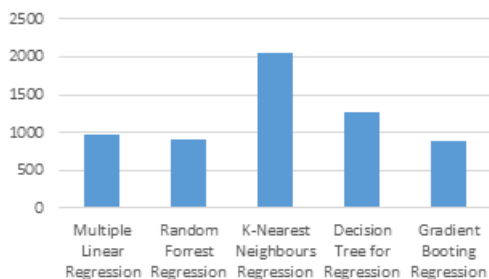

Fig. 7.   Mean Absolute Error for used Toyota Corolla cars

According to Fig. 5, when comparing the Mean Absolute Error (MAE) of the algorithms, the highest error is given by the K-Nearest Neighbours algorithm which is above 2000. When the prices of the cars are also in a range of 5000 to 10000, an error of 2000 is a high error and therefore the algorithm cannot be accepted as a good one. But all the other algorithm's MAE values maintain below 1000 where that error is not critical.
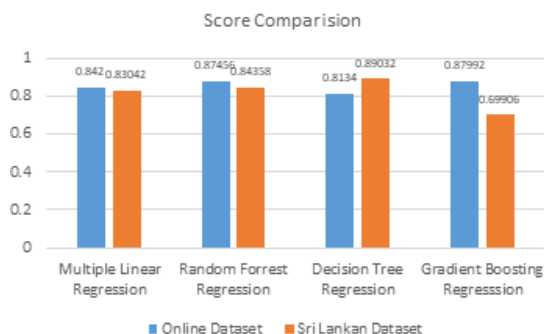

Fig. 8.   Score comparison

By looking at the above Fig. 6 of the scores of regression algorithms applied on the online data set and Sri Lankan data set, Multiple Linear Regression and Random Forrest Regression algorithms work mostly as same by achieving a same satisfactory score without major deviations. When it comes to the Decision Tree Regression algorithm, according to its score, it works much better with Sri Lankan data set when compared

with the score with the online data set. In Gradient Boosting Regression algorithm, it shows a major deviation of the score for Sri Lankan data set when compared with the score obtained with online data set.
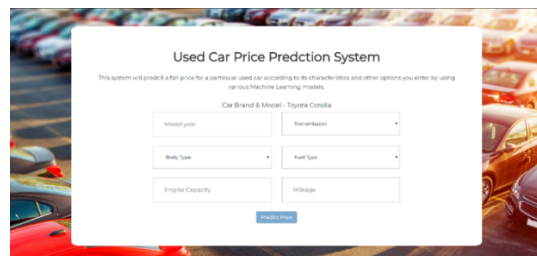

Fig. 9.   The landing page of the price prediction system

The above Fig. 7 shows the developed system to predict used car (Toyota Corolla) price in Sri Lanka using different algorithms. To use the system, the user needs to enter the expected car details to the system such as Model Year, Transmission Type, Body Type, Fuel Type, Engine Capacity and Mileage using the above interface.
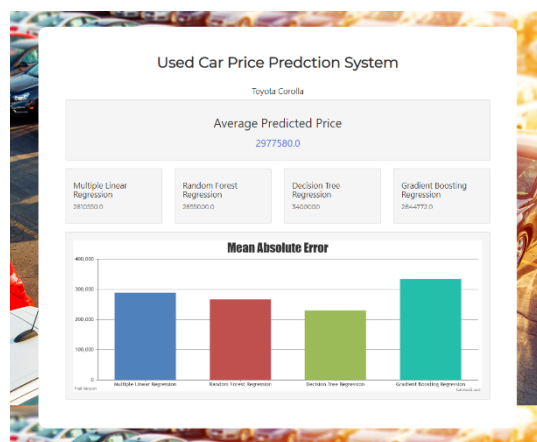

Fig. 10. The results page of the price predicted system

After filling the required car details and click the "Predict Price" button (in Fig. 7) the system will navigate to the above page (Fig. 8). It provides an average predicted price at the top according to the details entered by the user. Then, the price predicted using each algorithm is shown separately. After that, a graphical representation of the mean absolute errors of prices of used cars (Toyota Corolla) using the above 4 machine learning models is shown as a graph.

