19TH INTERNATIONAL CONFERENCE ON BUSINESS MANAGEMENT

"Equitable Recovery Amidst Economic Crisis: Post Pandemic Challenges and the Way Forward"

PhD Colloquium

PROCEEDINGS BOOK

9th Dececmber 2022

Faculty of Management Studies and Commerce
University of Sri Jayewardenepura
Nugegoda, Sri Lanka.

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"Equitable Recovery amidst Economic Crisis: Post-Pandemic Challenges and the Way Forward"

PhD Colloquium

Proceedings

Faculty of Management Studies and Commerce

University of Sri Jayewardenepura

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Preface

It is not an exaggeration that the Faculty of Management Studies and Commerce of the University of Sri Jayewardenepura is one of the foremost and eminent universities in Asia for Management education not only because of the fact that it is offering diversified and worthy degree curriculums and education programmes but also maintaining an affluence research culture that contributes the fulfilling of the vision of the university, "Prosper Lives through Education".

PhD Colloquium is a prominent event that is organized along with the International Conference of Business Management and let some selected PhD candidates to share their doctorial research with a distinguished audience. The goal of the PhD Colloquium is to provide a scholarly platform to help PhD students with their theses/dissertations and research plans by providing feedback and general advice in a constructive atmosphere. Students will present and discuss their research in the context of a well-known and established international conference, in a supportive atmosphere with other doctoral students and an international panel of established researchers. Accordingly, the PhD Colloquium will provide the opportunity to meet and network with the experts in different research fields in business management while incentivizing the junior academics in pursuing their higher doctoral studies.

We are grateful to Senior Professor Sudantha Liyanage, Vice-Chancellor, University of Sri Jayewardenepura, and Professor. P. D. Nimal, Dean, Faculty of Management Studies and Commerce, Senior Professor (Chair) R. L. S. Fernando, PhD Program Coordinator, the PhD unit, Senior Professor Weerakoon Banda, former PhD Research Coordinator, the PhD unit of the faculty of Management Studies and Commerce, Senior Professor Neville Warnakulasooriya, current PhD Research Coordinator, the PhD unit of the faculty of Management Studies and Commerce, the Co-Chairs of ICBM 2022, Dr. Prathap Kaluthanthri and Dr. Janaka Fernando, the Co-Coordinators of PhD Colloquium 2022, Prof. Nishani Wickramaarachchi and Dr. Neelangie Nanayakkara and the organizing committee of PhD Colloquium for their valuable and continuous support rendered to us to make this event a success. Our special thank goes out to our keynote speaker, Prof. Indralal De Silva, Former Senior Professor (Chair) Demography and the Former Dean of the Faculty of Arts of University of Colombo for his support rendered to make this event a success. We would also like to extend our sincere thanks to PhD students who presented their research at the session.

Special thanks should go to the discussants of the papers and the session coordinators for their valuable contribution given to us in making the conference a professionally rewarding experience to all the participants. Business Communication Unit, the Information Technology and Resource Centre of the faculty and all the ICBM Committee members should also be appreciated for their immense support given for the successful completion of the PhD Colloquium.

Finally, we are also pleased to acknowledge the contributions made by academic staff and all the other participants.

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ICBM 2022

19th International Conference on Business Management

(ICBM 2022)

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Message from the Vice Chancellor, University of Sri Jayewardenepura

It indeed a great honor for me to write this congratulatory message for the PhD Colloquium of the 19th International Conference on Business Management (ICBM 2022) organized by the Faculty of Management Studies and Commerce (FMSC) of the University of Sri Jayewardenepura under the theme, "Equitable Recovery Amidst Economic Crisis: Post-Pandemic Challenges and the Way Forward".

With the vision to “Prosper Lives through Education”, the University of Sri Jayewardenepura endeavours to continuously disseminate and create knowledge via teaching and researching. We strive to maintain a rich research culture within the university and our prominent academic staff is also devoted to pass that research culture to the next generation. The University of Sri Jayewardenepura, as the frontrunner in management higher education in Sri Lanka, is providing a constant and immense contribution to the sustainable intellectual development of the country and the world, even under the new normal conditions after the COVID-19 pandemic and the economic crisis prevailing in Sri Lanka.

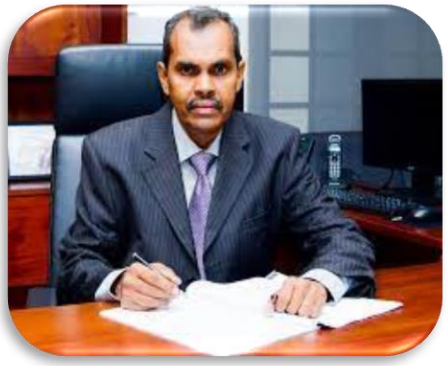
The PhD Colloquium of the 19th ICBM 2022 provides a valuable platform to PhD students to share their ongoing PhD research work with the academics and other academically inclined communities and immensely helps them to develop their final research thesis meeting all required standards. I am also happy to see that the student numbers are growing in postgraduate programmes. I highly appreciate the enormous dedication and effort made by the Dean of the Faculty of Management Studies and Commerce, Conference Co-Chairs, Co-Chairs of the PhD Colloquium and the members of the Organizing Committee of PhD

Colloquium in making this event a success. I would also like to express my heartiest congratulations to all the PhD students who are sharing their research experiences with the audience.

Senior Professor Sudantha Liyanage
BSc (Hons) (USJ), PhD (Cardiff), C Chem, FRSC, FIChem C, FPRISL

Vice-Chancellor

Message from the Dean, Faculty of Management Studies and Commerce



It is a great pleasure to write this message on behalf of the PhD Colloquium, 19th International Conference on Business Management (ICBM) 2022 organized by the Faculty of Management Studies and Commerce (FMSC) of the University of Sri Jayewardenepura.

The FMSC of the University of Sri Jayewardenepura is considered as the Centre of Excellence in Management Education in Sri Lanka and we as a faculty are highly devoted to enhancing the quality of teaching, learning and researching in the field of management and other related disciplines. The major focus of FMSC is to promote a multidisciplinary intellectual environment that is blended with international orientation, for its stakeholders constantly.

The FMSC is extremely proud to host the19th ICBM as it is an eminent event of the Faculty that brings many intellectual flavours in terms of researching. The theme selected for this year is, "Equitable Recovery Amidst Economic Crisis: Post-Pandemic Challenges and the Way Forward". This conference aims at promoting and publishing research to disseminate knowledge under 17 different management related tracks.

The PhD Colloquium is one of the prominent events under the umbrella of the 19th ICBM 2022. It provides PhD students with a platform to share their PhD research journey thus far and provide the opportunity to obtain constructive feedback from the academic and professional community.

I firmly believe that PhD Colloquium of ICBM 2022, will make a significant impact on the community and it will create a firm platform for the academia and the industry to meet and deliberate over different

research perspectives. I convey my best wishes for the PhD Colloquium while congratulating the PhD paper presenters and other contributors. Further, I appreciate and admire the commitment of the Organizing Committee of the PhD Colloquium, ICBM 2022.

Thank you.

Professor P. D. Nimal
Dean,
Faculty of Management Studies and Commerce
University of Sri Jayewardenepura

Message from the Co–Chairs, ICBM 2022

Dr. Prathap Kaluthanthri Dr. Janaka Fernando

It is with great honour that we welcome all the distinguished invitees, scholars, and other participants to the main conference, Ph.D. Colloquium and Business Forum of the 19th International Conference on Business Management (ICBM) 2022, which is organized by the Faculty of Management Studies and Commerce (FMSC), the University of Sri Jayewardenepura on the 8th and 9th of December 2022 at the University of Sri Jayewardenepura, Sri Lanka.

Considering the present health and economic crisis, the theme of the 19th ICBM was set as "Equitable recovery amidst economic crisis: Post-pandemic challenges and the way forward." Economic recovery is a key component of governments' long-term agendas, whether actively controlling pandemics or re-establishing normality. The need for an equitable recovery is emphasized due to the severity of the pandemic and its diverse effects on various groups in society.

As the centre of excellence in management education in Sri Lanka, the FMSC is of prime importance in revisiting the strategies organizations have adopted during the pandemic and rebuilding strategies to face the ongoing economic crisis in Sri Lanka. Accordingly, the conference aims to bring scholars and practitioners together to share their experiences and research findings on all aspects of post-pandemic challenges and managing economic crises.

In parallel to the main conference, a Ph.D. colloquium and a Business Forum are organized to encourage researchers and strengthen industry-university collaborations. Ph.D. colloquium stands as a platform to present the research findings of doctoral students to fellow Ph.D. students, researchers, and academics. Representing different industries, seven organizations were selected to develop case studies which will be published as a case study book entitled "Surviving Through Adversities: A Compendium of Sri Lankan Case Studies in Management" and will be presented at the Business Forum.

Finally, on behalf of the organizing committee of ICBM 2022, we are highly grateful to all the presenters, participants, paper reviewers, keynote speakers, plenary speakers, session chairs, sponsors, discussants, all the officials of the university, members of the FMSC and all the others who contributed in different capacities to make this event a great success.

Dr. Prathap Kaluthanthri – Co-chair, ICBM 2022

Dr. Janaka Fernando – Co-chair, ICBM 2022

Message from the Co-Coordinators, PhD Colloquium 2022

Prof. Nishani Wickramaarachchi Dr. Neelangie Nanayakkara

It was a challenging yet exhilarating experience to co-ordinate the Ph.D. Colloquium of the International Conference of Business Management 2022 (ICBM 2022) under the theme "Equitable Recovery Amidst Economic Crisis: Post-Pandemic Challenges and the Way Forward." From its inception, the main purpose of the Ph.D. Colloquium of the ICBM has been to provide an intellectual platform for Ph.D. students to share their ongoing activities with an internationally recognized panel along with a prominent scholarly audience.

It is with great pleasure we announce that we have received a remarkable number of papers showing the enthusiasm of the Ph.D. students and the extent of trustworthiness they have offered on this ICBM Ph.D. Colloquium. The theme of the ICBM 2022 "Equitable Recovery Amidst Economic Crisis: Post-Pandemic Challenges and the Way Forward" carries its own meaning to the Ph.D. Colloquium. Similar to other academic areas doctoral studies in Sri Lanka are also striving for equitable recovery amidst both economic and post-covid challenges. Though most Sri Lankan Ph.D. students previously pursued doctoral degrees abroad, the current economic crisis and related issues may restrict such pursuits, highlighting the need for homegrown solutions where existing Ph.D. programs offered by local universities need to be strengthened on par with their foreign

counterparts. Thus, Ph.D. Colloquiums with impeccable history is a significant contributor to achieving such objectives. Thus, Ph.D. Colloquium, ICBM 2022 contributes immense value to Sri Lankan doctoral studies.

We take this opportunity to thank all the presenters today for sharing their work in this intellectual forum and wish them all the best in earning their respective PhDs in the future. This event would not have been a possibility if not for the contribution of the young and vibrant Ph.D. Colloquium team who was with us from the beginning, thus they receive our sincere appreciation. At the same time, we would like to thank the main ICBM 2022 team along with the two co-chairs who positively contributed to the success of the Colloquium. Furthermore, we like to sincerely thank the Ph.D. coordinator and the research coordinator of the Ph.D. Program of the Faculty of Management Studies and Commerce for their guidance and assistance for this event. We do hope that the Ph.D. Colloquium, ICBM 2022, conducted by the FMSC, USJ will be another fruitful session for all the participants!

Prof. Nishani Wickramaarachchi – Co-coordinator, PhD Colloquium

Dr. Neelangie Nanayakkara – Co-coordinator, PhD Colloquium

Keynote Speech

Enhancing Capacities for Scholarly Research with Special Reference to Formulation of the Research Problem and Question(s)

Keynote Speech by W. Indralal De Silva

Welcome to the PhD colloquium of the Faculty of Management Studies and Commerce, University of Sri Jayawardenepura! Conducting a research is one of the most challenging, creative, and intellectually satisfying professional activity. In the research process, identification/formulation of an appropriate research problem is vital and many find it as a difficult task. If you have identified an appropriate problem for your research, you have accomplished the most challenging component in academic research - the problem is the central point of the research. By doing scholarly research, either new knowledge is created, or existing knowledge is challenged, amended or re-stated. However, Albert Einstein once stated, *"If we knew what it was we were doing, it would not be called research, would it?*

What is the Significance of Conducting Research?

Research can help to increase the likelihood of success: Good judgment plus increased knowledge, increases the probability of correct decisions. However, in general, a few decision makers in our country utilize the existing research knowledge (findings/conclusion/recommendations etc.) in the decision-making process. Why? First, in an environment where research culture is poor or research findings are disseminated poorly, decision makers are not able to access or utilize research material for decision making process. Second, a decision maker with a deadline for a decision cannot wait for new scientific evidence or be too concerned about scientific scruples over demonstration of cause-and-effect.

Advanced research utilizes methodologies that can be replicated, produces results that are examinable by peers, including decision makers, and creates knowledge that can be applied to real-world situations. Scholarly researchers are likely to work as teams (multidisciplinary approach) to enhance our knowledge of how best to address the world's problems ranging from environmental degradation, COVID-19 to economic crises.

Challenges in Conducting Scholarly Research

Although universities in our country expect high quality research from post-graduates and the staff, very often they have to face the problem of lack of

research skills and motivation for it. However, it is not your fault. Even in GCE (A/L) curriculum of state owned schools there is no provision to teach you "how to conduct a research". In fact, most of you initiatives to learn about research it is at the latter part of your degree program. Thus, it is like you are expected to figure it out through trial and error in an environment where the research culture itself is poor. When you know how to do research, it's much easier to improve your life and work. Instead of having to ask someone every time you have a question, research will help you solve problems yourself and help others in turn. Researchers go out into the field and design studies that give policymakers hard data on which they can base their decisions.

Steps Involve in the Research Process

Research can make you overwhelmed, but it is more manageable when you break it down into steps. In my own experience, the research process has a number of key steps, which are fairly similar to the items incorporated into MPhil/PhD proposals. Those steps involved in the process of social research, i.e., (1) Identification/formulation of a **Research Problem**, (2) Selection of a **Topic** (3) Review of relevant **Literature,** (4) Development of **Theoretical and Conceptual Framework** (5) Formulation of research **Questions/Objectives/Hypotheses**, (6) Working out **Research Design/Methodology**, (7) Administering the tools of **Data Collection** and Others, (8) **Analyzing the Data** (9) Presenting and interpretation of **Results** (10) **Conclusion and policy implications** and (11) **Reporting the Research** (writing/presenting etc.). However, research guidelines provided by some academic institutions may deviate from the above.

Central Point of the Research: Identification of an Appropriate Problem

The research process usually begins when a researcher selecting a broader research topic. Perhaps this can be identification of a research area. This usually includes generating ideas and identifying a problem. However, not all problems are 'research-worthy'. In general, any question that you need answers, any assumption or assertion that you want to challenge or investigate can become a research problem.

As a PhD candidate you may feel that it is an easy task to formulate a problem, more precisely a "research problem." Yet, it requires a considerable knowledge in both the subject area and research methodology. Once you examine a question more closely, you will soon realize the complexity of formulating an idea into a problem that is researchable. Several ways are available for generating ideas/questions and identifying a problem, but usually problems are selected based on interest, urgency, usefulness, ability, uniqueness, or limitations.

A problem can be defined generally as one or more discrepancies such as a difficulty, obstacle, disagreement, inconsistency, dissatisfaction, or other abnormal characteristics permeating an existing situation. A research

problem, though, is a vital issue containing one or more of these characteristics, which requires the application of scientific and often technical procedures, to find an answer or a solution, which will correct the discrepancies and alleviate the problem. Fisher et al. (1982) have put it more simply by identifying three conditions that lead to research. Namely, (1) **a perceived discrepancy between what is and what should be**, (2) **a question about why the discrepancy exists**, and (3) **at least two possible and plausible answers to the question**. This concept can be shown more clearly by looking at an example from nutritional status of children in Sri Lanka. Let us assume that nutritional status among children in villages of a particular district declines over the past three-year period. However, in one village the nutritional status increases over the same period. This leads to a discrepancy between existing and expected situations and the question "**why is this happening**" arises. Both qualitative and quantitative methods can be employed to identify possible reasons for this contradiction.

Social researchers truly do not do research on problems However problems are simply the general focus of the study, a starting point. To develop the research study, the researcher needs to refine and narrow down the problem into a research question. A common mistake of early career researchers is that they fail to narrow down a problem sufficiently, or they try to jump from a broad problem directly into a research without first deciding upon what research question(s) they are seeking answers.

The key difference between a research problem and a research question is that a **research problem** refers to an issue, difficulty, or gap in knowledge that is being addressed in research, whereas a **research question** refers to a statement that is in the form of a question. Moreover, research question examines, learns, and explores the research topic, where as a research problem focuses on the issues or the gaps that are analyzed and discussed under the research project. Furthermore, although a research question is formed based on the qualitative and quantitative forms, research problem is not formulated considering qualitative and quantitative categories. Besides, the research questions help to determine the methodology and hypothesis of the research, while a research problem cannot determine the methodology.

Sources of Research Problems

Identifying a problem to study can be tough not because there is lack of issues that could be investigated, but due to the fact that formulating a socially relevant and researchable problem statement that is unique and does not simply duplicate the work of others is quite challenging. To facilitate how you might select a problem from which to build a research study, consider following three broad sources:

Theory: Utilizing a theory, the researcher can formulate a research problem or hypothesis stating the expected findings in certain empirical situations. The researcher asks the question: "What relationship between variables will

be observed if theory aptly summarizes the state of affairs?" One can then design and carry out a systematic investigation to assess whether empirical data confirms or rejects the hypothesis and hence the theory.

Interdisciplinary perspectives*:* Identifying a problem that forms the basis for a research study can come from academic movements and scholarship originating in disciplines outside of your primary area of study. An interdisciplinary approach to selecting a research problem offers an opportunity to construct a more comprehensive understanding of a very complex issue than any single discipline might provide.

Interviewing practitioners/key informants*:* The identification of research problems about particular topics can arise from formal or informal discussions with practitioners/key informants who provide insight into new directions for future research and how to make research findings increasingly relevant to practice. Discussions with experts in the field, offers the chance to identify practical "real world" problems that may be understudied or ignored within academic circles.

Personal Experience*:* Your everyday experiences can give rise to worthwhile problems for investigation. Critically assess your own experiences and/or frustrations with an issue faced by the society, your community, or your neighborhood.

Focus on literature*:* A research problem can often be derived from an extensive and thorough review of pertinent literature associated with your overall area of interest. Also, authors frequently conclude their studies by noting implications for further research, this can also be a valuable source of finding problems to investigate.

Now let me provide you a timely example from Sri Lanka: a research problem and question(s)

Problem definition: According to Sri Lanka's labour force data for 2020, 65% of the male and 34% of the female population (age 15+) contribute to the Sri Lankan economy. Compared to women from the Western World, Asian women may not contribute to their countries' economies due to a lack of flexible job opportunities, transportation, childcare issues etc. Since the pandemic, newly adopted virtual employment opportunities have supported many companies worldwide to keep their businesses alive and support their economies. Virtual employment can help countries like Sri Lanka to increase female employees' proportion in the labour force and contribute to economy productively. Along with the pandemic and economic recession, many companies and state organizations in the world are inclined to move to the virtual platforms and flexible working hours considering the current scenario. Virtual job platforms, especially for women, can be of great help in managing work-life balance and increasing the proportion of women in the workforce contributing to the Sri Lankan economy. However, in the Sri Lankan context

virtual employment opportunities have not expanded compared to many countries in the developing world.

***Research Questions**:* What kind of benefits can be obtained through virtual employment? What are the current virtual employment opportunities available for women? Why do women need virtual employment? What are the benefits of virtual employment for women and the employer? How can we achieve work and life balance when working virtually?

Inference

A good problem statement begins by introducing the broad area in which your research is placed and then gradually leads the reader to narrower questions. In a nutshell **a research problem is** a statement about an area of concern, a condition to be improved, a difficulty to be eliminated, or a troubling question that exists in scholarly literature, in theory, or in practice that points to the need for meaningful understanding and deliberate investigation. In some social science disciplines, the research problem is typically posed in the form of **a question**. A research problem does not state how to do something, offer a vague or broad proposition, or present a value question. Also do not confuse a research problem with a research topic. A topic is something to read and obtain information about whereas a problem is something to solve or framed as a question that must be answered. For many PhD candidates research is an intimidating and overwhelming process. Another way to look at the prospect of conducting research is that it is your turn to explore into a new and interesting subject and present your own ideas about what it means. Undoubtedly, for successful completion of your research project you require to have strong commitment and motivation. By participating in this PhD colloquium your research capacities and commitments would get enhanced significantly. **Finally, it is inspiring to see that PhD candidates are enthusiastic and passionate about the quality of their research work and that their work contributes towards the enhancement of knowledge in their respective fields of study and at a large scale, towards the development of our country via incorporating research knowledge into scientific decision-making process.**

W. Indralal De Silva (MA & PhD – Canberra)

Emeritus Professor of Demography

Former Dean & Chair Professor of Demography

Faculty of Arts

University of Colombo

List of Titles and Authors

GENDER DISPARITIES ON HOUSEHOLD EDUCATION EXPENDITURE IN SRI LANKA WITH SPECIAL REFERENCE TO COLOMBO, BADULLA, KILINOCHCHI AND HAMBANTOTADISTRICTS

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ABSTRACT

The total household level expenditure is shared by the households itself, public sector and voluntary organizations. The educational expenses according to the literature are generally brought under two main subthemes as public and private expenses. Moreover, the above sources of expenses are complementary to each otherand in the absence of either of them, it is likely to be an under allocation of resources for education. The household expenditure on education is fully consummated by theindividual households itself. Majority of the Asian region civilians consider the gender when spending money on education. They spend more on their male children than that of female children .This issue is very prominent almost in all the south Asian countries. Being a south Asian country Sri Lanka does not show the same trend when compared to the other countries. One major reason for this is the impressive record of educational attainments and the educational achievements in Sri Lanka, because Sri Lankans are privileged to receive the free education system.This study has used four districts from Sri Lanka, namely Colombo, Badulla, Kilinochchi and Hambantota.The main objective of this study is to assess the genderrelated disparities of household level expenditure on education. This study has usedthe t Test to assess the gender related disparities. The main findings of the researchillustrated that there is a statistically significant difference between male and female children on mean preschool expenses, households spend more on their male children preschool education expenses than that of female children in these four districts. (Preschool expenses mean the expenses, which include only maximum of 2 years educational expenses for the nursery school fees, stationary item expenses, transportation fees). In addition, this study has found that there is no any such difference between male and female children on mean school level or higher studies expenses. Therefore, according to the previous studies' findings on gender disparities on education, this study found out a very different finding on gender disparities on education in Sri Lanka.

Keywords: Gender Disparities, Households, Education Expenditure, Colombo,Badulla, Kilinochchi, Hambantota

INTRODUCTION

Sri Lanka is a middle income South Asian country with an impressive recordof school enrolment ,education achievements and learning in South Asian region (Mal, 2007) especially for achievements in literacy (91.9% in 2017), primary education enrolment (99.11% in 2018) (World Bank,2019) and equalopportunity and access to education (Little, 2010).

As a result of the free education policy[1] (1947) and introduction of Sinhala and Tamil languages as the medium of instruction, Sri Lanka gained Universal Primary Education by 1964 (Liyanage, 2014).Under the Sri Lankan free education policy ,several welfare services are also provided bythe government :such as free text books to all the children up to Grade 11,transport subsidies for travelling to school, a set of school uniforms annually, free medical inspection in schools(Dental care, Free spectacles to needy children),scholarships schemes (For needy children) (Nawastheen, 2019)According to the Annual Performance Report (2018) which publishedby the Ministry of Education ,the Sri Lankan Education vision is" to achieveexcellent in the global society by producing skillful citizens who share the Sri Lankan Identity". The system or programme on 13 years of education has been initiated in the year 2017 under new educational reforms for guaranteeing Education for 13 years for every student subsequent to admission to schools (Annual Performance Report, 2018).The totalhousehold level expenditure is shared by the households itself, public sectorand voluntary organizations. The educational expenses according to the literature are generally brought under two main subthemes as public and private expenses. Moreover, the above sources of expenses are complementary to each other and in the absence of either of them, it is likelyto be an under allocation of resources for education. The household expenditure on education is fully consummated by the individual householdsitself. According to the previous studies, Himaz (2015) has found out that there is a gender related disparities on education in Sri Lanka, that isespecially rural sector households spend more on their female children's education than that of male children. Moreover, the evidence on inequality

[1] Free education has been provided for the past 60 years.Dr.C.W.W.Kannangara (1884 - 1969)was the first Minister of Education in the State Council of Ceylon. He introduced the Free Education Act in 1945 which enables access to free education for every child in the country.Dr.C.W.W.Kannangara who held the portfolio of education during his whole

period is one person responsible for initiating a series of educational reforms that created a lasting influence on the history of education on this country.

in the allocation of goods and services within households in developing countries showed that females obtained fewer opportunities than males; moreover, this can be seen in the intra-household allocation of educational resources; in many countries. This study attempted to identify whether the same pattern continuous or not.

JUSTIFICATION

Author has collected secondary data from four districts according to the HIESreports. The HIES (2016) latest report shows the following data which is related to the household expenditure on education.

Table 1: Household monthly expenditure on education (2016)

District	HEE Amount	HEE Percentage
Kilinochchi	Rs.1421	10.3%
Colombo	Rs.4169	6.5%
Badulla	Rs.1426	5.7%
Hambantota	Rs.1497	3.9%

Source: HIES 2016, (DCS)

HEE: Household Expenditure on Education

Table 1 depicted the largest percentage of household expenditure on education as 10.3 % from Kilinochchi district, while the lowest percentage of 3.9% is represented from Hambantota district. Further, Badulla district showed 5.7% on household education expenditure and the author has taken Colombo district, which showed the average percentage (6.5%) on householdeducation expenditure. In addition, researcher has used all four districts to cover the locational divisions. Researcher has collected 250 households' datafrom the above four districts .The following table shows the information related to it.

Table 2: Locational Division Population Percentage (2012)

District	Urban	Rural	Estate
Colombo	77.6%	22.1%	0.3%
Kilinochchi	0%	100%	0%
Badulla	8.6%	72.6%	18.9%

Hambantota	5.3%	94.7%	0%

Source: Census of Population and Housing Report, 2012(DCS)

RESEARCH QUESTION

Are there gender differences in allocation of household level educational expenses?

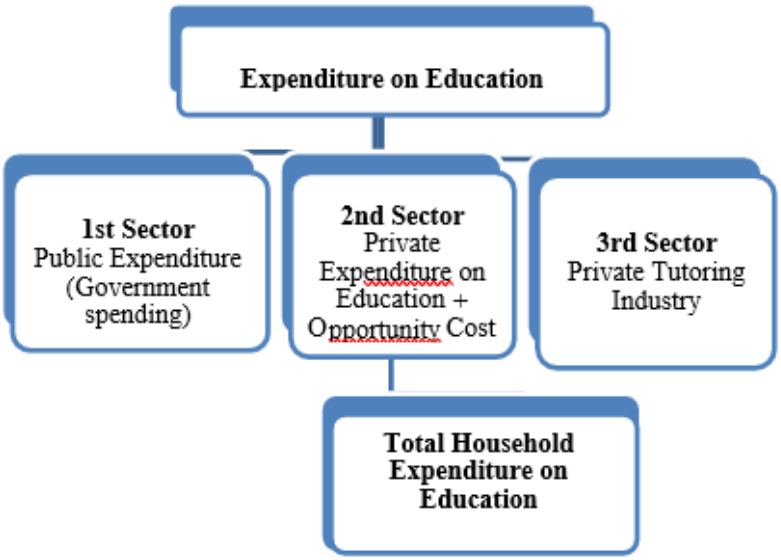
OBJECTIVE

To assess the gender related disparities of household level expenditure on education.

LITERATURE REVIEW

Education plays an important role for every country. It is a powerful tool to develop the knowledge among the people in the country (Sabulayan, 2013). Education raises not only labor productivity and efficiency of workforce but also produces a highly skilled manpower that leads the economy towards sustainable economic growth and hence economic development (Afzal, 2011). From economic point of view, the education associated with high rates of returns, both private and social especially in developing countries (Psacharopoulos & Patrinos, 2004) Expenditure on education can be categorized under the following sectors.

Figure 1: Classification of Educational Expenditure



Source: Growing phenomenon of private tuition, 2008(Dang)

When local empirical studies concerns, according to Himaz's article on 'Intrahousehold Allocation of Education Expenditure 'revealed that there is a bias-favoring girl in rural Sri Lanka.

From the three sectors, household expenditure on education connects directly with second and the third sectors. At present, most of the households mainly focus on the third sector (Dang, 2008). Public expenditure on education largely done by the government as a result of free education system in the country.

Except human capital approach and poverty, welfare also plays a significantrole in the field of education. Welfare state refers to a type of government inwhich the national government plays a key role in the protection and promotion of the economic and social well – being of its citizens (governmentprotected minimum standards of income, nutrition, health, housing and education for every citizen). When categorizing welfare state, there is an important and appropriate service area namely education takes the key position .Education is essential for the distribution of life chances (Nikolai, 2013)Welfare can be divided into parts. Child welfare is a term most often used in a general sense to cover the broad scope of involvement by the stateand its legal professionals in supporting children and their families (Carnoy,1995). Child welfare is one of the key parts which related to the education. Child welfare is designed to ensure that children are safe and that families have the necessary support to care for their children successfully. Child welfare raises the level of the standards of household. According to the Sri Lankan context the following table shows the information related to this subject.

Table 3: Sri Lankan Children (working/non-working) Percentage Aged5 -17

	Main Indicators		
Survey Year	**Children not Engaged in Any Work of Economic Value**	**Children Engaged in Economic Value (Working Children)**	**Children Engaged in Work but Non Child Labor**
1999	78.7	21.3	N.A
2008/09	87.1	12.9	10.4
2016	97.7	2.3	1.3

Source: Child Activity Survey, 2016(DCS)

According to the above table 3, working children percentage has declined from 21.3 % (1999) to 2.3% in 2016.Moreover, Non-working children percentage has increased considerably. So that the above table provides evidence to prove, that the child welfare raises the level of the standards of household. Therefore, for the economic stability of a country, policy makershave a great role to play to uplift the child welfare. Similarly, economic growth or general welfare in social directly related to the household economy.

Table 4: Sri Lankan School Attendance Status Percentage by Age Group and Gender

Survey Year /Age	Attending School	Not attending School
2016		
5-11	97.9	2.1
12-14	98.4	1.6
15-17	60.3	39.7
Gender Wise	90 Male) 90.2 (Female)	10(Male) 9.8 (Female)

Source: Child Activity Survey, 2016(DCS)

And also according to the above table 5, its clear that more than 90% from both gender attended school over all age groups.

Tilak (2002) revealed that households have different levels of expenditure on the education of their male and female children in rural India. Households preferred to spend more money on education of male children than that of thefemale children. And also he observed that the pattern is the same whether children are enrolled in government or private schools. On the other hand households tent to spend less per student on the education of females than on males. Another supportive study revealed the same scenario in India.A study by Rao (2014), Analysis of household expenditure on education in India, emphasized that Indian households tend to spend less on education of their girl children in contrast to that of boys.

Maritime(2017) in his study on "Determinants of household expenditure on education in Kenya" emphasized that the households still prefer to invest in the male child rather than in the female child. Jensen(2002) discussed that in some developing countries, parents may have "son preferring of differential stopping behavior". According to this if early born children are daughters, parents will be less likely to end bearing more

children than if the first born are sons. This way of fertility behavior tends to fact that, on average female children will have a larger number of siblings and larger household size thanmale children.

Lloyd (1996) revealed that the school enrollment levels for girls are smaller than the boys. On the other hand female headed households tend to spend more on school enrollment of girls than boys (Lloyd, 1996). According Korinek (2012)gender discrimination pattern is visible in households in Nepal (Korinek, 2012).Many studies have found out that education of parents(both) is one of the key determinants of child schooling (Glick & Sahn, 2006). In other words that the educational background of the parents influences in investing in their children's education. And also, if at least oneof the parents had been in the university then they will be more prepared to spend more on their children's education. Improvements in father's education lends to raise the schooling of children (Glick & Sahn, 2006).

Increase in household income tends to increase the investment especially on girls' education. (Glick & Sahn, 2006). Moreover, the level of educational expenditure increases with the household income across years (Andreou, 2012).Household in which women receive remittances spend more on their children's education than other households, even if they are not the householdheads (Pickbourn, 2016).Mother's education has a strong impact only on girl's education (Glick & Sahn, 2006).The number of children under six years of age have a negative effect on educational spending (Psacharopoulos & Patrinos, 2004).

When local empirical studies concerns, according to Himaz's article on 'Intrahousehold Allocation of Education Expenditure 'revealed that there is a bias-favoring girl in rural Sri Lanka. More over this finding was much more different from all the other articles, considered gender of the child of households in Sri Lanka (Himaz, 2015).

Sri Lankan General Education

The period of general education system in Sri Lanka comprises all grades from grade 1 to thirteen in the school system. Broadly there are two main divisions, primary covers the first five years and secondary eight years from grade six to thirteen. However the general education system in Sri Lanka provides 13 years in three deferent cycles (Ministry of Education, 2013).

i. Primary School Education(Grade 1-5)

ii. Secondary School Education
- Junior Secondary School Education- (Grade 6-9)
- Senior Secondary School Education-(Grade 10-11)- (Ordinary Level Examination)

iii. Collegiate School Education– (Grade 12-13)-(Advanced Level Examination) (Nuffic, 2016).

After the school education, the well-performed students from the Advanced Level Examination will eligible for entering to the state or government universities according to their examination results.

School System

According to the Annual Performance Report (2018) which published by the Ministry of Education ,the Sri Lankan Education vision is" to achieve excellent in the global society by producing skillful citizens who share the Sri Lankan Identity".

The system or programme on 13 years of education has been initiated in theyear 2017 under new educational reforms for guaranteeing Education for 13years for every student subsequent to admission to schools (Annual Performance Report,2018).

There are 4 main types of schools can be seen in Sri Lankan education field, namely: Government schools,Private schools, Pirivenas(Buddhist centers) and International schools. Sinhala ,Tamil and English are used as media of instruction in government schools .In other three types of schools use either one language or two languages as the medium of instruction.

According to the School Census (2017) contemporary school system of thecountry consists of 10194 government schools,80 private schools,753 Pirivenas,26 special schools and more than 265 international schools. The government schools are categorized based on the grades and streams. In addition to the School Census (2018) latest report there are four types of Government schools can be seen in Sri Lankan education institutions. Following are the four categories with definitions for each type of school;

I. 1AB-Schools having Advanced Level Science(Bio Science/ or Physical Science) stream classes

II. 1C-Schools having Advanced Level classes other than Science (Artsand/ or Commerce and /or Technology) streams

III. Type 2 – Schools having classes only up to grade 11(Grade 1-11 or Grade 6-11)

IV. Type 3-Schools having classes from grade 1-5 or grade 1-8 (AnnualPerformance Report, 2018).

Education System in Four Districts

GCE Advanced Level Examination (A/L)

Examinations take a major role in the Sri Lankan education system. GCE Advanced Level Examination or so called A/L examination is a General Certificate of Education qualification examination in Sri Lanka. It conducts annually by the Department of Examinations of the Ministry of Education. It is usually taken by students during the optional final two years of collegiate level (grade 12 and 13 or external (non-school) candidates),after they have completed GCE O/L examination. For this high competitive examination, majority of the candidates enter the examinations via their respective schools, while candidates who have finished school education can also apply as private applicants. The qualification serves as an entrance requirement for Sri Lankan state Universities (There are 15 State Universities in Sri Lanka) (School Census Report, 2018).

The candidates can be selected one of the 5 major fields of study, namely

I. Physical Science Stream (Combined Mathematics (Pure & Applied), Physics, Chemistry or Information Technology)
II. Biological Science Stream (Biology (Botany & Zoology),Physics orAgricultural Science and Chemistry)
III. Commerce Stream(Economics, Business Studies)
IV. Arts Stream (Media,Sinhala, Political Science)
V. Technology Stream (Engineering Technology, Bio-system Technology, Science for Technology and a category subject (SchoolCensus Report,2018)

Table 5: G.C.E (A/L) Examination Results (2014 -2019)

Indicator	2014	2015	2016	2017	2018	2019 (New)	2019 (Old)
NumberSat	207304	210340	211865	206630	218191	173781	61769
EUE%	61.25	62.35	63.36	66.02	64.70	62.35	75.36
FAS%	8.01	8.64	8.36	8.21	8.34	8.91	4.62

Source: G.C.E(A/L) Examination(2019),Department of Examinations

EUE% -Eligible for University Entrance Percentage FAS%-Failed in All Subjects Percentage

According to the above information, it is clear that the Sri Lankan overall failed rate has decreased by 3.72% from 2018 to 2019.Moreover the eligiblefor University entrance rate has increased up to 75.36% with 2019 Old syllabus and declined slightly to 62.35 with 2019 new syllabus.

Table 6: G.C.E (A/L) Examination Results-District Wise

Colombo District		
Year	Number Sat	EUE%
FAS%		
2019	22141	66.98%
7.54		
Kilinochchi District		
Year		
	Number Sat	EfUE%
FiAS%		
2019	968	61.88%
10.64%		
Badulla District		
Year		
	Number Sat	EfUE%
FiAS%		
2019	7378	62.35%
8.7%		
Hambantota District		
Year		
	Number Sat	EfUE%
FiAS%		

2019	5490	56.68%
11.28%		

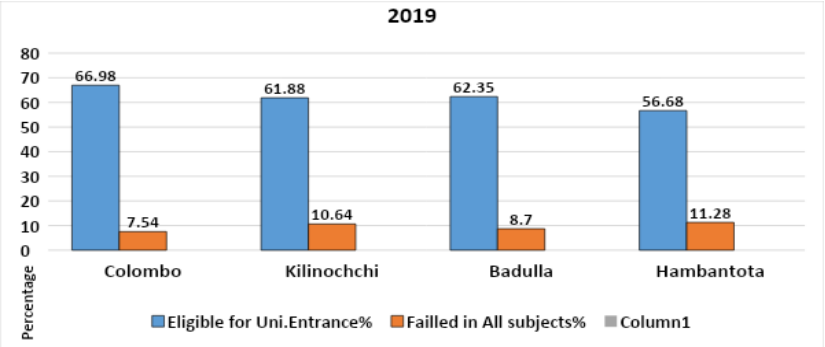
Source: G.C.E(A/L) Examination(2019),Department of Examinations

EUE% -Eligible for University Entrance Percentage

FAS%-Failed in All Subjects Percentage

According to the above table 6 it revealed that only Hambantota district showed the lowest eligibility percentage for University entrance when compared to other three districts

Figure 2: District Wise Performances



Source: G.C.E (A/L) Examination (2019), Department of Examinations

G.C.E (O/L) Examination

The Sri Lanka Ordinary Level (O/L) is a General Certificate of Education (GCE) qualification in Sri Lanka, conducted by the Department of Examinations of the Ministry of Education. It is uasally taken by students at the end of year 11(Usually ages 16-17) or external (non-school) candidates. This examination is held in three mediums Sinhala, Tamil and English.It mainly coveres 9 subjects(Mathematics, Sinhala Language,Science, History, Religion, Esthetic subject).

Table 7: O/L examination results

Indicator	Colombo	Kilinochchi	Badulla	Hambantota
G.A/L% (2018)	80.2	60.36	74.1	81
G.A/L% (2019)	79.09	60.51	71.35	80.51
FAS% (2018)	1.86	3.86	1.94	1.02

FAS% (2019)	1.36	3.90	2.56	1.28

Source: G.C.E(O/L) Examinations(Performance of Candidates),2019, Departmentof Examination

G.A/L%-Qualified for G.C.E (A/L) Examination Percentage

FAS%-Failed in all subjects percentage

The above table 6 shows the four districts O/L examination performance andthe failed in all subjects' statistics. According to the above statistics, Badulladistrict's performance is highlighted and it is higher than Colombo district aswell.

Year 5 Scholarship Examination

The scholarship Examination (also known as the Grade 5 exam) is highly competitive Sri Lanka examination conducted by the Department of Examinations of the Ministry of Education. It is optional for students to undertake it during the final year of primary school (at the age of 9-10).Based on the results of the examination, students could transfer to prominent national schools. The examination is held in two mediums: Sinhala and Tamil.