V.Conclusion

The aim of this work is to develop a price prediction system for used cars in Sri Lanka. As the initial step, an online data set with 1019 records (39 parameters) have been used as the 1st instance to train selected 5 machine learning algorithms. Then the prediction scores and the mean absolute errors have been calculated and it helped in getting an idea of how the selected algorithms behave, the accuracy and the performance when predicting prices of used cars (Toyota Corolla). After evaluating the performance of the algorithms for predicting prices of used cars (Toyota Corolla) using the online data set, the necessity for a Sri Lankan actual data set arises to predict Sri Lankan used car market real prices. To collect data for the real Sri Lankan data set, an automated process has been introduced using RPA technology where it extracts actual details of Sri Lankan cars advertised in ikman.lk (Car advertisement website) for selling. The extracted data set was processed by the above-selected regression algorithms (Multiple Linear Regression, Random Forrest Regression, Decision Tree Regression, Gradient Boosting Regression) for the predictions. The car Model Year, Condition, Transmission, Body Type, Fuel Type, Engine Capacity and Mileage are the parameters which have been included in the Sri Lankan data set for price prediction.

According to the analysis results, it can be concluded that Multiple Linear Regression and Random Forrest Regression algorithms work best (score of 0.8) in predicting the prices while Decision Tree Regression and Gradient Boosting Regression algorithms shows moderate performance. But K-Nearest Neighbours algorithm does not work as expected with both online and Sri Lankan data sets. By considering the above algorithms, a web interface has been developed as a system to generate the selling price of a particular used car, when the user enters the features of his/her expected car such as Model year, Transmission, Body type, Fuel type, Transmission, Engine capacity and Mileage. Thus, it can be concluded that predicting the price of used cars is a very risky enterprise but which is feasible.

This system will be very useful to car dealers and car owners who need to assess the value of their cars. In future, we need to collect more data to predict selling prices of used cars of other models in the Sri Lankan context and more features to make use of a variety of machine learning algorithms for better prediction. Also, we can collect data from websites time to time and create a data warehouse where the system will predict the future prices of used cars by identifying the mining patterns over time.

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A Study on the Effectiveness of Green Sustainability Initiatives on Organizational Performance at "XYZ" Company under Apparel Industry

S.G.B. Narmada Kulathilake
Faculty of Business
NSBM Green University Town
Homagama, Sri Lanka
NarmadaK@masholdings.com

Abstract— **Understanding the factors that influence Organizational Performance is vital because satisfied employees as well as supporting the society wellbeing will improve overall effectiveness of an organization. XYZ Company being the leading apparel manufacturing company in Sri Lanka plays a crucial and significant role within the Sri Lankan economy; however, lack of attention has been focused on understanding the concept of Organization Performance within this context.**

The main objective of this research was to identify whether there is impact or relationship between Green Sustainability Initiatives such as (Environmental, Social & Economical) and the organizational Performance at the XYZ Company. A survey was developed and utilized to gather data regarding the importance of several factors to an Organizational Performance. The data that was gathered was statistically analyzed in order to support or reject the research hypothesis.

The findings of the research had been indicated that there is significant impact, between Environmental, Social & Economical Sustainability initiatives and Organizational Performance. The researcher then suggested for future researchers, certain strategies in order to enhance the Organizational Performance and has suggested other areas to be research accompanying the findings and limitations of this research.

Finally, the researcher intends to draw more attention to the Organizational Performance at the XYZ Company and by doing that the researcher strives to enhance the overall effectiveness via three pillars of Sustainability Initiatives. Thereby the determination of Researcher is to encourage implementation and practice and to help step the apparel Industry in Sri Lanka towards wining journey with a satisfied, motivated, well-educated and well society concern workforce within their organization.

I. INTRODUCTION

Researchers have understood the importance of the sustainability & green concepts. Running an environmentally friendly business helps to reduce the impact on the environment and preserves natural resources. Natural resources have becoming scarcity as a globally facing problem. Particularly when it comes to business organizations, in current context this needs to be understood how we can run the business in sustainable manner. Particularly when it comes to manufacturing firms, we need to see how we can align with green practices for better sustainability in the industry. Now a days most of the manufacturing firms in the industry, get in to these new practices of green sustainability & concepts. It's very challenging to get in to these practices & play a good role in the industry. According to Peter Yacob, (2018) the results of sustainability practices have broader implications for manufacturing organizations, particularly in developing economies where the growth of manufacturing & the development of integrated environmental sustainability are key stages in economic development.

Green sustainability is a broad discipline & it is about the study of how natural systems function remain diverse & produce everything that we need. Also, it has revealed human civilization takes resources to sustain our modern way of lifestyles.

There are countless examples throughout human history where the civilization has damaged its own environment & seriously affected due to its own survival chances. Sustainability takes our attention how we might live in harmony with the natural world around us protecting it from damage & destruction for the use of future generation as well.

In today's world, customers, retailers are focusing more on sustainable apparel, how far they can satisfy their own needs with sustainable solutions. According to Maria Eugenia Ruiz, (2018) retailers have shown an increasing interest in providing evidence of the sustainability of their activities. This is mainly due to the demands of the policy & consumers as well as competition. Further to that article, several retailers are making efforts to design & implement sustainable practices from a triple bottom line approach such as economic, social & environmental sustainability.

II. SIGNIFICANCE OF STUDY

Green sustainability has become a buzzword in companies big and small. Many of the true corporate giants have named sustainability as a key priority moving forward. Sustainability is most often defined as meeting the needs of the present without compromising the ability of future generations to meet theirs. It has three main pillars: economic, environmental, and social. These three pillars are informally referred to as people, planet and profits.The researcher identifies following major areas of significance related for this study as follows:

Importance to the researcher

The research would be of great importance to me as a researcher because researcher acquire research skills to conduct business research. Skills like developing questionnaires, interacting with new people, getting the necessary information, analyzing and presenting data. The research would also be beneficial to the Management of XYZ Company as it would shed some light on incentives and rewards valued by employees most; thus, would help them come up with incentive and reward systems that can promote productivity in the relevant company. The research also benefited the future researchers who carry out research about the same topic on the effects of incentives and wages and the effects they have on employee. As importance to the Policy Makers, this study

benefits policy makers like the ISO Standards, Environmental authorities and other government organizations to come up with effective and realistic policies that led to protect the environment as well as to help the country to grow in economically.

As importance to XYZ Company, the study was also beneficial to XYZ Company as they identified areas that they needed to improve on to be able to increase organizational performance, and to take necessary actions in future by considering the level of effectiveness towards organizational performance & value taken by the green sustainability initiatives and to maximize their profits.

III. CONCEPTUAL FRAMEWORK

As shown in Figure 1, in this research "Organizational Performance" is the dependent variable & there are three independent variables such as "Organizational initiatives on environmental sustainability", "Organizational initiatives on social sustainability", "Organizational initiatives on economical sustainability". This can be considered as an acceptable model based on theories.
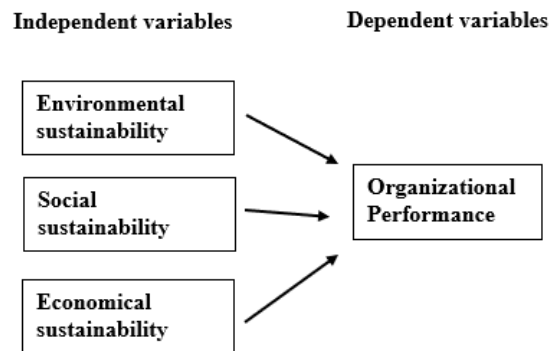

Fig. 11. Organizational Performance

Development of Hypothesis

Under each category it is assumed that the hypothesis relevant to each Environmental, Social & Economical sustainability initiatives have an influence over organizational performance. The primary objective of the study is to prove the hypothesis.

H1- There is an impact between Environmental Sustainability & Organizational Performance.

H2 - There is an impact between Social Sustainability & Organizational Performance.

H3 - There is an impact between Social Sustainability & Organizational Performance.

Data Analysis Strategies

This section discusses the analytical strategies used in the study to achieve its objectives Method of analysis includes a statistical analysis of information collected using such tools as bar charts, However, as a data analysis tool the author is going to use SPSS. The SPSS the most basic is a summary table of descriptive statistics that gives figures for all the measures and it uses graphical options to make comparisons between the variables simpler.

TABLE II.   DESCRIPTIVE STATISTICS

Variable	Valid:	Miss:	Mean	Std Dev	Skewness
Environmental Sus:	70	0	3.94	0.713	-0.479
Social Sus:	70	0	3.86	0.737	-0.415
Economical Sus:	70	0	3.92	0.617	-0.320
Org. Per	70	0	3.97	0.670	-0.077

Data Analysis

Researcher has analyzed the level of employees' responses with regard to sustainability with organizational performance by applying descriptive statistics. Mean, Standard deviation and coefficient of skewness have been used to test the responses. According to descriptive statistics, all the mean values of variables are very close to the Likert scale 4. This says that responses with regard to the variables are in agree level. Highest standard deviation belongs to social Sustainability as the highest standard deviation is 0.73. This says that social Sustainability has comparatively higher variance.