Table 8: Obtained Marks 100 and Above (Above 50 for Each Paper)

Year	Colombo	Kilinochchi	Badulla	Hambantota
2019	57.70%	45.44%	56.81%	66.19%

Source: G.C.E (O/L) Examinations(Performance ofCandidates), 2019,Department of Examination

METHODOLOGY

This study has used both primary and secondary data. The primary data is collected from the field survey by the author using tools or instruments as, direct Observations, administering, questionnaire and Focused Group discussions. This study survey adopted information from all four districts for the primary data purpose.

The questionnaire was used mainly because of the possibility of gathering much information from the households within a shorter period of time. The researcher used a structured questionnaire with both closed and open-ended questions to collect data. Researcher used the back-to-back translation method for the questionnaire. Researcher checked the validity and the reliability of the questionnaire. In confirmation of the questionnaire,

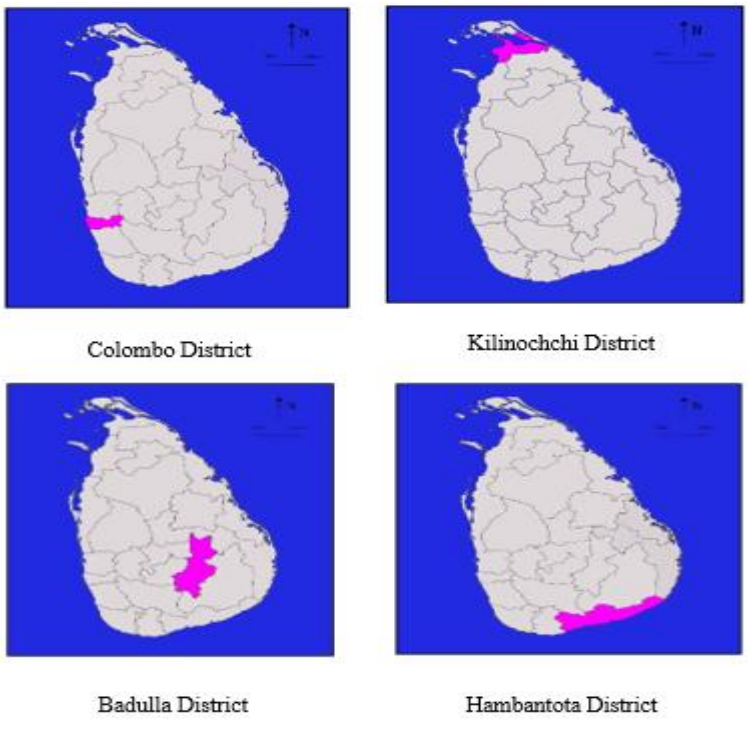
the draftquestionnaire was given to the supervisor/experts in order to obtain the comments and the relevancy to the research objectives. One way ofI entifying the reliability has done by the researcher by using the simple andclear language and instructions appropriately to the respondents. And also, the researcher is planned to do a pre-test with 10 to 20 questionnaires in the pilot study. According to Mugenda &Mugenda (1999) a pilot study provides that research instruments are explained clearly and have the similar meaningto all responds. Further, they explained that pilot study helps to see the simplicity and sustainability of language used in the final instrument for the actual data collection. Based on the pilot study the researcher was able to modify or add the necessary questions in order to carry out the survey productively.

Focused group interviews, this particular data collection is used in this study, by meeting the relevant people (Parents, Principals, Head of academics, Teachers …etc.). This study used the relevant questions to get their ideas and opinions were useful when these relevant people were physically or virtuallypresent.

Individual interview method was used to gather information from expertise (Principals, Educational officers) on household expenditure on education. More details on focus group interviews and individual interview explained inthe qualitative research methods.

This study has used the stratified purposive sampling technique to gather the information from the sample. Stratified sampling is a probability sampling technique where in the researcher divided the entire population into different subgroups or strata, and then selects (according to the purpose) final groups proportionally from the different strata. According to this study ,four districts are the main domain used for the stratification. Selected householdsfrom each district was the selection domain of this study. The sampling frame was the household units prepared from selected households. From theSlovin's formula, the sample size margin value has taken. The researcher hasbeen taken 250 households from each district.

Map 1: Maps of Four District



Source: Colombo ,Kilinochchi ,Hambantota and Badulla districts position maps(2019)

Sri Lanka has been divided into nine provinces and subdivided into 25 districts for the administrative purposes. Colombo district shows the largest population out of all three districts in the Western province. Kilinochchi is the main town of Kilinochchi district in the Northern province and it totallyconsists of Sri Lankan Tamils and Indian Tamils. Badulla district is the province capital of Uva province of Sri Lanka. Hambantota district is located on the Southern Coast of Sri Lanka.

This study used t Test to assess the gender of the child related disparities ofhousehold expenditure on education. This study carried out investigated whether the intra-household allocation of educational expenditure in four districts favored boys over girls or the same pattern continuous.

ANALYSIS

Independent t -Test

The independent t- Test has used to identify the gender related disparities oneducational expenditure. Researcher considered the gender differences between groups. Experiments have designed to establish cause effect relationship. In the simplest experiment, there were two groups of participants created by the manipulation of an independent variable (the cause).The two groups were measured on the same independent variable (theeffect)in order to compare their scores. Data analyses were needed to determine whether the independent variable manipulation produced significant differences in scores between the two groups on the dependent variable. The t –test has used to determine whether the difference between means of two groups or conditions was due to the independent variable, or ifthe difference was simply due to chance. Thus, this procedure established the probability of the outcome of an experiment, and it enabled the researcher to reject or retain the null hypothesis. There were many hypotheses could test as part of this method using t-test. According to this study, researcher tried to investigate any gender differences that might exist among household expenditure on education.

Researcher has used the t –test analysis to identify the gender disparities on household education expenditure.

Table 9: Independent t Test

Type of the Edu. Ex	F	Sig.	t	Mean .Dif	Std.Error.Dif	Lower	Upper
(Levene's Test Equality of variances)				(95% Confident Interval of the Difference)			
Preschool							
Equal variances assumed	21.537	.000	3.051	4350.491	1426.137	1495.768	7205.214
Equal variances not assumed			2.884	4350.491	1508.445	1276.001	7424.981
Primary and Secondary							
Equal variances assumed	.184	.669	.285	474.216	1666.208	-2811.886	3760.319
Equal variances not assumed			.28211	474.216	1681.750	-2846.048	3794.480
Higher Studies							
Equal variances assumed	.567	.453	.970	2399.000	2472.330	-2507.258	7305.258
Equal variances not assumed			.961	2399.000	2497.239	-2569.884	7367.884

Source: Researcher's calculation using primary survey data in 2020

According to the survey study researcher has divided the household expenditure on education under three categories such as

i. Preschool education expenses
ii. School level (Primary/Secondary) education expenses
iii. Higher studies (University/Training school) expenses.

Preschool Education Expenditure

An independent t test was conducted to determine if a difference existed between the mean household expenditure on education of males and females'

.According to the preschool education expenditure calculated using both genders male and female. And also '1' indicated male population and the '0'indicated the female population from the households.60 cases (both male andfemale) have been taken to this analysis. According to the 'Group Statistics"it indicated that mean for male as 7633.93 and mean for female as 3283.44.Therefore,this indicated that male children had significantly higherspending on preschool education than female children in all four districts. When mean difference concerned, it showed 4350.49(7633.93-3283.44).Thesign of the mean difference corresponded to the sign of the t value. The positive t value in this case indicated that the mean expenditure for male group is significantly greater than the mean for female group. And also the average preschool education expenses for male children was 4350.49 greater than the average preschool education expenses for female children. According to the kindergarten expenditure on education the two hypotheses were:

Hypothesis 1:

:H_0: $\mu_{male} - \mu_{female} = 0$(the difference of the means is equal to zero)

:H_1: $\mu_{male} - \mu_{female} \neq 0$(the difference of the means is not equal to zero)

Where μ_{male} and μ_{female} are the population means for male and female children respectively.

The p value of Levene's test is printed as 0.000 ,it was very small, so can berejected the null of Levene's test and concluded that the variance for femalechildren is significantly difference than that of male children. The 95% confidence interval is1279.001 to 7424.981.There is a statistically

significant difference between mean preschool education expenses between male children and female children ($t = 2.884$, $p < 0.000$). (Appendix - table 1here).

Primary and Secondary School Level Education Expenditure

According to this school education expenditure have been taken from both primary and secondary sections.'1' indicated male population and the '0' indicated the female population from the households.197 cases (both male and female) have been taken to this analysis. According to the 'Group Statistics" it indicated that mean for male as 9769.17 and mean for female as9294.95.Therefore,this indicated that male children had significantly higher spending on school education than female children in all four districts. When mean difference concerned, it showed 474.22(9769.17-924.95).The sign of the mean difference corresponded to the sign of the t value. The positive t value in this case indicated that the mean expenditure for male group is significantly greater than the mean for female group. And also the average school education expenses for male children was 474.22 greater than the average school education expenses for female children. According to the school expenditure on education the two hypotheses were:

Hypothesis 2:

H_0: $\mu_{male} - \mu_{female} = 0$(the difference of the means is equal to zero)

H_1: $\mu_{male} - \mu_{female} \neq 0$(the difference of the means is not equal to zero)

Where μ_{male} and μ_{female} are the population means for male and female children respectively.

The p value of Levene's test is indicated as 0.669 ,it was very large, so can be accepted the null of Levene's test and concluded that the variance for female children is no significantly difference than that of male children.The95% confidence interval is -2811.to 3794.480.There is no statistically significant difference between the mean school education expenses betweenmale children and female children ($t = 0.778$, $p > 0.669$). (Appendix - table 1 here).

Higher Education Expenditure

According to this higher studies education expenditure have been taken

from both training schools and University sections.'1' indicated male population and the '0' indicated the female population from the households.100 cases (both male and female) have been taken to this analysis. According to the 'Group Statistics" it indicated that mean for male as 12796.75 and mean for female as 10397.75.Therefore,this indicated that male children hadsignificantly higher spending on higher studies than female children in all four districts. When mean difference concerned, it showed 2399(12796.75- 10397.75).The sign of the mean difference corresponded to the sign of the t value. The positive t value in this case indicated that the mean expenditure for male group is significantly greater than the mean for female group. And also the average higher studies education expenses for male children was 2399 greater than the average higher studies education expenses for female children.According to the higher studies expenditure on education the two hypotheses were:

Hypothesis 3:

H_0: $\mu_{male} - \mu_{female} = 0$(the difference of the means is equal to zero)

H_1: $\mu_{male} - \mu_{female} \neq 0$(the difference of the means is not equal to zero)

Where μ_{male} and μ_{female} are the population means for male and female children respectively.

The p value of Levene's test is indicated as 0.453 ,it was very large, so can be accepted the null of Levene's test and concluded that the variance for female children is no significantly difference than that of male children. The 95% confidence interval is -2507.258 to 7367.884.There is no statistically significant difference between mean higher studies education expensesbetween male children and female children ($t = 0.961$, $p > 0.453$) (Appendix
- table 1 here).

In general, gender is believed to be a very significant determinant of household expenditure on education, especially in developing countries. Being a developing country Sri Lanka do not display this trend except for kindergarten stage. In kindergarten stage, it showed that parents of the households spend more on their male children's education than that of female children. The previous study on "Intrahousehold Allocation of

Education Expenditure: The Case of Sri Lanka'' revealed that parents spend more on their female children's education than that of male children. However, the primary survey concluded that there is no such difference on allocation of money on education gender wise. Therefore, this study proved that gender isnot a decisive factor on expenditure of education in primary, secondary and University level in all four districts of Sri Lanka. Furthermore, Buddhist culture has also influenced the Sri Lankan society not been selective gender wise even at child birth, school enrollment, school level education expensesand job selection.

RESULTS AND DISCUSSIONS

According to the t test analysis, this study found out that there is a statisticallysignificant difference between the male children and female children on mean preschool expenses. It revealed that households spend more on their male children preschool expenses than that of female children in these four districts. On the contrary, the other two levels such as school level expenses (primary & secondary education) and higher studies expenses (University &Training school education) have not displayed any such pattern like the kindergarten expenses, which further unfolds that there is no statistically significant difference between male children and female children on mean school level expenses or higher studies expenses. Therefore, it is consideredand concluded that there is no gender disparities on household level education in these four districts in Sri Lanka. (Kindergarten education is for the age of below 6 years, mainly from 2 to 3)

SUGGESTIONS

Further, being a developing country in the region of South Asia, Sri Lanka shows a positive and equal contribution to children's education despite gender disparity. The author would rather suggest that every governmentshould maintain this equality.

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A CONCEPTUAL FRAMEWORK INTEGRATING PERSONALITY TRAITS, CONTEXTUAL FACTORS, ENTREPRENEURIAL INTENTION, AND NASCENT ENTREPRENEURIAL BEHAVIOR WITH THE MODERATING EFFECT OF GENDER

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ABSTRACT

This research paper uses critical studies to develop a conceptual framework integrating antecedents of entrepreneurial intention and nascent entrepreneurial behavior with moderating effect of gender. As the method, a desk research strategy is used to demonstrate possible future areas for further studies. Thus, this study has developed a conceptual framework with fourteen variables. They are four personality traits: proactive personality, need for achievement, risk-taking propensity, locus of control, and three contextual factors: perceived educational support, perceived relational support, and perceived structural support. In addition, entrepreneurial intention (independent variable) and its three antecedents, such as attitude towards entrepreneurship, perceived behavioral control, and subjective norms, are also considered. Next, nascent entrepreneurial behavior (dependent variable), gender, and the participants' entrepreneurial family background are also incorporated into the proposed model. The relationship between personality traits and antecedents of entrepreneurial intention, entrepreneurial intention, and nascent entrepreneurial behavior is acknowledged with the support of Bandura's Social Cognitive Theory (SCT) (1986). In addition, Ajzen's theory of planned behavior (TPB) provides theoretical support for recognizing the interconnection between antecedents of entrepreneurial intention and nascent entrepreneurial behavior (1991). The social cognitive career theory has established the association between contextual factors and antecedents of entrepreneurial intention and nascent entrepreneurial behavior (Lent, Brown, and Hackett, 1994). The social role theory

is also employed to investigate how gender affects the relationship between entrepreneurial intention and nascent entrepreneurial behavior (Eagly, 1987). After reviewing the literature, entrepreneurial family background is identified as an influential variable in entrepreneurial intention and the development of entrepreneurial behavior. This paper suggests that the study should control for the entrepreneurial family background. Due to the lack of an integrated model that considers four theories within a single conceptual framework, both locally and internationally, this study report has important implications for future scholars.

Keywords: Personality traits, Contextual factors, Entrepreneurial intention, Nascent entrepreneurial behavior, Gender

INTRODUCTION

There are many research studies and publications on entrepreneurial intention. Still, no analysis of personality traits, contextual factors, antecedents of entrepreneurial intention, nascent entrepreneurial behavior, and gender is available. Further, this study has identified undergraduates' family background as an influential factor for the above variables.

Moreover, after reviewing the literature, the researcher has noted shortcomings in convincing theories on the nexus between personality traits, contextual factors, antecedents of entrepreneurial intention, gender, and nascent entrepreneurial behavior. Ajzen's theory of planned behavior (1991) has been used to establish the relationship between antecedents of entrepreneurial intention and nascent entrepreneurial behavior. Next, Bandura's Social Cognitive Theory (1986) shows the connection between personality traits with antecedents of entrepreneurial intention and nascent entrepreneurial behavior. Further, the social cognitive career theory (Lent, Brown, and Hackett, 1994) has been used to build the relationship between contextual factors with antecedents of entrepreneurial intention and nascent entrepreneurial behavior. Finally, the social role theory by Eagly (1987) has been used to show the moderating role of gender on the connection between entrepreneurial intention and nascent entrepreneurial behavior.

OBJECTIVES OF THE PAPER

This paper attempts to achieve the following two objectives.

- To present literature to show the interconnection between variables with the support of past literature.

- To propose a conceptual framework integrating the personality traits, contextual factors, antecedents of entrepreneurial intention, nascent entrepreneurial behavior, gender, and participants' entrepreneurial family background.

METHOD

A wide-ranging literature survey is carried out to achieve the two objectives following two stages procedure.

Stage 1: Keywords Identification

The first step seeks to discover the most pertinent keywords to establish the subject's boundary. First, a starting set of keywords is taken from the most crucial academic literature. Following was the conclusion for the 14 keywords: Nascent entrepreneurial behavior, entrepreneurial intention, attitude towards entrepreneurship, subjective norms, perceived behavioral control, proactive personality, need for achievement, risk-taking propensity, locus of control, perceived educational support, perceived relational support, perceived structural help, gender, and participants' entrepreneurial backgrounds.

Stage 2: Database Analysis

This investigation has determined the appropriate academic, peer-reviewed publications for a thorough literature evaluation in the second step. The author has employed a desk research strategy to find relevant articles, specifying a particular period of 2000 to 2022 and using six databases: Taylor & Francis, Emerald, Springer, Wiley Online Library, Elsevier, and Sage. Limiting the articles' publication dates between 2000 and 2022 (those published within the last 22 years) allows this study to base its review on contemporary literature that addresses information synthesis and retrieval in the digital age. Finally, 185 articles are chosen using the most robust databases with extensive worldwide research coverage, assuring the highest quality of scientific publications. Next, with the support of Zotero, an open-access reference management tool is used to store the selected 185 articles. Next, they are exported to a Microsoft Excel spreadsheet for additional examination. One hundred eighty-five articles were ultimately chosen for the research.

RELATIONSHIP BETWEEN VARIABLES

Relationship between Entrepreneurial Intention and Nascent Entrepreneurial Behavior

Nascent entrepreneurs are just starting their venture-starting processes (Lanivich et al., 2021). According to Krueger et al. (2000), developing entrepreneurial behavior is a deliberate choice that necessitates careful consideration and detailed resource planning. Intentions are taken to reflect the motivating variables affecting any intended behavior, according to Ajzen (1991). Therefore, understanding the extent of engaging with entrepreneurial behavior is essential to deciding how far a person is prepared to develop their venture. Furthermore, Yasir et al. (2017) argued that starting a business takes deliberate efforts that may result from solid entrepreneurial intention because starting a business is a deliberately planned behavior. Moreover, any planned behavior has intention as its primary antecedent (Ajzen, 1991; Farooq, 2018; Laukkanen, 2022). Thus, the best indicators of entrepreneurial behavior are intentions.

According to Liang and Chen (2021), a solid contextual foundation, personality traits, and entrepreneurial intention influence start-up behavior. Additionally, Meoli et al. (2020) noted the urgent need for research into how entrepreneurial intention develops since it can encourage the emergence of entrepreneurial behavior and aid in making career decisions. Further, Kallas and Parts (2021) stated that entrepreneurial intention strongly contributes dramatically to promoting entrepreneurial initiatives and economic sustainability, which ultimately encourages the nascent entrepreneurial behavior of a person. This statement further supports the ideas of (Meoli et al., 2020). Thus, there is a connection between entrepreneurial intention and entrepreneurial behavior. Additionally, this relationship will be strengthened by the Theory of planned behavior (Ajzen,1991).

Theory of planned behavior (TPB): Ajzen (1991) created the theory of planned behavior (TPB) as an expansion of Fishbein and Ajzen's theory of reasoned action (TRA) (1975). The idea of planned behavior (Ajzen, 1991) is another well-known entrepreneurial intention model. It is the most often used theoretical model in studying entrepreneurial intentions. This model describes the intricate link between the critical variables of human behavior

and that behavior itself. According to Krueger et al. (2000), entrepreneurship is the product of deliberate and planned activity. The idea of planned behavior is a valuable and influential framework for researching and comprehending entrepreneurial activity because it demonstrates that human activity is a cause of intention (Al-Jubari, 2019; Maheshwari, 2021). Furthermore, according to Laukkanen (2022), people are more likely to engage *in* an entrepreneurial activity if their intention is higher. The theory of planned behavior is generally accepted and utilized in the literature on entrepreneurial intention and behavior. Thus, this investigation employed the theory of planned behavior as its primary theory of study (Cui & Bell, 2022; Martins et al., 2022; Onjewu et al., 2022; Palmer et al., 2021; Neves & Brito, 2020; Vamvaka et al., 2020)

There is a dearth of theoretical and empirical research that examines the connection between entrepreneurial intention and behavior (Kallas & Parts, 2021; Yasir et al., 2017). Ajzen's (1991) theory of planned behavior has frequently been used in research on entrepreneurial intention to understand the factors influencing people's decisions to pursue entrepreneurship. With a few notable exceptions, academics generally concur that the three antecedents of the theory of planned behavior, namely, attitude toward entrepreneurship, subjective norm, and perceived behavioral control, shape each person's intention to engage in business. These three cognitive pre-requisites for planned activity are considered accurate predictors of entrepreneurial intention, which explains the diversity in emerging entrepreneurial behavior across research (Awwad & Al-Aseer, 2021; Hsu et al., 2019; Vamvaka et al., 2020). Unfortunately, there has not been enough research done on this part of the idea.

There are significant research gaps between the advancement of the information needed to support the entrepreneurial intention and nascent entrepreneurial behavior (Alam et al., 2019); (Kaki et al., 2022; Zhang et al., 2022). This paper concentrates on how healthy entrepreneurial intention predicts actual start-up activity. Only a small number of research have looked at the relationship between intention and nascent entrepreneurial behavior in the context of entrepreneurship, despite the notion of planned action's constant predictive value (Alam et al., 2019; Farooq, 2018; Laukkanen, 2022; Meoli et al., 2020; Shinnar et al., 2018; Yasir et al., 2017; Zhang et al., 2022). Considering all the above literature, the current study has concluded that firm

entrepreneurial intention promotes nascent entrepreneurial behavior for start-up activity. Thus, the first hypothesis of this study is stated as follows.

H1: Entrepreneurial intention has a positive impact on nascent entrepreneurial behavior

Although the theory of planned behavior is a valuable tool in studying entrepreneurial intention, it is crucial to include additional pertinent factors to strengthen the theory's capacity to explain and predict choice. Accordingly, this study has considered attitudes toward entrepreneurship, subjective standards, and perceived behavioral control as the key determinants of entrepreneurial intention, as proposed by the theory of planned behavior by Ajzen (1991). With this theory in this investigation, the relationship between these constructs with entrepreneurial intention is theoretically enhanced.

Attitude toward Entrepreneurship and Entrepreneurial Intention

Ajzen (1991, p. 188) defines attitude as "the degree to which a person has a favorable or negative opinion or appraisal of the conduct in issue" and says it is a one-factor determining purpose. Moreover, the first construct in the theory of planned behavior is the attitude toward entrepreneurship, which is described as a person's overall assessment of a particular activity (Ajzen, 1991). A person's attitude denotes their thoughts of their attractiveness and includes their ideas and expectations regarding the emotional effects of the results of a specific action (Krueger et al., 2000). An attitude in the context of entrepreneurship refers to the unique qualities that influence people to have a favorable attitude toward entrepreneurship in general and entrepreneurial intention.

Intention toward entrepreneurship can only be explained by attitude, and there is a strong correlation between attitude and entrepreneurial sense (Miranda et al., 2017; Palmer et al., 2021; Santos et al., 2016). Neves and Brit (2020) found that attitude has the most significant impact on influencing entrepreneurial intention, among other characteristics. Hatak et al. (2015) looked at attitudes toward students' entrepreneurial intentions to elucidate further. They discovered that the desire to become an entrepreneur was well predicted by attitude toward entrepreneurship.

According to several studies, favorable attitudes toward establishing a venture affect students' future job choices and their entrepreneurial mindset over time (Galvão et al., 2018; Lopez et al., 2021; Maheshwari, 2021; Nguyen & Duong, 2021; Paray & Kumar, 2020). It follows that attitude influences and sparks entrepreneurial intention logically. However, the theory of planned behavior asserts that attitude towards entrepreneurship is a significant antecedent of entrepreneurial intention (Ajzen, 1991). Additionally, empirical research has shown that entrepreneurial attitudes significantly impact nascent entrepreneurs' choices to establish a firm (Altinay et al., 2012; Awwad & Al-Aseer, 2021; Farrukh et al., 2018). It is possible to conclude that attitude toward entrepreneurship impacts entrepreneurial intention based on the theory of planned behavior and the literature. Thus, the second hypothesis of this study can be stated as follows.

H2: Attitudes toward entrepreneurship have a positive impact on entrepreneurial intention

Subjective Norm and Entrepreneurial Intention

Subjective norms in the context of entrepreneurship might be defined as views of what essential people in a person's life think about starting their own business, conditioned by the intensity of their drive to do so (Krueger et al., 2000). Moreover, Mohammed et al. (2017) defined subjective norms as a person's perception of what others in their close social circles or significant others, such as parents, friends, and co-workers, would think about them engaging in or abstaining from engaging in a specific action, such as a business endeavor. Additionally, subjectivist norms, which compel people to adhere to predetermined standards, are frequently the result of peer pressure, friend pressure, or family pressure. The normative views linked with the likelihood that essential referent groups or persons would support or oppose certain conduct serve as the fundamental drivers of subjective norms (Nungsari et al., 2022). According to Ajzen (1991), a person's perception of social pressure to act in a certain way is influenced by the opinions of significant others, which can either encourage or limit a specific action. Thus, subjective norms, which compel people to adhere to predetermined standards, typically result from peer pressure, friends, or family.

The prior entrepreneurial intention research had contradictions according to subjective criteria. For example, it has been noted as a negligible or small

factor of entrepreneurial intention, among others (Krueger et al., 2000; Linán & Chen, 2009). However, other research has revealed that subjective norms are a powerful predictor of entrepreneurial ambition.(Al Mamun et al., 2016; Anwar et al., 2020; Arranz et al., 2019; Kaki et al., 2022; Roy et al., 2017).

People are less inclined to participate in entrepreneurial action if essential people, including family and friends, think it is too hazardous, and the opposite is also true. Numerous investigations have supported this connection between subjective norms and entrepreneurial intention empirically (Amofah et al., 2020; Cavalcante et al., 2022; Nikou et al., 2019; Otache et al., 2021; Wijayati et al., 2021), which found that the decision to initiate a business venture was significantly influenced by referent groups such as friends. Subjective norms in the context of entrepreneurship may be seen as an individual's impressions of what essential people in their life think about starting their own business, which is influenced by how strongly they are motivated to do so (Krueger et al., 2000). Thus, after referring to the literature above, it can be concluded that subjective norms impact entrepreneurial intention. Thus, the third hypothesis of this study can be stated as follows.

H3: Subjective norms positively impact the entrepreneurial intention

Perceived Behavioral Control and Entrepreneurial Intention

The phrase "perceived behavioral control" relates to how simple or complex an activity is seen by the person doing it (Ajzen, 1991). If the work is thought to be simple, it will probably be carried out. Likely, individuals will not participate if it is considered challenging. These control ideas may be founded partly on experience with the behavior, according to Ajzen (1991). Many scholars have asserted that in addition to knowledge, perceived behavioral control is also influenced by first-hand understanding of the behavior (Mohammed et al., 2017; Vamvaka et al., 2020 Thevanes, 2021), the experiences of acquaintances and friends, and by other factors that either increase or decrease the perceived difficulty of engaging in the behavior.

According to the theory of planned behavior, perceived behavioral control, entrepreneurial intention, and entrepreneurial behavior are related (Trivedi, 2016; Nasip et al., 2017; Ohanu & Ogbuanya, 2018; Paray & Kumar, 2020; Martins et al., 2022). Moreover, the theory of planned behavior (Ajzen,1991)

has highlighted that perceived behavioral control is a significant antecedent in determining entrepreneurial intention.

Moreover, the theory of planned behavior (Ajzen,1991) has highlighted that perceived behavioral control is a significant antecedent in determining entrepreneurial intention. People should feel more in control of their actions if they have enough chances and resources and expect few obstructions or hurdles (Martins et al., 2022). Kolvereid (1996) asserted that perceptions of behavioral control about entrepreneurship reflect people's perceived capacity to become entrepreneurs. According to Krueger, the degree to which a person believes they can start a firm effectively is crucial in critical sloping entrepreneurial intention. As a result, we identify perceived behavioral control as a vital component of people's entrepreneurial sense based on the theory of planned behavior by Ajzen (1991) and the research.

Thus, based on the above literature and the theory of planned behavior (Ajzen, 1991), it can be concluded that there is an impact between perceived behavioral control and entrepreneurial intention. Thus, the fourth hypothesis can be constructed as follows.

H4: Perceived behavioral control positively impacts entrepreneurial intention

Relationship between Personality Traits and Attitudes Towards Entrepreneurship

Personality traits continue to receive much attention despite earlier criticism. Numerous paradigmatic research examines the impact of the prominent five personality traits on entrepreneurial intentions (Awwad & Al-Aseer, 2021). Other, more focused personality traits have been researched, such as risk perceptions (Elali & Al-Yacoub, 2016; Farrukh et al., 2017; Yoopetch, 2021), locus of control (Fernandes et al., 2018), need for achievement (Elali & Al-Yacoub, 2016; Farrukh et al., 2017; Ismail et al., 2012), and (Nungsari et al., 2022; Sidratulmunthah et al., 2018).

However, other personality traits, including creativity (Biraglia & Kadile, 2017; Shahab et al., 2019) and innovativeness (Adu et al., 2020; Awwad & Al-Aseer, 2021), are also considered in numerous studies that influence people's intentions to start their own business. Therefore, it can be concluded that personality traits have also attracted significant attention, potentially

affecting entrepreneurial choice. Therefore, after reviewing prior research, this study has noted that proactive personality, need for achievement, propensity for taking risks, and locus of control are all highly influential personality traits regarding nascent entrepreneurs' intentions to start their businesses. The social cognitive theory links the four selected personality traits with entrepreneurial intention and nascent entrepreneurial behavior.

The social cognitive theory: The social cognitive theory refers to human behavior as the triadic, dynamic, and reciprocal connections between a person's characteristics, behaviors, and environment. It also describes how humans' cognitive processes are affected by their perceptions of efficacy, affecting whether and how particular actions are carried out (Tran & Von Korflesch, 2016; Wang et al., 2021). Moreover, according to Wang et al. (2021), the social cognitive theory is a valuable method for outlining how an entrepreneur's traits influence their entrepreneurial activities due to their interactions with the environment.

Social cognition theory is the primary paradigm for analyzing entrepreneurial phenomena in many settings, including nascent entrepreneurs' goals and conduct (Wang et al., 2021). According to this idea, effectiveness grows through imitation and observation of role models and involves modifying the observer's mental models, which govern their beliefs and behaviors (Bandura, 1986, 1997). Based on the social cognition theory, Bandura's reciprocal determinism asserted that individuals' conduct would be influenced by their characteristics and perceptions of their surrounding environment (Bandura, 1978).

This is because the social cognitive theory offers a helpful framework for tackling the challenge of figuring out how certain personalities eventually affect entrepreneurial intention and behavior, which has been deemed essential in recent years by many scholars (Farooq, 2018; Shirokova et al., 2016; Wang et al., 2021). Additionally, this theory emphasizes how crucial it is to look at individual factors for budding entrepreneurs to comprehend intricate organizational processes, such as new venture creation.

The current study, which is grounded in social cognitive theory, aims to investigate the effects of four personality traits, namely: proactive personality, need for achievement, risk-taking propensity, and internal locus of control, which are crowned as widely acknowledged personality traits in

entrepreneurship literature, on entrepreneurial intention-behavior literature in starting new businesses.

H5: personality traits positively influence entrepreneurial intention

Proactive Personality and Attitude toward Entrepreneurship

A dispositional concept known as the proactive personality describes how people differ in how much they act to change their surroundings (Bateman & Crant, 1993). people who take the initiative to affect or change their surroundings by founding their businesses have the talent and imagination to do so (Nasip et al., 2017). In the entrepreneurship literature, a proactive personality directly affects on attitude toward entrepreneurship (Adu et al., 2020; Awwad & Al-Aseer, 2021; Maheshwari, 2021), and they also have a positive correlation with venture formation (Chang et al., 2009; Mergemeier et al., 2018; Vogel, 2017). In addition, Fernandes et al. (2018) claimed that a proactive personality is directly associated with a favorable attitude towards entrepreneurship to generate an entrepreneurial intention, innovativeness, risk tolerance, and optimism. Thus, the next hypothesis is as follows.

H5a: Proactive personality positively influences on attitude toward entrepreneurship

Need for Achievement and Attitude toward Entrepreneurship

"A person's desire for excellence or to succeed in competitive conditions" is the need for achievement (Shinnar et al., 2018). According to a study by Nasip et al. (2017), university students' demand for success (need for achievement) affects their positive attitude toward entrepreneurship to start their businesses. Furthermore, Farrukh et al. (2018) discovered that the desire for accomplishment is the best indicator of an individual's attitude to start a business and that those with a high need for achievement will invest more in their ventures. Maheshwari (2021) discovered a similar positive relationship between the need for achievement and attitude toward entrepreneurship. Therefore, based on the past literature and the social cognitive theory, this study suggests the following hypothesis:

H5b: The need for achievement positively influences the attitudes toward entrepreneurship

Propensity to Take Risks and Attitude toward Entrepreneurship

Prospective entrepreneurs must deal with risk or uncertainty to launch a new business. "The perceived probability of receiving rewards associated with the success of a situation that the individual requires before he will subject himself to the consequences associated with failure, the alternative situation providing less reward as well as less severe consequences than the proposed situation," says Yoopetch (2021). According to Koh (1996), one's positive attitude towards taking chances in ambiguous decision-making might be a risk-taking style. According to a study by Nasip et al. (2017), dispositional risk propensity affects how receptive students think and start their businesses on the campuses of comprehensive universities.

However, Farrukh et al. (2018) found that risk-taking directly affects one's attitudes toward entrepreneurship. According to another study, taking risks and having attitudes toward entrepreneurship are associated (Awwad & Al-Aseer, 2021; Farrukh et al., 2017; Maheshwari, 2021). Thus, based on the above literature and the social cognitive theory, the next hypothesis can be stated as follows.

H5c: Risk-taking propensity positively influences the attitudes toward entrepreneurship

Locus of Control and Attitudes towards Entrepreneurship

The idea of locus of control is either internal (people feel they have control over their lives) or external (people think their actions and lives are determined by other forces they have no control over, like chance or fate) (Rotter, 1966). According to prior research, an internal locus of control component significantly impacts attitudes toward entrepreneurship (Awwad & Al-Aseer, 2021; Farrukh et al., 2017).

Additionally, managing entrepreneurial businesses have a more muscular locus of control and attitudes toward entrepreneurship (Farrukh et al., 2018). Further, Tseng et al. (2022) have underlined the link between internal locus of power and successful entrepreneurial ventures with positive attitudes. Thus, based on the past literature and the social cognitive theory, the next hypothesis can be stated as follows.

H5d: Locus of control positively influences the attitudes toward entrepreneurship

Relationship between Contextual Factors and Perceived Behavioral Control

The social cognitive career theory: Building on Bandura's social cognitive theory (Bandura, 1986), The social cognitive career theory (Lent, Brown, and Hackett, 1994) examines how an individual's social situation complements their choice to pursue a specific job, affecting career transitions. Further, this theory is one of the most widely acknowledged theories in supporting ideas describing how people develop their job interests and make congruent career decisions in their lives. According to the social cognitive career theory, contextual factors impact people's development and professional choices. They do this by strengthening the relationship under favorable environmental conditions and weakening it under unfavorable ones (Lent et al., 2000). Therefore, in developing a new venture, this theory might assist clarify how people's entrepreneurial intentions are turned into an entrepreneurial career choice, as every opportunity, resource, and challenge is impacted by human perception (Arshad et al., 2019). Moreover, if people believe their aims are supported by their surroundings, people are more inclined to turn their interests into goals and take action (Lent et al., 2000). However, people are less prone to follow confident professional choices if they believe that the context would hinder their efforts in those directions.

Lent et al. (1994) stated that the contextual factors might be modeled as a series of concentric circles enclosing people. The individual can be seen as nestled inside the inner circle, surrounded by their closest social connections (such as family, friends, and mentors), and surrounded by the broader social backdrop (e.g., organization and macroeconomic conditions). As a result, this study will use the social cognitive career theory to analyze the relationship between contextual elements on intentions to start new businesses in the future. Thus, the next hypothesis of this study is as follows.

H6: Contextual factors positively influence entrepreneurial intention

According to Turker and Selcuk (2009), three contextual elements directly impact a person's intention to launch a new business. They all directly impact perceived behavioral control (how simple or complex an activity is seen by

the person doing it) that people require to start a new business. They are perceived educational support, perceived relational support, and perceived structural support.

Perceived Educational Support and Perceived Behavioral Control

Getting essential entrepreneurship education information through a college education is an effective method. Still, it also highlighted how many students' entrepreneurial dreams are hampered by a lack of preparation, business knowledge, and a reluctance to take risks to realize their goals(Awwad & Al-Aseer, 2021). Therefore, universities may play essential roles in motivating young people to pursue entrepreneurial careers. However, they are frequently criticized for promoting entrepreneurship and being overly scholarly (Anjum et al., 2022; Anwar et al., 2020). Most institutions now offer entrepreneurial undergraduate and graduate courses or programs to address this deficiency.

Some studies (Anjum et al., 2022; Anwar et al., 2020; Arranz et al., 2019; Maheshwari, 2021) analyzed how the entrepreneurial interests of universities affect the perceived behavioral control of students. According to Paray and Kumar's study from 2020, university students' entrepreneurial education might favor perceived behavioral control. Many scholars also suggested a connection between entrepreneurship education and perceived behavioral control(Mohammed et al., 2017; Thevanes, 2021; Wijayati et al., 2021; Zhang et al., 2022). Thus, entrepreneurship education may influence how simple or complex an activity is seen by the person pursuing a career in entrepreneurship (Anjum et al., 2022; Maheshwari, 2021). Therefore, based on the social cognitive career theory, the next hypothesis is formulated as follows.

H6a: Perceived educational support positively impacts perceived behavioral control

Perceived Relational Support and Perceived Behavioral Control

Family history has also been considered in earlier research as influencing entrepreneurial inclination. According to Farooq (2018), family influences respondents' professional decisions second only to personal experience. Therefore, one's professional choice is likely to be influenced by the support of family and friends. This relational support in the current study primarily

refers to the emotional and material assistance of family and friends. Someone may be inspired to pursue an entrepreneurial career if they know they will receive this assistance when they launch a firm.

Additionally, it is crucial to have strong relationships to pool the first funds needed to launch a new firm (Ambad & Damit, 2016; Tomy & Pardede, 2020). Furthermore, Patuelli et al. (2020) found a substantial correlation between the extent of relational support and the entrepreneur's performance and entrepreneurial intention. A study of the literature considers several research that supports the claim that the quantity and quality of relational support is a critical factor in determining how simple or complex an activity is seen by the person (Adu et al., 2020; Farooq, 2018, 2018; Jena, 2020; Meoli et al., 2020). It is important to note that this concept of relational support greatly influences young entrepreneurs' perceived behavioral control, entrepreneurial intention, and, later on, behavior.

Additionally, Tomy and Pardede (2020) emphasized that relational support may significantly contribute to perceived behavioral control, mobilization of resources, opportunity recognition, tacit knowledge, and technical information needed to launch a new company endeavor. Relational support is hence highly regarded for business venture formation. The following hypothesis is therefore put forth considering the social cognitive career theory.

H6b: Perceived relational support positively impacts perceived behavioral control

Perceived Structural Support and Entrepreneurial Intention

Perceived structured support is the third variable under contextual variables. People today live in broader social, cultural, economic, political, and technical aspects (Barba-Sánchez et al., 2022). Entrepreneurship's contemporary environment is mainly determined by economic and political forces controlled by individuals working in public, private, and non-governmental sectors. Entrepreneurs may face opportunities or risks in such a system. People may exhibit a lesser propensity for entrepreneurship, for example, if there are some hurdles to entrance into the market. However, it would be assumed that individuals are more likely to start a firm if they view

the current circumstances as sufficient and suitable (Esfandiar et al., 2019; Vamvaka et al., 2020).

The government primarily provides structural support for entrepreneurship, and especially this support is needed to inculcate people's positive attitudes toward perceived behavioral control (Thevanes, 2021; Wijayati et al., 2021). Perceived behavioral control of a person will vary depending on how beneficial the support system is and how much support is provided (Ambad & Damit, 2016; Neves & Brito, 2020). To reduce the strain of entrepreneurial start-ups and development on entrepreneurs, there is an urgent need for government help (Mamun et al., 2017). Government support primarily manifests in two ways: first, through the provision of policy support, such as non-profit tax reduction and exemption, and second, through the provision of partial discount loans and service support for problem-solving, such as by streamlining the processes for evaluating entrepreneurial qualifications, expanding the channels for entrepreneurial credit loans, offering technical assistance and training to entrepreneurs, and developing a business interaction platform (Zhang et al., 2022). These many government aid programs directly impact a person's impression of how easy or difficult it is to launch a new business. Therefore, based on the social cognitive career theory, it is assumed that:

H6c: Perceived structural support positively impacts perceived behavioral control

Gender as a Moderator on the Relationship between Entrepreneurial Intention and Nascent Entrepreneurial Behavior

Gender and sex are two distinct notions. Ahl (2006) asserts that gender relates to society's significance to male and female categories. In contrast, sex refers to the biological qualities of men and women (biology, anatomy, and physiology) constructed through social, cultural, and psychological means. Gender is ultimately something one does and performs about others, not just one part of sex (Shinnar et al., 2018).