TABLE III.   CORRELATION ANALYSIS

Independent Variables		**Organizational Performance**
Environmental Sustainability	Pearson Correlation	.649**
	Sig. (2-tailed)	.000
	N	70

Social Sustainability	Pearson Correlation	.886**
	Sig. (2-tailed)	.000
	N	70
Economical Sustainability	Pearson Correlation	.712**
	Sig. (2-tailed)	.000
	N	70

Minimum variance belongs to Economical Sustainability as the minimum standard deviation is 0.61. This indicates that comparatively organizational performance has minimum variance. All the coefficients of skewness are between -1 and +1.

According to the correlation analysis, the probabilities of Social sustainability & economical sustainability are highly significant between the Organizational Performance (endogenous variable) and factors Green Sustainability (Exogenous variables). Environmental sustainability is significant with the organizational performance. Coefficients of correlation between them are positive. Their values are more than 0.6. This means that Green Sustainability Initiatives are having strong positive association with organizational performance.

TABLE IV.   REGRESSION ANALYSIS

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	24.710	3	8.237	86.658	.000^b
Residual	6.273	66	.095		
Total	30.983	69			

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.025	.241		2.599	.000		
	Environmental Sustainability	.246	.103	.365	1.033	.000	.258	3.883
	Social Sustainability	.735	.076	.809	9.623	.045	.434	2.305
	Economical Sustainability	.234	1.21	.216	1.926	.049	.245	4.088

Probability of F test statistics of the regression ANOVA is highly significant as the P value is 0.000. This means that the model is jointly significant and Green Sustainability Initiatives jointly influence on organizational Performance. Model is appropriate. Individual effect has been analyzed by table 4.6. Probability of Green Sustainability initiatives is highly significant with positive beta values. Their probabilities are less than 0.01. This says that they significantly influence positively on organizational performance. These assumptions have been tested as diagnostic tests to decide the validity of regression results. In the model summary, D-W test is in the accepted level and residuals are independent. All the Variance Inflation Factors (VIF) are less than 10 and it indicates that independent factors are not highly or perfectly correlated. Therefore, no multicollinearity problem in the regression model. Accordingly, regression model is highly valid.

DISCUSSION

When the Researcher considers the hypothesis made during this study, the hypothesis no 01, Environmental sustainability has a positive impact or relationship with organizational performance. According to the correlation analysis, the probability of Environmental sustainability is 0.649.the standard must be 0.7. Therefore, there is significant between Environment sustainability with organizational performance.

According to the regression analysis Probability of Environmental sustainability is highly significant with positive beta value. Their probability is less than 0.01. This says that they significantly influence positively on organizational performance. These assumptions have been tested as diagnostic tests to decide the validity of regression results. Accordingly, regression model is highly valid.

When it comes to hypothesis no 02, Social sustainability has a positive impact or relationship with organizational performance, according to the correlation analysis, the probability of Social sustainability is 0.045 & therefore there is a high significant between Social sustainability with organizational performance. Accordingly, Correlation model is highly valid.

According to the regression analysis Probability of Social sustainability is highly significant with positive beta value. Their probability is less than 0.01. This says that they significantly influence

positively on organizational performance. These assumptions have been tested as diagnostic tests to decide the validity of regression results. Accordingly, regression model is highly valid

Hypothesis no 03, Economical sustainability has a positive impact or relationship with organizational performance, according to the correlation analysis, the probability of Economic sustainability is 0.049 & therefore there is highly significant between Economical sustainability with organizational performance.

According to the regression analysis 0.058 which is significant because probability is less than 0.01. This says that Economical sustainability positively impact on organizational performance. Accordingly, regression model is highly valid.

CONCLUSION

The study assessed the relationship of the organizational sustainability initiatives taken & the organizational performance. The organizational problem was world customers are more concerned & more focused on Green concepts & Sustainability. When it comes to business world, most of the business leaders, suppliers are taking their initiatives through sustainability perspective to win the business world & for own their sustainability & survival. This research aims to investigate the effectiveness of Green Sustainability on organizational point of view performance at XYZ Company which is coming under Apparel manufacturing industry. The "XYZ" company is attached to apparel industry which is manufacturing branded high-end sportswear garments to European market. This company has taken several initiatives on Green Sustainability to increase the market share of industry & to sustain in the emerging industry.

The first objective of this study was to identify & determine the impact of the environmental sustainability initiatives of the XYZ organization for the organizational performance.

Based on the Research in existence, a questionnaire comprising 29 questions was prepared and circulated among all the employees of the company. Questionnaire comprised of five personal questions and five close ended questions with five Likert scale related to Environmental Sustainability.

The second objective of this study was to identify how was to identify & determine the impact of the social sustainability initiatives of the XYZ organization for the organizational performance.

According to the study, Questionnaire comprised of five personal questions and five close ended questions with five Likert scale related to Social Sustainability.