Female entrepreneurship is essential to boosting the economy and reducing poverty (Anwar et al., 2020). Sadly, statistics reveal that women are less likely to become business owners (Sidratulmunthah et al., 2018; Vracheva et al., 2019). This can be partially related to how entrepreneurship has

historically been viewed as a job for men (Ahl, 2006; Vracheva et al., 2019). Consequently, women often have weakened entrepreneurial intentions (Westhead & Solesvik, 2016). Thus, understanding the role of gender is crucial because it may explain the low start-up rate among women, which may not be due to less entrepreneurship in their hearts or a weak social setting. This study has proposed that gender served as a moderator on entrepreneurial intention and nascent entrepreneurial behavior, considering all prior research on the relationship between gender, entrepreneurial preference, and developing entrepreneurial behavior with the support of social role theory (Eagly, 1987).

Social Role Theory: According to Eagly's social role theory (1987), physical differences, gender roles, and socialization affect how men and women behave. Furthermore, Eagly contended that elements connected to adult social functions significantly impact a person's execution of specific behaviors. Thus, socially imposed gender stereotypes categorize certain professions as primarily feminine or masculine (Anwar et al., 2020; Vracheva et al., 2019).

Despite a rise in female entrepreneurship, empirical research indicates that males are more likely than women to own more and larger enterprises (Adu et al., 2020; Palmer et al., 2021; Vamvaka et al., 2020). (Fernandes et al., 2018; Hatak et al., 2015; Ohanu & Ogbuanya, 2018; Trivedi, 2016). One lens for interpreting these disparities is social role theory (Eagly et al., 2000), which suggests that men and women occupy various social positions. Due to socially imposed gender stereotypes, several professions are stereotyped as held mainly by women or men. People should strive for careers that are socially acceptable for their gender, according to Maheshwari (2021). These stereotypes are not only prescriptive, indicating how men and women "should" behave, but also descriptive, indicating the disparities between men and women (Arafat & Saleem, 2017).

According to socially conditioned conceptions, entrepreneurship has always been seen as a manly profession (Ahl, 2006) that requires aggressiveness, competition, and risk-taking (González-López et al., 2021). Therefore, the possibilities and incentives people encounter while pursuing particular careers might be influenced by widely held notions about gender roles. The gendered nature of an entrepreneurial profession can also affect how female entrepreneurs interact with different service providers, such as lenders, and,

as a result, restrict women's access to the resources or family support they need to be successful as entrepreneurs (Armuna et al., 2020).

Moreover, women may also experience more significant business-family conflict than males (Zhang et al., 2019), leading them to see the environment as complex and unsuited for entrepreneurship (Dao et al., 2021). According to Jena (2020), "women tend to regard themselves and their business environment in a less favorable light than males" and "perceive the entrepreneurial position as being less adequate for them" (Tseng et al., 2022). Further, Paray and Kumar (2020) stated that socially imposed gender roles and gender differences might contribute to comparatively low entrepreneurial ambition among women. Therefore, several research (Hatak et al., 2015; Liguori et al., 2018; Neves & Brito, 2020; Ohanu & Ogbuanya, 2018; Palmer et al., 2021; Tsai et al., 2016; Vamvaka et al., 2020) discovered variations in entrepreneurial intention and entrepreneurial behavior between the gender.

The issue of how likely it is for women with good intentions to follow through on those plans by starting businesses is still largely unresolved. It is still unknown how gender influences the developing relationship between intention and behavior. As a result, this study has concluded that further research has to be done on gender roles. This study aims to investigate the role of gender in the relationship between entrepreneurial intention and nascent entrepreneurial behavior. It is expected that gender moderates this relationship, making it more significant for males than for women.

This study has analyzed the literature on the theory of planned behavior, highlighting the connection between entrepreneurial intention and behavior to create the baseline hypothesis of the direct relationship between entrepreneurial intention and behavior. Thus, this study contributed by examining gender as a moderator in Ajzen's (1991) intention-behavior relationship, which drew on social role theory (Eagly, 1987). Despite the number of women starting businesses rising, data from many nations typically points to a persisting gender gap in business ownership (Kumar et al., 2020; Sidratulmunthah et al., 2018; Vracheva et al., 2019). Understanding the underlying causes of this imbalance is necessary to address it; therefore, based on social role theory, this study has established the following hypothesis on the moderating effect of gender in the relationship between entrepreneurial intention and nascent entrepreneurial behavior.

H7: Gender moderates the relationship between entrepreneurial intention and nascent entrepreneurial behavior such that the relationship is more vital for men than women

Entrepreneurial Family Background as a Control Variable of the Study

People with an entrepreneurial family history are those whose parents or other family members are self-employed (Bogatyreva et al., 2019). According to several pieces of evidence in the literature on student entrepreneurship, students with a family business background come from a particular familial context that may have an impact on their future career intentions and increase their propensity to turn these intentions into actual behaviors (Liguori et al., 2018; Jena, 2020; Dao et al., 2021). According to empirical research by various scholars (González-López et al., 2021; Maheshwari, 2021; Shrivastava & Acharya, 2021), parental experience has a considerable influence on children's entrepreneurial intention and nascent behavior.

Also noted by Kaki et al. (2022) is the importance of earlier entrepreneurial experience as a predictor of self-employment, such as having parents who are independent business owners. For instance, by providing social capital, such as connections with vendors, business partners, and clients, parents who are also company owners can impact their children's career choices in entrepreneurship. In other words, while attempting to launch a new business, aspirant student entrepreneurs may profit from their parents' networks (Leiva et al., 2021). Comparatively to their universities, which also want to be entrepreneurs but lack the diversity of resources from family business experience, this robust network offers them an advantage in turning intentions into deeds. Growing up in an entrepreneurial environment provides the chance to learn from self-employed parents who serve as role models (Leiva et al., 2021; Patuelli et al., 2020; Vracheva et al., 2019), fostering positive attitudes toward engaging in entrepreneurial activities as well as positive beliefs about a career in entrepreneurship. Children of these entrepreneurial parents may grow up wanting to start their businesses and being driven not to face challenges during their start-up preparation stage.

In addition, having experience in a family business gives individuals insight into entrepreneurial activity and the decision-making process (Onjewu et al., 2022), which makes it simpler to move from entrepreneurial intentions to actions because those who have this knowledge will be less afraid of failing. Additionally, parents frequently help their children by transferring money (Fernandes et al., 2018) and giving them opportunities to develop their human capital (Ohanu & Ogbuanya, 2018). Because of the resources and options available, aspiring student entrepreneurs may feel more confident because of the additional resources provided by the family (Ajzen, 2011)

Not only that, but families with businesses are also more likely to emotionally support their children's entrepreneurial endeavors, establishing a favorable subjective norm and supporting their career choices. This is in addition to providing help with various resources. Evidence reveals that people are more likely to turn their entrepreneurial ideas into start-up activities when they perceive support from their family and social networks (Jena, 2020; Kaki et al., 2022; Zhang et al., 2022). The likelihood of both entrepreneurial intents and start-up action is increased by a personal network of strong supporting links and high entrepreneurial self-efficacy, which may also emerge from family company experience (Fernandes et al., 2018; Bogatyreva et al., 2019; Palmer et al., 2021).

Thus, entrepreneurial family support needs to be controlled to determine the nexus between personality traits, contextual factors, entrepreneurial intention antecedents, and people's nascent entrepreneurial behavior. As a result, the control variable in this study is determined to be the entrepreneurial family background.

Thus, the first objective, ‘To present literature to show the interconnection between variables with the support of past literature,’ is achieved as above.

PROPOSED CONCEPTUAL FRAMEWORK

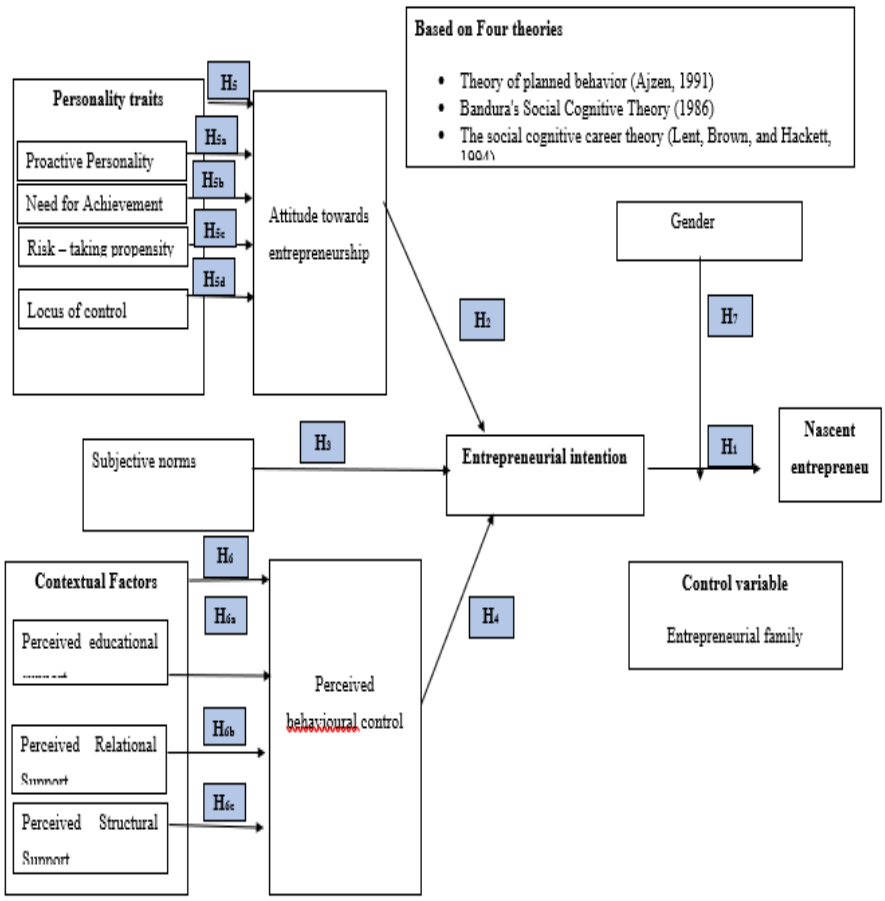
A result of this study's seven hypotheses and sub-hypotheses should be systematically and empirically tested to contribute to the existing knowledge of entrepreneurial intention and nascent entrepreneurial behavior. Moreover, based on the seven hypotheses, the proposed conceptual framework with 14 variables is presented in Figure 1: A proposed conceptual framework of the study.

The second objective, 'To propose a conceptual framework integrating the personality traits, contextual factors, antecedents of entrepreneurial intention, nascent entrepreneurial behavior, gender, and participants' entrepreneurial family background,' is also achieved as above.

CONCLUSION

In Management, Entrepreneurship is an exciting and critical construct. The primary purpose of this study is to develop a conceptual framework integrating personality traits, contextual factors, antecedents of entrepreneurial intention, and nascent entrepreneurial behavior with moderating effects of gender. Seven hypotheses and seven sub-hypotheses are formulated using a desk research strategy. Finally, A conceptual framework with 14 variables considering seven hypotheses and seven sub-hypotheses based on four theories is developed. This study report has significant ramifications for future scholars because no integrated model considers four theories inside a single conceptual framework, both locally and internationally.

Figure 1: A Proposed Conceptual Framework of the Study



Source: Author Developed, 2022

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SUSTAINABLE FACILITIES MANAGEMENT FRAMEWORK FOR SRI LANKAN CONSTRUCTION INDUSTRY

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ABSTRACT

There are numerous definitions of sustainable development, but the most frequently cited definition comes from "Our Common Future", is the Sri Lankan construction industry moving towards a sustainable future? This can be considered a topic worth rigorous investigation. Sustainability does not impose a constraint on the construction industry, the building sector has a substantial global potential to help protect the environment, which is lacking in Sri Lanka and further, it will resolve the current energy crisis up to a certain extent facilities management specialists in Sri-Lanka have realised the importance of their work in the development of sustainable structures, method of providing a solution to the aforementioned problems

The existing literature reveals a deficiency in theoretical and empirical knowledge on the use of sustainable buildings in the construction industry. Therefore, the research therefore aims to develop a framework that can be used to achieve sustainable buildings in Sri Lanka, through the facilities manager's role. As a result, four objectives were set for the research.

This study's methodology combines a literature review with an interview, and content analysis of relevant literature, through a systematic approach. Following this, a questionnaire and interview survey was conducted for data collection(purposive sampling method and simple random sampling method to be used for data collection with facilities managerswho are registered members of the Institute of Facilities Management Sri Lanka - IFMSL). Further, the proposed framework will be validated and tested on an actualconstruction by adopting field research methodologies.

The developed framework can be used as a no prescriptive guide by facilities managers in achieving sustainable buildings in Sri Lanka. This framework improves knowledge and comprehension of what makes a sustainable building as well as the facilities manager's contribution to the creation of sustainable buildings at the

design, construction, and operation stages. Further, the study will give an understanding of the need for sustainable building, and knowledge of constituents that make a sustainable building in order to encourage the drivers and mitigate the barriers to sustainable building practice in the Sri Lankan construction industry.

Keywords: Sustainable Development (SD); Facilities Management (FM); Sustainable Building (SB); Sustainable Building Construction (SBC);

Sustainability

INTRODUCTION

The construction industry consumes almost 40% of all-natural resources and generates 40% of all waste and greenhouse emissions (Tzourmakliotou, 2021). Buildings consume up to 45 per cent of all produced energy to power air conditioning and heating (Reed et al., 2011). Constructions also consume one-sixth of the world's freshwater, a quarter of all wood harvested, and two-fifths of all material and energy flows (Emmanuel, 2004). The construction industry consumes more than 40% of the world's raw materials and accounts for 40% to 50% of greenhouse gas emissions (Huang et al., 2017). The worldwide community is devoting all of its resources to addressing challenges like biodiversity loss and local community dangers to people's health and well-being as a result of these growing concerns (Bell & Cheung, 2009; Constantinescu & Platon, 2014). As a result, understanding the environmental challenges surrounding the construction industry in Sri Lanka is significant, given that the building sector is critical to the country's economic and physical progress, accounting for the fourth most important industry in the economy (Central Bank of Sri Lanka, 2017). Therefore, the building industry is a major candidate for sustainable developments (SD). Despite the built environment's rapid contribution to resource depletion, waste generation, and energy consumption (Emmanuel, 2004). Furthermore, in order to achieve SD, green building practices must be used to manage construction waste (Hamid & Kamar, 2012).

The SD movement was raised even in 21st-century development discourse. Despite the popularity, it has gathered over the years, Sri Lanka, similarly to other countries, is focusing on achieving sustainability in the construction industry (Munasinghe, 2019), but due to the activities of the construction industry and other sectors, the state of attaining sustainability needs improvements (Athapaththu & Karunasena, 2016). Further, sustainability does not impose a constraint on the construction industry but the building

sector has a substantial global potential to help protect the environment,

which is lacking in Sri Lanka (Ranathungage, et al., 2018 and Kulathunga, et al., 2018).

The COVID-19 epidemic has had a devastating effect on Sri Lanka's construction sector, which has a direct bearing on the country's economy (Marwah & Ramanayake, 2021). In order to guarantee long-term growth in the local context and streamline upcoming projects with the development needs and sustainable goals, it is crucial to rebuild the sector's crumbling pillars that were caused by the COVID-19 pandemic (Hewawasam & Matsui, 2019). Further, the economic crisis has led to a material shortage inthe building construction sector (Daily News, 2022), which has led to a vitalfact to focus this evaluation on the use of sustainable development constituents (Ranaweera, 2010 and Munasinghe, 2009).

Despite the fact that SD has many definitions by various authors, it is clear that the Brundtland Report provided a globally accepted definition of SD. The definitions above are based on the widely cited Brundtland Report, which defines SD as meeting the needs of the current generation without jeopardising future generations' ability to meet their own needs (WCED, 1987). The Brundtland report points out the interconnecting nature of the environment, economy, and social issues and aspects. Further, Burndland's report offered an arguable definition of SD, which is a concise definition of SD offered in what is arguably the most crucial document of the second half of the century (Brooks, 1990).

In order to increase performance, sustainable construction requires adhering to best practices for material selection, sourcing, and construction methods as well as a design ethos. Decrease the environmental burden of the project, reduce waste, and be more environmentally friendly while taking environmental, socioeconomic, and cultural values into account (Matar et al., 2008.). According to (Olaniyi, 2017), it is the completion point of SD.

This has resulted in the growth of SD's environmental, economic, and social dimensions. The environmental element involves protecting natural resources, preserving ecosystems, and assessing the ecological impact of economic progress. Economic growth, resource sustenance, limiting the depletion of renewable resources, and decreasing the use of nonrenewable resources are all aspects of the economic element. The social component includes eliminating poverty, ensuring proper population growth, and

providing enough social services like medical services and general human wellbeing (Pânzaru & Dragomir, 2012 and Harris, 2003).

This has resulted in the Brundtland Report, which acknowledges that the environment is necessary for human security and basic survival (WCED, 1987). The environment should be preserved in such a way that subsequent generations can benefit from it. But no one has taken enough precautions toprotect it. (Brandon & Lombardi, 2009).When it was clear that human activity was making the world's environmental situation worse, the necessity for SD became obvious. These activities include construction and technological advancement, with little or no consideration for generations ahead (Maiellaro, 2001). Environmental and economic development building sector activities have shown the involvement of buildings in the degradation of the natural environment (Mora et al., 2011). The construction industry consumes a large proportion of the world's nonrenewable resources, making it one of the least sustainable industries (Edwards, 2010). Despite its negative environmental effect, the construction industry plays an essential role in reaching SD (Gibberd, 2002). It addresses fundamental human requirements such as housing, access to services and entertainment, healthy living, and social infrastructure (Sinha et al., 2013 and Shah, 2007). According to Du Plessis (2007), the industry faces a huge problem in fulfilling the growing urbanisation and demand for suitable housing, as well as in doing so in a way that is both socially and environmentally acceptable. In order to achieve the objectives of boosting economic efficiency, safeguarding and restoring natural systems, and enhancing human well-being, it is therefore becoming a crucial issue for construction specialists in the business (Sinha et al., 2013). Public awareness of sustainable building practices has never been higher. People are starting to prefer to reside in and work in attractive, healthy, and energy-saving features buildings (Gupta et al., 2016).

As a result, attempts to achieve SD have encouraged specialists in the built environment to undertake efforts to eliminate behaviours that hurt the environment. It has heightened attention in environmentally friendly structures. Includes integrating economic, social, and environmental considerations into the phases of building planning, construction, and demolition (Kibert, 1994 +and Ibrahim et al, 2013). Du Plessis (2002), Sustainable construction is often defined as a process in which the fundamentals of SD are implemented to the construction project life cycle,

from raw material extraction to planning the building, design, and fabrication, and even dismantlement. Such definitions demonstrate that sustainable construction addresses not only the construction activities but also the design and demolition stages, with the goal of minimising environmental impact. The positive influence of sustainable building on the physical environment is pushing green construction to the forefront. As a result, the introduction of sustainable buildings as it pertains to the quality and attributes of the actual building created using sustainable construction guidelines. Green building has resulted from the processes of sustainable building design. (Sev, 2009). Sustainable buildings entail processes in which government and non-governmental organisations develop policies to support sustainable buildings (UNEP, 2009). As a result, understanding the effects of SD in the construction sector is unavoidable. SB's are environmentally friendly during the design, construction, operation, and destruction stages. Dimoudi and Tompa (2008), Insist that a building can only be fully sustainable if sustainable building practices are used throughout the entire construction process. However, the stage of operations, which is the longest in the life cycle of a building, has by far the highest environmental effect (Shah 2007). Therefore, the impact is created by energy consumption and carbon emissions, and the operating period of buildings has the most negative influence on the environment (Abigo et al., 2012).