The third objective of this study was to identify how was to identify & determine the impact of the Economical sustainability initiatives of the XYZ organization for the organizational performance.

According to the study, Questionnaire comprised of five personal questions and five close ended questions with five Likert scale related to Economical Sustainability.

Finally, this study was to explore how significant of green sustainability initiatives affect to organizational performance. According to the respondent's view, management & organizational support and is highly impact on the organizational performance.

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Impact of Rewards on Employee Motivation: Food Industry in Sri Lanka

R.P.A. A. Dhevindra
Siyon Food Ingredients
Sri Lanka
arthmald@gmail.com

D M S Gayanika
Faculty of Business
NSBM Green University Town
Homagama, Sri Lanka
sashini @nsbm.lk

Abstract— **Understanding the factors that influence employee motivation is vital because satisfied employees will improve overall effectiveness of an organization. ABC Food Ingredients Company being the Leading food ingredients providing company in Sri Lanka plays a crucial and significant role within the Sri Lankan economy; however, lack of attention has been focused on understanding the concept of employee motivation within this context. The main objective of this research was to identify whether there is an impact between financial & Non-Financial incentives and the employee motivation of the employees working in the ABC Food Ingredients company.**

Keywords—rewards, motivation, financial and Non-Financial

II. INTRODUCTION

Employee turnover has become one of the major issues faced by organizations in the global as well as local context. According to the labour turnover report published by [6] there is a steady increase in the employee turnover rates over the years 2016 to 2018. The voluntary employee turnover rate in the food ingredients industry has amounted to 17.6% in 2016 this statistic shows how that when ten professional employees leave in the organization organizational losses are estimated to be around one million Sri Lankan Rupees.

Within an organization, the best performance is feasible with most committed employees that can only be achieved through employee motivation. According to [2] assume that motivation contains "those psychological processes that cause the arousal, direction and persistence of voluntary actions that are goal directed." Motivation depends on certain intrinsic, as well as, extrinsic factors which in collaboration results in fully committed employees. Tangible incentives are effective in increasing performance for task not done before, to

encourage "thinking smarter" and to support both quality and quantity to achieve goals.

III. LITERATURE REVIEW

A. Rewards and Motivation

Incentives, rewards and recognitions are the prime factors that impact on employee motivation. The employees engage in their working activities purposely for owns sake, then they will feel intrinsic motivation in their behaviors as their activities will essentially be enjoyable and satisfactory. The factors like incentives and rewards are the most preferred factors for employee motivation programs.

Employees are motivated by either financial or Non-financial instruments. This in turn leads to customer satisfaction because satisfied employees pay greater attention to meeting customers' needs/wants. According to reference [3], financial performance of a firm also improves if customers' loyalty improved. Financial incentives are the process of influencing employees to act according to plans, to achieve the mutual goals of employees and employer.

Financial or monetary incentives are used by employers to attract, retain as well as compensate best workforce for a job well done. Financial incentives are divided into direct and indirect financial reward. Direct reward includes good salary packages, profits and commission. Indirect financial reward are all those benefits that are not covered by direct financial reward.

A non-financial incentive is any benefit an employee receives from an employer beyond the compensation package with a purpose of attracting, retaining and motivating the employees. All organizations are now concerned with what should be done to achieve a high level of employee productivity through staff motivation using the right kind of incentives. Also, non-financial

recognition can be more effective than cash awards, because they can help the employees with their self-esteem, as well as giving they deserved recognition, and a feeling of fulfillment with their jobs.

B. Financial and non-financial rewards

According to [4] Cash bonus is a form of reward that organizations use to reward employees for exemplary performance that is if they have performed higher or exceed their set targets, this hence makes them eligible. The amount of cash is determined by how high the employee has over exceeded the set targets or they can also be based on ranks or job groups. Not only cash bonus but also can generate benefits to the organization through fostering greater employee cooperation by ensuring that all the employees are in pursuit of the organizational objectives, reducing employee turnover, increasing productivity, costs reduction, providing retirement security and it also gives employees a direct stake in the profitability of an organization creating an atmosphere in which employees want the business to succeed as much as management does.

According to reference [1] non-financial incentives are considered as more important incentives than monetary incentives. For an example, when employees' recognition is given, when employees are appreciated, they feel motivated to perform better on the other hand, lack of recognition has resulted in firms loosing disenchanted innovators as well as lower level of effort and even sabotage and espionage. Communication, training and employee empowerment are some of the non-monetary rewards which can make a significant impact on employee motivation.