Sustainability in the construction business is dependent on the decisions made by a variety of persons involved in the building process, such as governments, owners, managers, professionals, and so on (Abidin, 2010). Studies show that the facilities manager (FM) plays a critical role in achieving sustainability in the built environment, which includes the buildings' low environmental impact and the comfort of their occupants. (Shah, 2007 and Mohammed & Hassanain, 2010). The facilities manager, as a professional with knowledge in building management, may help in the attainment of sustainable buildings (Shah, 2007). As a response, the need for the construction sector to meet SD's requirements for creating a sustainable environment has prompted the development of SB's, which may be accomplished through the role of the facilities manager. Thus, the theoretical framework for this research investigation is established.

FM as a profession has been defined by many authors, as a practice that provides quality overall operations of buildings, encompassing a wide range

of activities ranging from tactical operational planning to regular physical repairs, cleaning, and the oversight of environmental performance issues (FMAA, 2019; EuroFM, 2014 and IFMA, 2014). The function of the FM inbuilding management is investigated because it is the facilities managers who remain the longest with the building. Other building professionals, such as architects, project managers, structural engineers, mechanical and electrical engineers, and so on, spend a limited amount of time throughout the building's life cycle, beginning with design and ending with completion. On the contrary, the facilities manager starts his work at the design phase by offering recommendations on how to ensure a facility's sustainability all through life-cycle stages as well as the comfort of the building's occupants (Mohammed & Hassanain, 2010). As a result, the researcher thinks that FM experts in Sri Lanka have recognised the role they can play in the development of SB's to provide a solution to the difficulties described above.

The limited literature on SD and sustainable constituents used in the construction industry does not have a solid analytical and theoretical framework to support the knowledge obtained by the scholars through systematic research work in this field. Also, there is no literature on sustainable facilities manager's framework in relation to the Sri Lankan construction industry. In order to attain sustainable structures in Sri Lanka, the aim of this research is to provide a framework that can be used as a non-prescriptive guide, outlining actions that facilities managers need to take during the design, construction, and operations stages of the building life-cycle. In the design, construction, and operation phases of a building's life cycle, this study evaluates the facilities manager's function in relation to sustainable building components. Additionally, the study focuses on how facilities managers may create sustainable buildings that meet the demands of building occupants; this is an area of FM in Sri Lanka that has been overlooked in earlier research.

THE OBJECTIVE OF THE STUDY

This research aims at developing a sustainable facilities manager's framework to achieve SB's through their role in Sri Lanka. Therefore, to achieve the said aim, objectives were set as below.

1. Identify SB aspects and recognised SB standards with reference to literature.
2. Assess the role of facilities managers in SB life-cycle.

3. Evaluate the perception of facilities manager's role in relation totheir competence in achieving SB's.
4. Develop and validate a sustainable facilities management framework for SB practice for facilities managers in Sri Lanka.

However, in order to achieve the above, there is a need to address the below questions:

1. What constitutes sustainable buildings?
2. What is the current facilities manager's role in achieving sustainablebuildings?
3. Are facilities managers in Sri Lanka competent in their roles in achieving sustainable buildings?
4. What is the need for a sustainable facilities manager's framework for the Sri Lankan construction industry?

LITERATURE REVIEW

The Brundtland report emphasises the interconnected nature of environmental, economic, and societal factors (Burton, 1987). This approach identified that it is critical to harmonise the three aforementioned detentions in order to operationalize SD (Munasinghe 2009 and Burton, 1987). Previous studies on sustainable indicators and constitutes (Ugwu & Haupt, 2007) highlight the importance of a national strategy that is specific to each nation in achieving sustainability in the construction industry, which is mostly driven by professionals and contractors (Athapaththu & Karunasena, 2018). Therefore, this study concentrates on selected SD constituents and tools in the construction industry, with reference to previous studies.

The function of the facilities manager was also utilised in Sri Lanka's sustainable construction practices to produce structures that adhere to sustainability requirements. This research study examines the role facilities managers' play in the design, construction, and operations phases despite the fact that in Sri Lanka they are frequently not involved in a building project until the beginning of the operations stage. Studies have shown that the facilities manager's role begins at the design phase and continues through the building phase, where it is crucial. Further, it has been noted that it is particularly crucial during the operations stage since this phase of the building life cycle is the longest and most significant (Shah, 2007) in the life cycle of a building. As a result, it is clear that facilities managers have the

most experience managing buildings during the design, construction, and operation stages. However, due to building users' concerns about a more sustainable environment and the need to meet their demands for comfort and health, this research examines the facilities manager's role in the management of buildings and their related services. To accomplish the goal mentioned above, the below steps were taken for the literature review:

- Step 1-literature review and content analysis on SB's.
- Step 2-literature review and content analysis on the role of facilitiesmanagers in SB's.
- Step 3- developing a conceptual model by recognising facilities managers' attitudes about sustainable construction in Sri Lanka, as well as evaluating facilities managers' perceptions toward theirintellectual ability in achieving SB's, are all discussed. This was accomplished through a literature review as well as an interview questionnaire survey.
- Step 4-improving and validating the developed sustainable FMframework in the pursuit of SB's by highly experienced facilities managers and by implementing the framework in an actual project.
- Step 5- identification of the research area: the rationale for the needfor a sustainable FM framework.
- Step 6- conclusion, recommendations and feature works.

Further, there is a small amount of evidence in relation to aspects of SB's and also there is limited literature on achieving SB's through the role of facilities management. As a result, this study will present documented evidence of SB characteristics as well as how the facilities manager's role helps to achieve SB's.

METHODOLOGY

This Research discusses the research framework which consists of three stages as below:

- Stage 1- Review of pertinent writings on sustainable structures andthe roles of FM in relation to sustainable structures, using content analysis of 3 documents on sustainable building constituents and 4 documents on FM roles were studied. Further, the development of a conceptual framework that shows the facilities manager's role in the design, construction and operations stages in

SB's.

- Stage 2- consists of two steps: 15 facilities managers with relevant experience were interviewed, and the results of the questionnaire survey were investigated by 137 members of the Institute of Facilities Management in Sri Lanka.
- Stage 3- involves utilising the developed framework on a construction project in order to further develop and validate it.

Field Research, Archival Research and Digital Research Relevance to selected research topic and methodology having chosen mixed methods as an appropriate methodology for this research study, this section goes over appropriate research methods. According to Denscombe (2010), research methods are tools for gathering empirical data for research. Documents, interviews, observations, and questionnaires are the four main categories of tools or instruments. Documents, interviews, and questionnaires were used to collect data for this study. The exploratory design method was required for the research study, which entailed collecting qualitative data first, followed by quantitative data. The qualitative research aspect is discussed inthis document. It will be discussed below:

Stage1- Literature Review, Content Analysis and Development of the Framework of the Research.

Stage1-Step1- Literature Review:

The objective of this stage is to describe the various phenomena surrounding SB achievement and the role of the facilities manager in SB's. To collect asmuch information on SB constituents as possible, the research will begin with a collection of qualitative data from relevant documents and literature in sustainable building construction (SBC). The purposive sampling method was used for this stage of the research, which is usually appropriate for selecting cases that are informative to research (Neuman, 2011). In this stage archival and digital research methods were used to select to identify details of the below aspects.

- SB constitutes in the history of SD definitions
- Impact of SD on the construction industry
- Sustainable construction
- SB definitions and SB constituents
- FM role in SB and conceptual framework

- SB in the Sri Lankan context

This stage involves the selection of literature from a variety of sources which will include books, conference proceedings, websites, and databases such as Silence Direct, Elsevier, Discovery, and Ensco. It will also include a search in various journals namely. The study will start with a general review of related literature and then adopt a systematic approach to relevant literature to fulfil the aim of the study. The basis of literature selection included a keyword search for 'sustainable building'. Literature selection will also be based on the literature's relevance to the study, the currency of the paper and quality of the content on above-mentioned archival and digital research methods.

Stage 1-Step 2- Content Analysis:

The research has revealed various approaches for analysing textual data (Marshall & Rossman, 2014; Neuman, 2011). The content analysis method was used for the analysis of the selected documents as it involved evaluating text - based data from the chosen documents in order to identify the SB and FM role criteria in SB's. Rather than determining the frequency of words, the content analysis involved identifying themes. Because the SBC were described in rich text with detailed information, word frequency was deemed insufficient for analysing the content of the documents. Content analysis is a technique for identifying themes in textual data that can be accomplished with qualitative data analysis software (Bazelay & Jackson, 2013). Qualitative data analysis software has been developed to aid in the easy processing, structuring, and evaluation of large quantities of text or other data, as well as in the management of the resulting interpretations and reviews (Creswell, 2014). As a result, the QSR NVivo, a qualitative data analysis software developed by 'QSR International,' was used in this study to examine the information of the documents (Bazelay & Jackson, 2013).

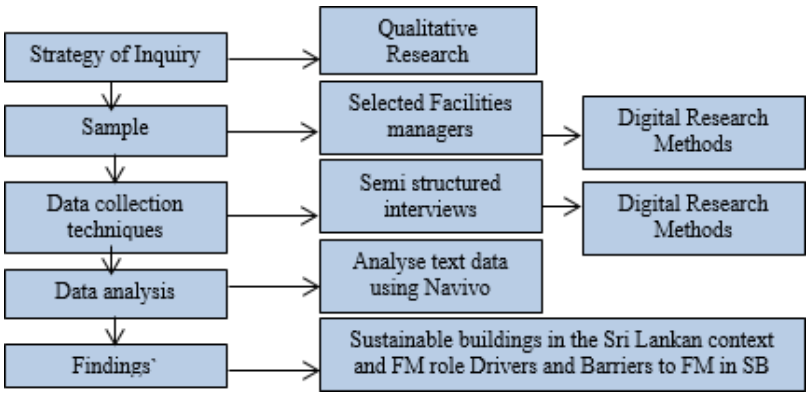
Stage 2- Interviews and Questionnaire

Survey.Stage 2- Step 1-Interviews:

Interviews will be considered appropriate in gaining insights into identifying SBC in Sri Lanka in the view of facilities managers and the facilities manager's role and the barriers and drivers to their role in SB in Sri Lanka. Conducting interviews, transcribing the interviews, and analysing the interviews are steps in this stage.as in Figure 1 (Patton, 2002 and Oppenheim, 2000). The following sections describe the method of the sample chosen, the type of interview conducted and the method of data

collected in relation to the use of digital research methods. Sample of study for interviews of the research will adopt a qualitative approach and choose anonprobability sampling method called the purposive sampling method (Neuman, 2011). Institute of Facilities Management In Sri Lanka (IFMSL) will be approached and requested by facilities managers who have been working for a reasonably long period of time in FM companies that are in Sri Lanka and that have shown an interest in the areas of sustainability in construction and are presently working on and has ongoing similar projects, was made by the researcher. Using their membership database, IFMSL selected members in the aforementioned category and after which participants will be approached via email and asked to show their interest in participating in the interviews by responding to the email by use of digital research methods. The interviews will take place at various times, and each one will be noted by the video conference software and manually recorded into Microsoft Word by the researcher. The interview questions will be based on issues identified in the literature review and document analysis to determine whether facilities managers understand the concept of SB and their roles within it. Interviews will be conducted via online interviews, fulfilling the questions which were categorized accordingly to gain answers to research objectives. Digital research methods such as "Zoom" and "WhatsApp" cloud-based video conferencing service programs will be used to conduct the interviews (Gray et al., 2020 and, Gilbert, 2002).

Figure 1: Research Design for Stage 2: Step 1



Source: Constructed by the Researcher

The disadvantage of being impractical in digital video conferencing will be mitigated due to the prevailing COVID-19 pandemic situation (Ranasinghe

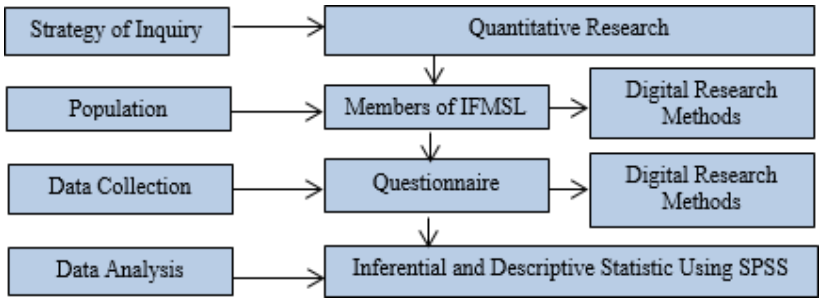
al., 2020). Further, the selected interviewers (IFMSL members) offices based in city limits, will be a minimum disturbance in the transmission-related issues (Haththotuwa & Rupasinghe, 2021).

Stage 2-Step 2- Questionnaire Survey:

The observations of the data obtained from the interviews and documents were used to create a questionnaire which was distributed to IFMSL members who are facility managers. They are expected to be able to answer questions about what constitutes an SB in Sri Lanka, as well as recognize the current role which facilities managers play in accomplishing SB and whether they are knowledgeable in this role. Researchers create questionnaire surveys to provide a quantitative or numerical description of trends, attitudes, or opinions in a population by studying a sample of that population (Creswell, 2014). Figure 2 shows the methodological approach at this stage, which discusses the third and fourth objectives of the research study. The sections that follow describe the sample method chosen, the type of interview conducted, and the data collection technique using simple random sampling and digital research methods. As in Figure 2 The IFMSL's registered members were the target audience for the questionnaires. Email addresses taken from the IFMA Sri Lanka register will be used to contact participants, as stated above. The questionnaires were to be filled out and returned via the email address provided by the participant, along with the completed questionnaires. They had a certain amount of time to complete the questionnaires. As per Cooper and Emory (1995), the response rate for self-administered surveys is typically higher than for postal or telephone surveys. As a result, it is anticipated that a higher percentage of questionnaires will be returned via email.

The rationale to use digital research method on sample selection from IFMSL database; the registers' current state, the availability of extensive information therein, saving time in gathering participant information, such as email addresses to which questionnaires will be sent. It is convenient as the above information will be available on the web page of IFMSL.

Figure 2: Research Design for Stage 2: Step 2



Source: Constructed by the Researcher

Stage 3- Development and Validation of Framework to Facilities Managers in achieving Sustainable Buildings, the Research Aimed at Developing a Framework for Facilities Managers to embed their Practice to achieving Sustainable Buildings.

Stage3- Step 1- Questionnaire Surveyor:

A framework can be validated by soliciting expert opinions and feedback (Hanson, 1999) and which could be accomplished through a qualitative or quantitative approach (Shaw, 1999). FM experts in Sri Lanka will validate the developed framework for this research by participating in a questionnaire surveyor that reflects all aspects of the research. The validation process started by identifying potential participants which involved FM experts who are viewed as qualified to help in validating the framework, by the use of purposive sampling method for data collection with twenty highly experienced facilities managers who are registered members of the IFMSL. The sample study was selected by IFMSL database as their detailed information will be available in the registers on their webpage. The participants were contacted through email initially and later the questionnaires were sent to assigned participants through email and sent backcompleting the questionnaires attached to their email addresses which they will receive.

Stage3-Step 2- Field Study:

The findings of the questionnaire survey will be integrated into the conceptual framework, and it will be validated further by trying to incorporate the framework on building projects from beginning to construction completion using the Field research method.

CONCLUSION

The building industry has developed sustainable practices in a bid to reduce the negative impact on the environment. The studies have highlighted buildings as a major contributor to greenhouse gases, and the major consumption of scarce resources. SB's have indeed been defined in the literature as structures that use resources and energy effectively, reduce emissions of greenhouse gases and encourage occupant health by offering quality indoor air and thermal, aesthetic, and acoustic comfort. Research has also disclosed the sustainable practices employed by facility managers in their efforts to achieve SB's. Based on the anticipated findings listed above, this study seeks to present the findings' conclusions in relation to the study's objectives.

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ENERGY POVERTY AND DEVELOPMENT OF SOLAR POWER AS A SUSTAINABLE ENERGYSOURCE: A STUDY BASED ON CUSTOMER PERSPECTIVES OF SRI LANKA

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ABSTRACT

Lack of opportunities to access energy services and products, deficiency of electricity to assist the socio-economic development, incompetency to reach quality standards in domestic energy services like cooking, space heating and cooling, use appliances and IT-related material. On the other side, sustainable development can be described as the capacity to withstand natural systems in order to deliver the resources and ecosystem services that are essential to the economy and society. Since energy crisis in Sri Lanka is getting worst, people are experiencing a deficiency of hydroelectricity and natural gas daily. Hence, Sri Lanka should look for alternative energy sources to sustain the economy. Out of many energy sources, the researcher identified solar energy as the best source to produce electricity need of the country. Therefore, this can be considered a topic worth rigorous investigation.

The existing literature reveals a deficiency in theoretical and empirical knowledge on the usage of solar power as a sustainable energy. Therefore, the researcher aims to design a sound framework to develop solar power as sustainable energy source in Sri Lanka. To do that, the researcher introduced four objectives for this research.

Having identified variables thrugh literature survey, a theoretical framework was developed indicating the relationships between variables. Theoretical framework was then operationalized associating relevant dimensions. As this research follows positivist and deductive approaches, Likert Scale will be used to formulate questionnaire to collect data quantitatively.

Key Words: Energy Poverty, Renewable Energy, Solar Power, Sustainable Energy Source

INTRODUCTION

Energy poverty can be defined as a dearth of opportunities to access sustainable energy services and products (Habitat for Humanity, 2021). Berry (2018) states that in daily life, energy provides many services for people like heating, lighting, food preparation, air conditioning, and refrigerating, etc. However, in the presence of energy poverty, many households find it difficult to obtain these services at their convenience. Moreover, some energy policies encourage authorities to raise electricity tariffs which often weakens the general public's ability to use electricity as they wish (Parry et al., 2005; Fullerton, 2008). In addition, energy poverty can be observed in all circumstances where there is a shortage of reasonably priced, trustworthy, quality, safe, and ecologically sound energy services. Low-income people often find it difficult to afford high energy costs, therefore they opt to live in houses with low energy efficiency. Though Sri Lanka is said to be one of the countries that met 100% grid electricity, many cannot afford it due to the high cost of electricity, vulnerability to energy insecurity and low reliability (Kumarawadu, 2018). It is a fact that Sri Lanka first used solar photovoltaic (PV) technology in 1970 to electrify the population in dark, however, the usage of solar power in Sri Lanka is yet in the primitive age. Up until the Sri Lankan Electricity Board established the Energy Unit in 1980, the Sri Lankan government had not ventured to promote solar photovoltaics to electrify rural domestics (Gunaratne, 1994). Despite the governments' aim to enhance the use of solar PV to reduce energy poverty, there is relatively less intent in the Sri Lankan community to use solar PV to meet the impending energy crisis in the world (Obeng et al., 2008).

PROBLEM STATEMENT

As per existing statistics, solar power can produce 32% of Sri Lanka's annual power demand that is approximately about 10,500 gigawatts, however, thus far 0.01% of that capacity has been produced, as per the Sri Lanka energy sector development plan for 2015-2025 (Perera, 2016). Being aware of the impending power crisis in the world, it is surprising to witness the the reaction of the Government of Sri Lanka (GoSL) in this regard. Hydroelectricity power crisis generally occurs when there is a shortage of rain that leads to low levels of water in the hydro dams. Having experienced that, the Public Utilities Commission of Sri Lanka (PUCSL) has taken an initiative to turn off the national grid to preserve power for essential services.

While reviewing the literature, it was realized that Sri Lanka has become a country that sufficiently reached 100% hydroelectricity a few years before.

However, due to power shedding for over five years on a daily basis and high per-unit electricity cost, many people struggle to use electricity as they wish. Therefore, many use electricity with care or light only one bulb during night. Some others use kerosene oil to light up their houses as they cannot afford high electricity costs. Recently, the price of kerosene oil in Sri Lanka has increased from Rs. 87/- to Rs. 340/-, which is an increment by 391% (Nilar, 2022). Hence, the researcher is of the opinion that Sri Lanka should promote solar energy to generate electricity for the countrymen. Solar power is a technology that converts photons into electrons to produce direct current. With that motive, Sri Lanka has joined hands with the Asian Development Bank (ADB) to enhance the use of solar power to generate electricity for the whole country and to comply with the Paris Agreement on climate change. GoSL envisions 1000 megawatts of solar power generation capacity by 2025 using the rooftops of businesses and homes (Asian Development Bank, 2021). Given that, ADB has granted an approved for $50 million loan for Sri Lanka's Rooftop Solar Power Generation Project in 2017, however, the usage of solar power in Sri Lanka yet remains in its primitive age. In the year 2016, the GoSL launched a Rooftop Solar PV Programme named "Sooryabala Sangramaya" to generate solar power to export the excess energy to the grid at a tariff of Rs. 22/= per kWh during the first seven years and Rs. 15.50 per kWh during the remaining thirteen years (Sri Lanka Sustainable Energy Authority, 2021). But these are yet to come into reality.