IV. METHODOLOY

The research study relied upon the survey method for collection of data; the questionnaire-based survey has become one of the most widely used techniques. The research is based on one of the food ingredients manufacturers, and employees in Trainees, Executives assistant Managers, Mangers at each department were taken to the data collection.

The main instrument used for the data collection purpose in the research is a questionnaire, which addresses the research question broadly. A sample of 70 employees representing trainees, executives' assistant managers, mangers were taken to the survey. Method of analysis includes a statistical analysis of information collected using such tools as pie charts, Bar Charts, histograms and frequency tables. The data analysis tool is SPSS. The SPSS the most basic is a summary table of descriptive statistics that gives figures for all the measures. And it uses graphical options to make comparisons between the variables simpler. The two-hypothesis tested based on literature is as follows:

H1: There is a positive impact from Non- Financial Incentives on employee motivation

H2: There is a positive impact from Financial Incentives on employee motivation

V. DATA ANALYSIS

The reliability analysis was conducted with 30 employee sample in order to measure the degree to which a research instrument yields consistent results on data after repeated trials. The Cronbach alpha value of all three factors represented above 0.7.

TABLE I.   RELIABILITY ANALYSIS

Variables	Cronbach's Alpha	No of Questions
Non-financial rewards	0.919	08
Financial rewards	0.892	07
motivation	0.894	12

With the reliability results, the relationship between financial and non-financial rewards was tested based on Pearson correlation value (figure 1).
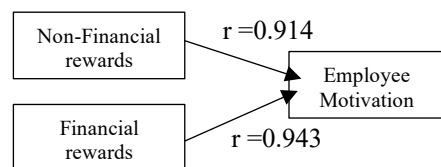

Fig. 1.   Conceptual framework

According to the above correlation analysis, all the probabilities are highly significant between the Employee motivation (endogenous variable) and factors of Incentives (Exogenous variables) which is less than 0.05 (Non-financial and financial rewards p $=0.000 < 0.05$). Coefficients of correlation between them are positive. Their values are more than 0.7. This means that non - Financial & Financial incentives are having strong positive association with Employee Motivation.

Effect of individual factors on employees' Motivation has been analyzed using regression model. Researcher applied Classical Linear Regression Model (CLRM). Multiple correlations "R" is 0.918. This says that there is a strong joint association between the Financial & Non-Financial Incentives and Employee Motivation. R-square is 0.843. This indicates that 84.3% of Motivation (dependent variable) has been covered by the model. As the value is more than 60%, regression model is nicely fitted. Adjusted R-square is also representing that 83.9% of the dependent variable has been covered by the model. Durbin-Watson test statistic is 2.097. This is almost pass to 2 and will be between 1.5 and 2.5. Therefore, residuals are independent, and model is valid. Regression ANOVA is given by table 2.

TABLE II.   REGRESSION RESULTS

R	R SQUARE	ADJUSTED R SQUARE	DURBIN-WATSON
0.918	0.843	0.839	2.092
REGRESSION			
SIG. (F)	0.000		
NON-FINANCIAL	B= 0.516	SIG = 0.000	
FINANCIAL	B=0.231	SIG =0.048	

Probability of Non- Financial Incentives & Financial Incentives is highly significant with positive beta values. Their probabilities are less than 0.01. This says that they significantly influence positively on employees' Motivation.

VI. CONCLUSION

Significant of rewards to affect to motivate employees are assessed with correlation analysis and regression analysis. In the correlation analysis, it is found that Personal Correlation has a strong significance in Employee Motivation. In the regression analysis, it has shown that strong significance in Non- Financial and Financial Rewards on employee motivation. Therefore, both hypotheses was accepted.

Recognition means acknowledgement with a show of appreciation. It is crystal clear that the main and repeated cause of turnover is the lack of employees' recognition when employees are appreciated, they feel motivated to perform better. Also, as reference [4] explains, if employees are provided opportunities for advancement and growth to develop their personality, they feel much satisfied and become more committed to organizational objectives. Active participation of employees in organizational decision-making process leads to increase the motivation of the employees [3]. According to the past literature, when management consider employees' ideas and their suggestion before making any decision, they feel belonging to the organization. They feel they are part of the organization and they engage more in their works. Hence hypothesis 1 is supported by the above literatures and therefore non-financial rewards are highly related with the employee motivation.