As of 2022, the electricity tariff was increased dramatically for Domestic and Religious and Charitable Institutions as follows.

Table 1: Increased Tariff Applicable to Domestic, Religious and Charitable Institutions

Consumptionpeí month (fiWh)	Blocfi	Eneígy Chaíge (LKR/fiWh)	Ïixed Chaíge (LKR/month)
Domestic Categoíy			
Consumpl'ion 0 – 60	0 – 30	8.00	120.00
	31 – 60	10.00	240.00
Consumpl'ion above 60	0 – 60	16.00	N/A
	61 – 90	16.00	360.00

	91 – 180	50.00	960.00
	Above 180	75.00	1500.00
Opl'ionall'imes	Day (05.30 – 18.30)	70.00	
	Peak (18.30 – 22.30)	90.00	
	Off Peak (22.30 –0530)	30.00	1500.00
Religious and Charitable Institutions			
Consumption	0 – 30	8.00	90.00
	31 – 90	15.00	
	91 – 120	20.00	120.00
	121 – 180	30.00	150.00
	Above 180	65.00	1500.00

Source: CEB (2022)

Moreover, three different rates were introduced to Industrial, General Purpose, Hotel, Government, Street Lighting and Agricultural Sector sectors and the same is given below.

Table 2: Tariff applicable for Industrial, General Purpose, Hotel, Government, Street Lighting and Agricultural Sector sectors

OTHER CONSUMER CATEGORIES			Industrial		General Purpose / Hotel / Government	
			IP 1-1	IP 1-2	GP 1-1 / H 1-1 / GV 1-1	GP 1-2 / H 1-2 / GV 1-2
Rate 1 Supply at 400/230V Contract demand <= 42kVA	Volume differentiated monthly consumption		*For ≤ 300 kWh/month*	*For > 300 kWh/month*	*For ≤ 180 kWh/month*	*For > 180 kWh/month*
	Energy Charge (Rs. /kWh)		20.00	20.00	25.00	32.00
	Fixed Charge (Rs. /Month)		960.00	1500.00	360.00	1500.00
Rate 2 Supply at 400/230V Contract demand > 42 kVA	Energy Charge (Rs. /kWh)	Day (05:30 – 18:30 hrs)	29.00			
		Peak (18:30 – 22:30 hrs)	34.50			
		Off Peak (22:30 – 05:30 hrs)	15.00			
	Demand Charge (Rs. /kVA)		1500.00			
	Fixed Charge (Rs. /Month)		4000.00			
Rate 3 Supply at 11 kV & above	Energy Charge (Rs. /kWh)	Day (05:30 – 18:30 hrs)	28.00			
		Peak (18:30 – 22:30 hrs)	34.00			
		Off Peak (22:30 – 05:30 hrs)	14.00			
	Demand Charge (Rs. /kVA)		1400.00			
	Fixed Charge (Rs. /Month)		4000.00			
STREET LIGHTING (Rs. /kWh)			22.00			
AGRICULTURE - Optional Time of Use Electricity Tariff						
			Energy Charge (Rs. /kWh)		**Fixed Charge (Rs. /Month)**	
Rate 1 Supply at 400/230V Contract demand <= 42 kVA		Day (05:30 – 18:30 hrs)	20.00		1500.00	
		Peak (18:30 – 22:30 hrs)	35.00			
		Off Peak (22:30 – 05:30 hrs)	15.00			

Source: CEB (2022)

Considering the current situation, Sri Lanka should venture into an alternative source of electricity generation and ideal option is solar power. Though initial investment is high, benefits receive in the longer run as people can use the electricity on free of charge basis while transmitting the excess energy to the national grid to earn additional incomes. By conducting this research, the researcher intends to promote solar energy in Sri Lanka with the mediation of the GoSL. This will provide a solution to the impending energy crisis in the country.

RESEARCH OBJECTIVES

- To examine the percentage of energy poverty in Sri Lanka to enhance the usage of solar power as renewable energy in Sri Lanka.
- To identify whether solar power is a viable and long-lasting solution to reduce energy poverty in Sri Lanka.
- To investigate the type of government mediation that is required to enhance the usage of solar power in the country.
- To comprehend whether sustainable solar power development is achieved in Sri Lanka within a decade from now.

LITERATURE REVIEW

This literature survey is conducted by referring to books, journal articles, concept papers, past researches, and the internet of things. At the outset, the researcher trust that identifying relevant definitions and theories related to the study is significant.

Definitions Related to Energy Poverty

Accordingly, the researcher discovered the following definitions and theories related to energy poverty. Energy poverty can be defined as a lack of opportunities to access sustainable energy services and products (Habitat for Humanity, 2021). Reddy (2000) and Obeng et al. (2008) state that the deficiency of electricity to assist the socio-economic development of a country is termed energy poverty. Meanwhile, Berry (2018) states that energy poverty is the inability to achieve essential capabilities resulting directly or indirectly from insufficient access to affordable, reliable, and safe energy services. Phimister, Vera-Toscano, and Roberts (2015) illustrate two alternate measures of energy poverty as energy expenditure, and consumers' perceptions on heating their homes, paying utility bills, and housing conditions. Hills (2012) argues that energy-poor households are considered a category deprive of heating their homes adequately. Turai, Schmatzberger, and Broer (2021) show driving factors for energy poverty as the income of households, the energy efficiency of buildings and appliances, and energy markets; coupled with much weaker social systems. Okushima (2017) illustrates a multidimensional energy poverty index (MEPI) that comprises energy cost, income, and energy efficiency of housing from which energy poverty can be measured. Nussbaumer, Bazilian, and Modi (2012) indicate that the provision of modern energy services through effective policies is essential for sustainable development, and to enhance the living standards of people. Papada, and Kaliampakos (2016) state that income support measures are required to alleviate the energy poverty of households and to enhance their living conditions. Bouzarovski (2017) points out that energy poverty takes place when a domestic is incompetent to secure a level and quality of domestic energy services like space cooling and heating, cooking, use appliances, and IT-related material.

Sattler (2016) states that worldwide, 1.4 billion people live in lack access to electricity, and 2.7 billion people depend on outdated biomass for cooking, this surely leads to an energy crisis. Similarly, González-Eguino (2015) indicates that in a few decades, the energy sector will have to encounter three major transformations related to climate change, security, supply, and energy

poverty. Herington et al. (2017) state that across the world, about two-thirds of the population persist with traditional cooking practices. One of the theories to do away from this practice is to adopt social practice theory which helps them to think of adopting alternative, modern energy practices. Further Pellicer-Sifres, Simcock, and Boni (2021) argue that energy poverty can bring detrimental impacts on multiple aspects of people's well-being and life quality and this can be well studied using Nussbaum's normative theory of Central Capabilities. Moreover, energy poverty can directly harm health, emotions, affiliation, play, practical reason and senses, imagination, and thought process. Accordingly, it can be said that the lack of avenues to sustainable energy services to enhance people's well-being and life quality can be termed as energy poverty. Energy cost, income, and energy efficiency of housing are some of the key measures of energy poverty. Hence a multi-dimensional approach from the highest possible authority is required to motivate people to acquire solar energy to meet the energy crisis in the future.

Definitions and Theories Related to Solar Power

Warnecke & Houndonougbo (2016) point out that one of the good strategies to battle against energy poverty is solar power as which can light the darkness. Meanwhile, Gunaratne (1994) states that without a proper evaluation of the current solar PV electrification projects, governments cannot reap the full benefits of solar power to reduce energy poverty. Gillard, Snell, and Bevan (2017) show that in the face of rising energy costs, poor households are unable to afford solar power as renewable energy considering the high capital cost to avert energy poverty. Perera (2016) states that the Sri Lankan government is planning to light 100,000 homes with solar panels to convert them into power producers for the national grid. This may not be a lucrative move for many as the initial expenditure to get this installed is a little high. Renewable Energy Sources (RES) are often produced from natural resources and they do not diminish as Non-Renewable Sources (NRES). Therefore, the world is now encountering difficulties in using NRES since they are severely declining with the upsurge of the world population and the enhancement of their basic needs. Hence, the world has to move towards RES like solar power to light up their homes/workplaces/industries.

At this point, it is important to learn how solar cells work. Often light contains small 'parcels' or 'packets' of energy named photons and when photons shine on a solar cell, they are captivated by the cell. Then cell starts releasing electrons if the photons have sufficient energy. Then these electrons go in wires and travel around an electrical circuit in the form of a direct current (DC) which travels only in one direction. If the light is more powerful, more

electrons will be released to make the electrical current bigger, but the voltage of the cell will stand the same (STELR, 2021). The photovoltaic effect is the theory behind solar cell that converts light into electricity. The photovoltaic effect is a method that happens in some semiconducting materials which absorb a photon, which will then be extracted into an electrical circuit by built-in and applied electric fields. Electron energy levels are often divided into two bands: the valence band (comprises the main occupied electron energy levels) and the conduction band

(comprises the lowest unoccupied electron energy levels). The energy variance between the top of the valence band and the bottom of the conduction band is named the bandgap. No bandgap can be found in a conductor, as the valence band is not filled and that allows the free movement of electrons through the material (Duffie and Beckman, 2013).

Government Mediation

A program named "battle for solar energy" was launched by the government of Sri Lanka aiming to fulfill 10% of the country's daily electricity demand or 220 megawatts to the national grid by 2020, however, that was not achieved to date (Perera, 2016). Moreover, there is another plan to add 1,000 megawatts of solar power to the grid to meet fast-growing power needs. Sri Lanka will stop building coal-fired power plants and double the share of its electricity from renewables by 2030, according to the government's latest climate plan. Moreover, the GoSL has a plan to generate 70% of the island's electricity from renewables by 2030 by offering loans to set up rooftop solar (Lo, 2021). As the initial cost or investment to get solar power installed to remain high, a government mediation to promote this is highly essential. Moreover, wide publicity also has to be given to make the general public aware of the need to switch from hydroelectricity to solar electricity to face the impending energy crisis in the future.

Towards the Sustainable Solar Power Development in Sri Lanka

The government of Sri Lanka is having a plan to implement solar energy schemes across industrial parks and big scale roofs and households to reduce the current electricity cost. Moreover, the GoSL has to make the people aware of the solar power buy-back scheme to get them to know the additional revenue that they can get from it (Asian Development Bank, 2021). To have sustainable solar power development, the GoSL has already established an authority named Sri Lanka Sustainable Energy Authority to drive Sri Lanka towards a new level by enhancing indigenous energy and increasing energy efficiency and energy saving within the country. One of the main aims of the

Authority is to recognize, measure, and develop renewable energy resources to increase energy security to reap economic and social benefits to the country.

RESEARCH METHODOLOGY AND RESEARCH DESIGN

Philosophy – Pragmatism

Research can be divided into four philosophies; positivism, realism, interpretivism, and pragmatism (Mahesh, 2020). Sekaran & Bougie (2016) state that positivist attempt to view the world, science, and scientific research to get at the truth as they trust that there is an objective truth that exists to comprehend the world correctly so that the researchers can forecast and regulate it. Positivists often believe that there is a cause-and-effect relationship exists for everything so the scientific approach suits to study them (Pierre, 2017). Positivists believe that the reliability of observations is the key to generalizing the findings. Often they put forward deductive reasoning to test theories using a fixed, preset research design and objective measures. The main approach of positivist scholars is the experiment, which facilitates them to test cause and effect relationships through manipulation and observation. Therefore, positivists conclude that describing phenomena using emotions, feelings, and thoughts is impossible (Sekaran & Bougie, 2016).

Realism is the second research philosophy that trusts that reality should be independent of the human mind. It hypothesizes that the scientific approach is the best way to explore knowledge, hence it is divided into two; direct realism and critical realism. Direct realism is called naive realism and that trusts that "what you see is what you get" (Saunders, Lewis, and Thornhill, 2012). Those who believe in direct realism use human senses to see the world. On the other hand, Novikov and Novikov (2013) state that human beings experience the sensations and images of the real world as deceptive and not as they see.

Researchers who count on interpretivism interpret elements of the study through social constructions like language, shared meanings, consciousness, and instruments (Myers, 2008; Collins, 2010). They often criticize the philosophy of positivism and they extensively believe in quantitative analysis. This facilitates researchers to identify variances of people using multiple methods.

Mahesh (2020) states that pragmatism follows a mixed-method (quantitative and qualitative). It is also known as a problem-oriented philosophy that

assists researchers to answer research questions effectively by evaluating vivid aspects of a research problem (Creswell and Creswell, 2017).

Since the researcher intends to conduct this research by incorporating both quantitative and qualitative data, the researcher adopts pragmatism philosophy in this research.

Research Approach – Deductive

The purpose of this study is to determine the ways and means of motivating customers for enhanced use of solar power as renewable energy to face the impending energy crisis, the researcher adopts a deductive approach to explore identified theories or phenomenons and tests if that theory is valid in given circumstances (Sekaran & Bougie, 2016). By employing a deductive approach, a researcher tests the variables of this research based on existing theories (Bruce, 2003). That is exactly what the researcher attempts to do in this research.

Methodological Choice – Quantitative

In this research, the researcher intends collecting data using quantitative research techniques (Sekaran & Bougie, 2016). Statistical tools like Mean, Standard Deviation, Pearson correlation, P Value and ANOVA will be utilized in analyzing the data (Watson, 2015).

Research Strategy - Survey

In the survey method, a researcher attempts to find answers by raising questions in the form of statements to get their level of understandings and satisfaction. Later the collected data is analyzed from that particular sample of individuals (AESA, 2021). Since the main objective of this research is to determine the ways and means of motivating customers for enhanced use of solar power as renewable energy to face the impending energy crisis, the researcher adopts the survey method in this research.

Time Horizon – Cross-sectional

Research can be divided into two types based on time; longitudinal (succeeding independent samples) and cross-sectional (Bell et al., 2022). In the longitudinal study, the researcher studies a phenomenon or a population over some time (Caruana et al., 2015; Hastorf, 1997). In the cross-sectional study, the researcher takes a ‘snap-shot’ of the study; it refers to a phenomenon or a cross-section of the population is examined for one time (Setia, 2016). Due to time limitations, the researcher adopts cross-sectional time series in this study.

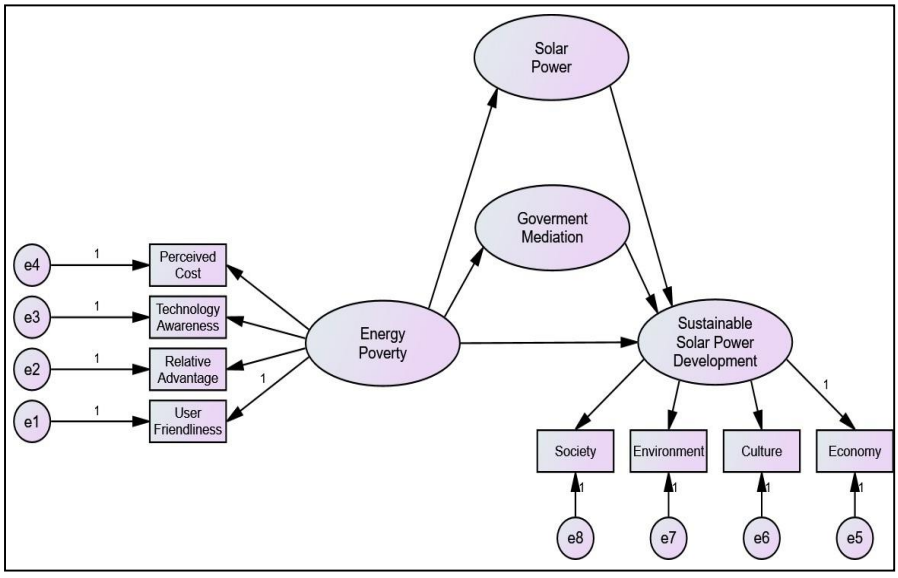
Data Collection and Analysis

In this study, the researcher adopts a questionnaire survey and interview methods to collect data. The researcher further intends to collect data from approximately 300 households by adopting a stratified sampling technique and to conduct structured interviews with almost all the solar power agents in the country. The data then will be analyzed establishing validity, reliability, and factor analysis.

THEORETICAL FRAMEWORK

This research follows a quantitative and qualitative method, therefore the deductive method is used to emphasize scientific principles or theories, explain a causal relationship between variables, gather quantitative data, employ a methodical approach, operationalize concepts to guarantee clarity of definitions (Warnakulasuriya, 2021). Moreover, the researcher will be developing research questions based on selected theories and then design a research strategy to test their validity and reliability. Therefore, this research follows a mixed-method through a deductive approach. Accordingly, the theoretical framework of this research is formulated as follows.

Figure 1: Conceptual Framework



Source: Constructed by the Researcher

Operationalizing the Variables

The operationalization of the variables is as follows.

Table 3: Operationalization Table

Variable	Type	Dimensions	Indicators	Measurement criteria	Literature
Energy poverty	IV	Perceivedcost	Direct price	**1 - 5 SD - SA**	Shah Alam et al. (2014)
			Non-pricecost elements		
			Purchaseintention		Kim et al. (2014)
			Consumerbehaviour		
			Maintenancecost		
		Technology trend awareness	On types of renewable energy		
			On Solartechnology		
			Difficulties in operating solar energy		
			Adoptability		
			Long-termbenefits		
		Relative advantage	Environmental benefits		
			Reduction ofair pollution		
			Decrease carbon footprint		

			Cost benefitsover time		
			Increased competitive advantage		
		User-friendliness	Clean andsimple		
			Operability		
			Risk aversion		
			• Ease of installation		
			• Quick learning		
Solar Power	MV	Requirement	• For what purpose		
		Dimension	• Length		
			• Width		
		Power	• For domestic use		
			• For commercial use		
			• For business purposes		
		Weight	• Number of cells and weight		
		Installation	• Roof or land		

			• Purpose		
Government mediation	MV	Capacity	• Development of Solar Parks		
			• Development of Ultra Mega Solar Power Projects		
		Funding	• Full or partial		
			• Loan schemes through government and private banks		
		Awareness	• Through media		
			• Workshops		
			• Social media		
Sustainable solarpower development	DV	Society	• Clean and pure energy fromthe Sun		
			• Combat greenhouse gas emissions		
			• Reduces collective dependence onfossil fuel.		

			• Coal and natural gas plants produce air and water pollution that is harmful to human health		
		Environment	• Limit greenhouse gas emissions fromfossil		
			• Reduce the demand for fossilfuels, limit greenhouse gas • emissions, and		
			shrink your carbon footprint.		
			• Solution for global temperatures and climate change.		
			• Reduce waterusage		
			• Reduce air pollution		
			• Reduces dependence on nonrenewable energy sources		

			• Improves humanity's healthin the long-run		
		Culture	• Getting usedto clean culture		
			• Preserve cultural heritage		
			• Create a new technologic al culture		
		Economy	• Lower utilitybills		
			• Can offset electricity usage		
			• Job creation		
			Diverse uses		
			• Powering new generation		
			• Help eliminate poverty		

Source: Researcher's work

FINDINGS AND DISCUSSION

Findings will be discussed in the following manner.

a. The level of energy poverty in Sri Lanka will be identified through literature review to make the Sri Lankan community aware on varying benefits of Solar Power.

b. The dimensions of all veriables (independent, mediate and dependent) will be measured sufficiently to discuss the

advantages and disadvantages.

c. The level of government mediation that requires to promote solar powerin Sri Lanka will be discussed in length.

d. The significance of developing solar power as a sustainable energy source will be discussed to identify ways to mitigate energy crisis in SriLanka.

SIGNIFICANCE OF THE STUDY

Solar power as a renewable energy source is extensively used by many developed nations to fulfill their energy needs. It is a known fact that hydropower is becoming a scarce resource shortly. To bridge that gap, solar power seems to be an ideal solution. However, the usage of solar power in Sri Lanka is still in its primitive age. Therefore, this research will help authorities to identify the means of enhancing the use of solar power in Sri Lanka which facilitates the users to earn an additional income while zeroing their electricity bills. Since the initial investment is high and lack of awareness of the benefits of solar power Sri Lankan community is yet reluctant in investing in solar power. For this, the mediation of the GoSL is highly necessary to promote and set up more and more solar panels in the rooftops of households and businesses. In that sense, this is a timely study to drive the country in a new direction.