According to reference [2] Cash bonus is a form of reward that organizations use to reward employees for exemplary performance that is if they have performed higher or exceed their set targets, this hence makes them eligible. The amount of cash is determined by how high the employee has over exceeded the set targets or they can also be based on ranks or job groups. Nowadays, companies are rewarding performance bonuses to junior employees to increase output, unlike the past where they used to be a privilege of only the top executives. A profit-sharing plan has a formula that provides a fixed percentage of profits that will be divided among employees [5]. Consequently, employees are motivated to perform well to increase company profits which results in a cut of the profits for them.

According to reference [3] connecting employee pay raises to performance reviews can encourage a more competitive workforce. This can result in a

higher level of productivity as it is given for specific performance results rather than simply for time worked. Hence Hypothesis 2 is supported by the above literatures and all the monetary rewards are highly related with the employee motivation.

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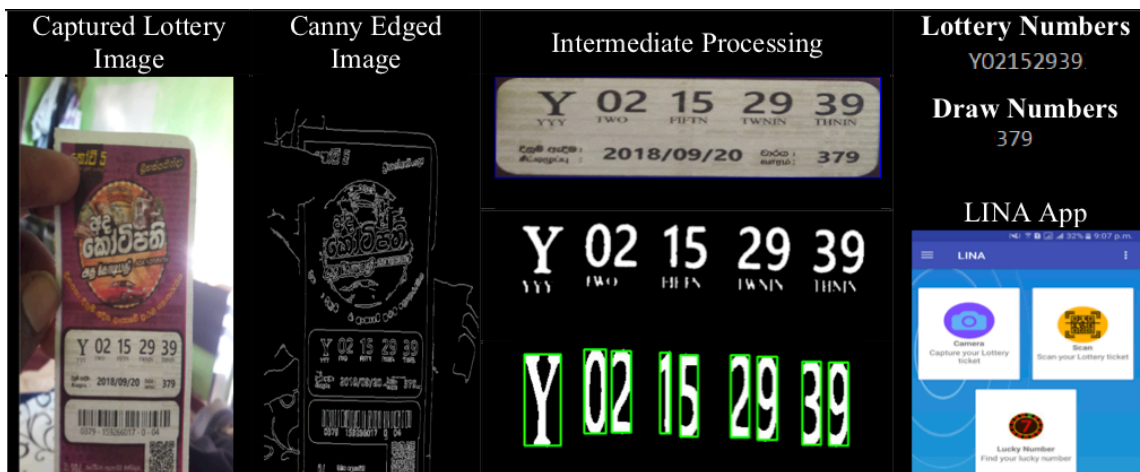
Lottery Numbers Identification System

Shamal Manawadu
Faculty of Computing
NSBM Green University Town
Homagama, Sri Lanka
shamal.gardiyamanawadu@students.plymouth.ac.uk

Rasika Ranaweera
Faculty of Computing
NSBM Green University Town
Homagama, Sri Lanka
ranaweera.r@nsbm.lk

Abstract—The use of computer vision or image processing techniques to help the human day-to-day activities are a common occurrence. We describe a set of image processing techniques which have been explored to detect the lottery ticket numbers using an android application. Sri Lankans spend thousands of rupees on lotteries every day. Some people buy many tickets with multiple numbers and it get increased when there are huge jackpots. According to the National lottery board, the sales income of the lottery tickets in 2016 was 201 million. The proposed solution has been implemented for convenient of the users, and it is implemented according to the client server architecture. It provides two option to the users to check the lottery results; capture image or QR scanning feature to check the lottery result.

There are several image processing mobile applications available, but none of the applications can be used to check the lottery results. This proof of concept is to overcome the limitations and explore the capabilities of web and mobile hybrid technologies.

Keywords—*Image processing, character recognition, image segmentation, Android, C++, Java, Open CV*

An Innovative Video Game for Learning History

Bopitiya Gamage Akila Udara
Faculty of Computing
NSBM Green University Town
Homagama, Sri Lanka
bopitiya.udara@students.plymouth.ac.uk

Rasika Ranaweera
Faculty of Computing
NSBM Green University Town
Homagama, Sri Lanka
ranaweera.r@nsbm.lk

Abstract—In Sri Lankan Schools, most subjects are taught in very traditional ways without much use of technology. This has become very problematic with students especially for the history parts of the subjects. In consideration of western music subject, most students follow finds its history part harder than other parts of the subject according to the lecturer in charge of the subject in the National Institute of Education (NIE), Maharagama, Sri Lanka. NIE is expected a software solution to make this history part more interesting and easier to the students. We have created a video game using Unity game engine for teaching western music history to school children. This system makes learning fun and interesting and also as this application is a game, it makes great leisure time activity which makes students enjoy while learning.

The game is created and tested for three platforms as Windows PC platform (Windows 10), Android mobile platform (version 4.4.2 and upwards) and Web platform (WebGL, does not support mobile browsers yet). This game is created in Role Playing Game (RPG) style and is intended to make learning history interesting and fun. The game has covered areas which covers western music local school curriculum and guidance was provided by aesthetic department of the RPG.

Keywords—Education, video gaming, Visual Studio 2017, C#, Unity game engine, Android, WebGL

Visitor Perception of Eco-Friendly Resorts Selection in Sri Lanka

D D I Perera
Faculty of Business
NSBM Green University Town
Homagama, Sri Lanka
dasniperera85@gmail.com

Chiranjeewa Atapattu
Faculty of Business
NSBM Green University Town
Homagama, Sri Lanka
atapattu.c@nsbm.lk

Abstract— Tourism is one of the most important industries in the world as well as in Sri Lanka. Therefore, identifying the factors affecting visitor perception on selection of eco-friendly resorts is vital. Visitor perception is highly considered in tourism industry since the success of the industry depends on the participation of tourists who visit Sri Lanka. This study was conducted to identify the perception of visitors on what is their opinion about Eco friendly resorts in Sri Lanka. Main objectives of this study were to find out the factors affecting visitor perception on selection of Eco-friendly resorts and to find out the impact on visitor perception. Independent variables were created based on factors affecting Theory of Planned Behaviour.Identified factors were attitude, subjective norms, perceived behavioral control which were used to determine visitors' intention to visit an eco-friendly hotel.

In this study, the quantitative research design is used. The survey has been conducted to collect data with a quantitative and explanatory approach where a structured survey was used on 150 local tourists who visited eco-friendly hotels in Sri Lanka.

The respondents were asked to express their agreement or disagreement with a statement on a five-point Likert-type scale. Sample was limited to 100 tourists who have visited any of Green hotels in Sri Lanka.

The data was analyzed through SPSS software. The findings of the study revealed that the impact of attitude to behavior, subjective norms and perceived behavioral control on guests' continued intention to use green hotels are significant and positive. The independent variables explained 51.7% of variance approximately in visitor perception by the adjusted R-Squared value. All the hypothesis was accepted except H3 which was tested for the perceived behavioral control factor.

Keywords— Visitor Perception, Eco-Friendly Hotel, Theory of Planned Behavior, Attitude, Subjective norms, perceived behavioral control

The Impact of Green Attributes on Consumer Purchasing Intention of Modern Trade Retail Market in Sri Lanka

V K Jayathilaka
Faculty of Business
NSBM Green University Town
Homagama, Sri Lanka
vinurivkj6@gmail.com

D M S Gayanika
Faculty of Business
NSBM Green University Town
Homagama, Sri Lanka
sashini@nsbm.lk

Abstract— Greening is becoming the buzzword of today's business world. Organizations are looking for applying green attributes in their business operations due to environmental deterioration. Nowadays retailers also paying attention on green movement since they play major role in the market by connecting with manufacturers and consumers. Retailers are the once who can greater impact on consumer purchasing intention. Today in Sri Lanka most of supermarkets of modern trade retail market are going towards greening in order to influence consumer purchasing intention and purchasing behavior. Owing to that investigating the impact of green attributes on consumer purchasing intention is very important to them. This study was conducted to identify to what extent modern trade retail market in Sri Lanka possess green attributes in their supply chain and impact of green attributes on consumer purchasing intention. Quantitative approach is used to collect analyze data. Two questionnaires were developed to answer both research questions. Keells, Cargills, Arpico and SPAR supermarkets were selected, and 10 employees were selected randomly in each super supermarket chain for analyzing first research objective.

For the second part of study 150 consumers of Colombo district were selected randomly as the sample. Convenience sampling was used for both studies. In this case, researcher mainly focused to collect information from young educated consumers with other ranges since they are the future generation who can do a greater impact to the society. Therefore, the findings of this study will be important to the other business organizations also. The data was analyzed through SPSS and Excel. The findings of the study revealed that key supermarkets of modern trade retail market in Sri Lanka possess green attributes in their supply chain and the supermarket where green attributes are most commonly possessed is Keells. Further, the attributes which are green product, 3R operation, green store atmosphere have positive relationship with consumer purchasing intention while green awareness has not an impact on consumer purchasing intention. And according to the result green product has a greater impact on consumer purchasing intention than other variables.

Keywords— Green attributes, green retailing, green supply chain management

NSBM Green University Town
Mahenwaththa, Pitipana, Homagama.
011 5445000
inquiries@nsbm.lk | www.nsbm.ac.lk

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