LIMITATIONS OF THE STUDY

The limitations of this study are as follows.

a. The lack of previous studies highlighting the importance of adopting solar power in Sri Lanka is considered a limitation. There are many scholarly articles written on solar power and its benefits to the world, but they cannot be rightly applied to the Sri Lankan context. Hence, thecollection of literature was found as a major limitation.

b. The reluctance of obtaining sensitive information from the ministry andthe CEB is one of the major limitations as they do not like to highlight their inefficiencies in implementing scheduled programs to enhance solar power in Sri Lanka.

c. Since the researcher is employed, the researcher had to resort to assistance from his friends in collecting data from necessary ministriesand other government and non-government agencies. However, the researcher will take his best efforts to discover the true picture of this study.

CONCLUSION

This research was undertaken to determine the ways and means of motivating customers for enhanced use of solar power as renewable energy to face the impending energy crisis. Having identified the research gap through a literature survey, the researcher constructed the conceptual framework and operationalize the same incorporating the essential dimensions. Since the researcher intends to use a structured questionnaire along with interviews and focused group discussions, the researcher adopts a quantitative method in this study. As the researcher uses existing theories in this study, intends to follow positivist and deductive approaches. The data will be analyzed through SPSS and AMOS software using all statistical techniques. The findings of this research will be helpful for sustainable energy development authorities to enhance the usage of solar power as a renewable energy source to meet the impending energy crisis in the future.

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A REGULATORY FRAMEWORK FOR SUSTAINABLE MIDDLE-INCOME HOUSING INSRI LANKA

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ABSTRACT

Housing is a basic human need and an essential social condition that determines a country's citizens' living standards. Housing developments worldwide have created many economic, social, and environmental problems on a major scale in the present day. It is a crucial priority for government institutions, industry professionals, and research organizations to make housing developments more sustainable in rapidly urbanizing areas. Sustainable housing refers to managing economic, environmental, and social sustainability considerations. The housing construction process involves natural resources on a major scale, such as energy sources, water sources, soil, and building materials, while producing waste and pollutants. Compared to expected living standards and monthly income-generating levels, educated middle-income populations to become the most vulnerable part of the community's struggle for reasonable housing.

The objectives are to describe the development and validity of the framework for the assessment of the regulations in order to achieve sustainability in middle-income housing. The research is initiated by studying existing local assessment frameworks and regulations that will be analyzed to provide the necessary context to build an interim framework to examine affordable and sustainable middle-income housing. The secondary study will be based on a semi-structured questionnaire survey conducted with industry experts and other stakeholders to examine the interim assessment framework. Discussion and comments will deliver necessary improvement and industry input to this interim assessment framework. The interim framework is to be developed into a strong and incremental regulatory framework that allows future success in SH for the middle-income population in the country. Finally, findings will be tested against the developed regulatory framework for sustainable middle-income housing in Sri Lanka.

Keywords: Sustainable housing, Middle-income, Regulatory framework

INTRODUCTION

In the present day, the rapid and largest building markets are found within the developing countries. The amalgamation of increased demand and limited supply leads to increasing housing prices which harm the foremost susceptible middle-income category population group. Compared to expected living standards and monthly income-generating levels, educated middle-income communities struggle to fulfill their basic needs within limited income. Middle-income populations become the most vulnerable part of the community worldwide, those who expect reasonable living standards in terms of housing, education, job/career expectations, vehicle ownership, good food, health facilities, and recreation facilities within limited income sources.

Housing is usually the largest budget item for households. Housing affordability is related to housing costs and income of households. The affordability of housing can be measured for owned houses as well as rented houses. Middle-income housing affordability plays an important role in the economy. The second largest expenditure item identified as electricity followed by L.P. gas for the global middle class housing. The global middle-class household spent a higher amount on water bills Compared to the other two classes according to surveys. Surveys reveals that global middle class shows increase demand for utilities and natural resources. It seeks attention to develop sustainability in housing developments in terms of affordability and energy efficiency in middle-income housing.

Developing countries have propelled a substantial number of housing programs initiated by private sector developers or by the Government under local authorities as a response to the present day housing crisis. Limitations related to land use, time and funds faced by housing developers can cause buildings to construct with hardly any attention with regard to durability, energy efficiency sustainability or environmental health. These variables may also result in low-cost housing that is of poor quality and has a high prevalence of faults, high maintenance costs, and short lifespans. Housing units might also be built in suburban locations, where residents will have limited access to the city's social and economic prospects as well as to essential amenities and infrastructure.

Finding and promoting solutions is crucial because doing so will enable verification of the sustainability that is frequently attained in inexpensive housing just as effectively as in high-standard structures, instead of private-sector developers encroaching on land and building non-affordable, low-standard housing units that lead to the environment and social problems on a

massive scale. Significant environmental, social, and economic benefits can be entirely provided to the middle-income population and to society using the successful regulatory framework for sustainable housing.

The regulatory framework is the backbone of the public sector services delivery. Getting regulation right is important to balance multiple public interests such as consumer protection, productivity, efficiency, innovation, and sustainability.

RESEARCH GAP

Rasel Ahmed explained that the limitation of existing work, empirical works to describe a theory or phenomenon or a Knowledge gap can be defined as research gap. (Rasel Ahmed.) University Technology Petronas.

The number of Sri Lankans who identify as the middle class is expanding, due to the present financial crisis in the country. It is obvious that documented literature in relation to what constitutes development of sustainable housing for the middle-income population is lacking. Although public housing aimed at the low-income category has been addressed with many housing developments, middle-income housing sustainability has not attracted attention in urban areas.

Housing sustainability can be significantly impacted by policy decisions. It is evident that absence of simple, effective, and well-structured regulations for sustainable housing development in the country.

PROBLEM STATEMENT

It is evident that there are multiple national policies, acts, and council regulations applicable to the existing national development process. Nevertheless, the housing developments, however, lead to creating social, economic, and major environmental issues, due to the lack of involvement associated with effective regulatory applications. Most of these frameworks have been limited to acts, and regulations, which could not be practice with the available existing planning or local economies. Nevertheless, all these laws, acts and regulations could not address to resolve the sustainable development in housing sector or built environment sustainability in a holistic approach.

Developers face difficulty to implement sustainable housing due to constantly changing in government policies and generally take a long period to obtain the approval of local councils.

A simple, effective, flexible, and well-structured regulatory framework shall

be introduced to overcome stakeholder interest in sustainable middle-income housing developments.

THE OBJECTIVES OF THE STUDY:

The primary objective of this research focus to introduce a regulatory framework for sustainable middle-income housing in Sri Lanka.

The novel thinking approach considers the future of sustainability regulations. Sustainability can be understood best in the context of other components and aspects, rather than in isolation. Thus, in terms of sustainability, a regulatory framework for economic, social, and environmental sustainability considerations should be interconnected. It is essential to study and assess previous regulatory practices and knowledge in order to create an interconnected and thus flexible regulatory framework.

1. To study the existing regulatory framework in Sri Lanka (a reference to regulations for SH in SL).
2. To study local and international sustainable regulatory frameworks.
3. To study factors affecting sustainable measures/dimensions in terms of economic, social, and environmental sustainability in middle-income housing developments.
4. To develop the regulatory framework for sustainable middle-income housing in Sri Lanka.
5. To substantiate the regulatory framework implications of middle-incomeSH.

These facts are to be taken into consideration while developing housing, which indicates the importance of a proper regulatory framework for future sustainable housing developments.

A LITERATURE REVIEW

Sustainable Development (SD)

The “official” definition of sustainable development, is “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Bruntland, United Nations General Assembly, 1987, p. 43). The overall goal of sustainable development (SD) is the long-term stability of the economy and environment; this is only achievable through the integration and acknowledgment of economic, environmental, and social concerns throughout the decision-making process. Bhatti (2000) has expressed that in relating sustainable development and sustainability to housing, a framework is more useful than a specific definition.

Albeit somewhat vague, this concept of sustainable development aims to maintain economic advancement and progress while protecting the long-term value of the environment; it "provides a framework for the integration of environmental policies and development strategies" (United Nations General Assembly, 1987). Long before the late twentieth century, however, scholars argued that there did not have to be a trade-off between environmental sustainability and economic development.

Sustainable Housing Development (SH)

The principle of sustainable housing is to give comfort and safety to human lives. Sustainable housing has been defined as, housing that must be economically viable, socially acceptable, technically feasible, and environmentally compatible (Choguill, 2007).

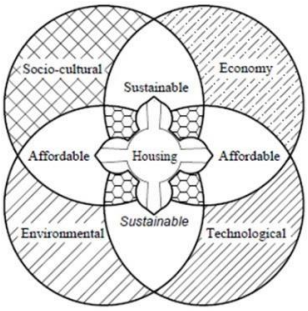
The UN-HABITAT (2012) noted that sustainable housing consists of socially enhancing and environmentally-friendly residential practices integrated into the wider settlement systems. The principles applied in sustainable housing, include concern for people by ensuring that they live in a healthy, productive, and in harmony with nature(Nazirah, Z. A. dan P, 2005).

Sustainable housing is important for human health, sustainability, and safety, and sustainable housing practices must integrate three aspects: environmental, social, and economic. There are numerous ways for humans to begin living in a sustainable housing on their own, even with the smallest implementation at an affordable cost. These practices also rely on the government, architects, developers, community residents, and construction leaders to create sustainable housing that incorporates the previously mentioned criteria and implementation, as well as land use, social, economic, and environmental considerations. In order for sustainable housing programs to continue, they must always evaluate economic viability, socio-cultural acceptability, technical feasibility, and environmental compatibility.

Sustainability has four main dimensions(According to Choguill, 2007)

1. Economically viable
2. Socially acceptable
3. Technically feasible
4. Environmentally compatible

Figure 1: Dimensions of Housing Sustainability.



Therefore housing to be described as sustainable, if given adequate consideration in all four objectives of sustainability.

Economic Viability

Early theorists proposed that policies to protect the environment could also promote innovation and profit by utilizing economic tools. Arthur Pigou, In 1920, emphasized that the presence of incidental, uncharged services act as a barrier to achieving equilibrium in the market. Thus Pigou noted that the divergence between marginal private costs and benefits and marginal social costs and benefits create what we now call "externalities" (Pigou, 1920).

Michael Porter and Claas van der Linde theorized that pollution is a sign of inefficient resource use. As a result, improvements that reduce pollution in manufacturing processes can create win-win situations for the environment and the economy. (Porter & van der Linde, 1999). These authors argue that competitive advantages rely on the capacity for innovation; thus, "by stimulating innovation, strict environmental regulations can actually enhance competitiveness" (Porter & van der Linde, 1995, p. 98). As the Porter Hypothesis states, properly designed environmental policies that make use of market incentives can encourage the introduction of new technologies and reduce production waste. Market-based environmental tools are generally perceived as more "business friendly" than traditional command and control policies (Cooper & Vargas, 2004).

Housing economic sustainability or affordability should be integrated into an economic development strategy that increases household members' economic self-reliance.

Social Acceptability

According to UN-HABITAT (2012), social sustainability in housing entails developing affordable, high-quality, inclusive and diverse (mixed-tenure and mixed-income) dwellings, residential areas, and communities that are well-

integrated into larger socio-spatial systems of human settlements. This means that housing is said to be socially sustainable when it is decent, safe/secure, healthy, inclusive, mixed tenure, and properly integrated with other human settlements fabrics.

Jepson, 2007, contends that Sustainable development has become firmly established in the literature on community development and planning. Choguill competes that authorities have taken less concern about sustainable cities, sustainable housing, and a variety of other sustainable activities. Choguill 2007, demands that sustainable development has become confidently established in the community development and planning literature.

Houses' location and style frequently reflect social inequalities. This affects their social relationships, daily lives, and, ultimately, future generations' prospects.

Technical Feasibility

Popular building materials are out of reach for the majority of the world's population due to their high cost. Journal of Sustainable Development emphasizes that rising construction material costs and environmental devastation due to the mistreatment of natural resources associated with building construction and housing development goings-on urge the exploration for alternative technological solutions. (Journal of Sustainable Development; Vol. 9, No. 2; 2016).

The basic requirements for technological sustainability are durability, reliability, functionality, strength, and feasibility. New technologies should be made available and feasible to the users equally. The construction techniques and raw materials should be strong enough to meet the basic strength parameters suitable to the local conditions in terms of safety and durability of its use. The environmental friendliness of technological options in sustainable constructions refers to the reduced use of renewable and nonrenewable resources, the extensive use of waste materials, and the reduction of waste product and pollution impact.

Environmentally Compatible

House constructions can be accomplished by addressing limited resources through efficient use of nonrenewable resources, reducing the impact of waste materials and pollution through the use of appropriate technologies, and utilizing local workforces.

According to the World Watch Institute , building constructions consume

40% of the raw stone, gravel, and sand, 25% of the virgin wood, 40% of energy, and 16% of the water also used annually worldwide. The construction industry is involved in actions that harmfully affect the environment through the over-exploitation of nonrenewable resources. It may result in topsoil stripping and the destruction of natural topography, causing problems such as erosion, landslides, and negative effects on local hydrology. Although, diminish of fertile soil and the devastation of agricultural land, as well as the depletion of natural resources and pollution of the environment as a result of the building process's emissions of dust, debris, and toxic gases. Statistics of total energy consumption show that the proportion of energy consumption for building activities in the developing world is 35% of the total annual energy consumption. It utilizes energy for the development or production and transportation of materials and machinery, building, and also for maintenance activities. At a global level, the building sector including housing has the largest potential for significantly reducing greenhouse gas emissions compared to other major emitting sectors – UNEP, 2009. This emissions savings potential is said to be as much as 84 gigatonnes of CO2 (GtCO2) by 2050, through direct measures in buildings such as energy efficiency, fuel switching, and the use of renewable energy – UNEP, 2016. The building sector has the potential to make energy savings of 50% or more in 2050, in support of limiting global temperature rise to 2°C (above pre-industrial levels) – UNEP, 2016.

Effective usage of renewable and nonrenewable resources, appropriate land management systems, healthy neighborhood, basic utilities, infrastructure services, and waste managing have been identified as needs to fulfill in sustainable housing. To achieve solutions to growing waste disposal problem in urban areas in Sri Lanka, should develop a proper solid waste management systems within urban areas.

Sustainable housing also promote energy saving and it is long-term/ flexible/ durable (environment and economic dimension). Resource conservation, affordability, business opportunity, and fulfilment all economic requirements is an important issue under the economic dimension of sustainable housing. Under social dimension, sustainable housing should be attractive or beautiful, have good design, be convenience for user, and fulfil all social requirements, ownership/administration, type of house, relationship with neighbour, appliances, and feng sui application. (Yip N.M., Mohamad J. , Ching G.H., 2017)

Government organizations are typically divided into sectorial ministries and departments. In practice, sustainable development requires the integration of economic, environmental, and social objectives across sectors, territories,

and generations. Therefore, sustainable development requires the elimination of fragmentation; that is, environmental, social, and economic concerns must be integrated throughout decision-making processes in order to move towards development that is truly sustainable. (Emas R., 2015).

Therefore, rather than the clients themselves, architects, project managers, consultants, contractors, and relevant public administration professionals should act responsibly in implementing sustainable housing.

The Middle Income People / Middle Class

According to Asian Development Bank report in 2010, the middle class is defined as a social class consists with technicians, government officers and professionals. This category of population are from well-educated employees, service providers and also small-scale entrepreneurs. Middle class demanding reasonable housing, improved quality services, and demanding comfortable lifestyles including luxury goods such as mobile phones, computers, and cars. Asian Development Bank (2010). Arunathilake and Omar, 2013 highlighted that the lifestyle has changed in the middle class although, they are highly spend on housing, education, health, transport and durable goods etc.

It is further explained that middle class is important for economic growth and development and poverty reduction. The local middle class is classified under spending less than 2-10 per day while, Global Middle Class - Spending Less than 10-100 per day (www.adb.org)

Economically the middle class has defined by relative approach and absolute approach. By the relative approach, middle class is defined relative to median per capita income. Another definition is that middle class is relative to standards of the developing countries. The Absolute approach defines the middle class based on earnings or income ranges and global demand for branded goods such as designer clothes, cutting-edge technology, and education and health services. The decision to buy a house is linked to the pricing and political framework of the housing market. Middle-Income Housing Affordability

According to Wendell Cox (2018), Housing affordability is the relationship between housing costs and income. Affordability can only be evaluated if there is a comparison to income.

Middle-income housing affordability is critical because affordable access to quality housing has been critical to the democratization of prosperity that has occurred in most high-income countries over the last century. Normally, the

competitive market has provided housing for middle-income people without the need for subsidies. Middle-income is different from low – incomehousing (also called "affordable housing" or “social housing”), which relies on public subsidies to serve the needs of households unable to afford the house prices or rents prevailing on the open market.

Middle-income housing affordability is also important to the economy. According to Paul Cheshire of the London School of Economics and Wouter Vermeulen of VU University, " housing being the dominant asset in most households’ portfolios, there are also repercussions on saving, investment and consumption choices.” Where housing is more affordable, households will have more discretionary income to purchase additional goods and services and to save (which generates investment). All of this can contribute to job creation and a stronger economy.

Government policies should address this developments in sustainable principals and economical means. Affordability in purchasing and maintaining property while benefit receive for life upgrading by healthier living and less utility expenses.

The upfront initial cost to the homebuyer has traditionally been used to determine whether a house is considered affordable. Housing costs that do not exceed 30% of a household's gross income are a commonly accepted standard for housing affordability. This guideline considers housing costs to include taxes and insurance for owners, as well as utility costs on occasion. When these combined monthly costs exceed 30% to 35% of household income, housing is considered unaffordable for that household.

The economic benefits of sustainablebuilding are simply not regarded in traditional costing methods.

Government fund support and loan schemes should be introduced to these developers who build sustainable affordable housing schemes for low- and middle-income communities.

According to the government regulations for the purpose of carrying out the principles and provisions of this Sri Lanka Sustainable Development Act, No. 19 of 2017 elaborates, that the issuance of guidelines to the Project Approving Agencies, the monitoring mechanisms and progress review processes on Sustainable Development Strategy implementation, and the sustainability standards and ecological footprint indicators.

However, with the rapid urban developments and complex urbanization, ‘building-centric’ frameworks cannot adequately describe sustainable

development (Spinks 2013; Conte & Monno 2012). Changing environmental, social and economic needs, countries have to develop its own development framework to adhere to sustainable built environment development-related activities to a sustainable future. This will address the main dimension of sustainable development while upgrading the quality of life.

Framework

Alternatively known as an 'environmental assessment method', or 'sustainability assessment tool' (Sharifi & Murayama 2013a) a framework is a tool designed to assess and guide sustainable building developments. Framework 'level' is defined as the scale at which it is designed to be implemented, for example, at the individual building level. A framework will refer to a regulatory assessment tool in this paper.

Due to inadequate definitions of sustainability and sustainable development, some have argued that a framework is more useful than a specific definition when relating these concepts to housing (Bhatti, 2000; Bhatti, Brooke, & Gibson, 1994). Some have also concluded that the U.N. concept of sustainable development has failed to change unsustainable trends, and a systematic framework is needed to achieve social, economic, and environmental objectives equally and in an integrative fashion (Hugentobler, 2006). Others have also argued for the need to examine the social, economic, and environmental dimensions of housing and sustainability (Bhatti, 1999,2000; Brown & Bhatti, 2003; Chiu, 2002, 2003a, 2003b, 2004; Huong & Soebarto, 2003; Thorns, 2004). Besides helping to define sustainable housing, these researchers have proposed analytical frameworks to holistically guide the development process, as well as evaluate the multidimensional strands of housing sustainability.

Systematic framework is needed to achieve social, economic, and environmental objectives equally and in an integrative fashion (Hugentobler, 2006). Others have also argued for the need to examine the social, economic, and environmental dimensions of housing and sustainability (Bhatti, 1999, 2000; Brown & Bhatti, 2003; Chiu, 2002, 2003a, 2003b, 2004; Huong & Soebarto, 2003; Thorns, 2004).

METHODS

This study aims to research the criterion necessary for sustainable housing for the middle-income populations in urban areas. Further, this paper aims to develop an introductory regulatory framework to manage sustainable

affordable housing and redirect existing housing into sustainable housing based on relevant criteria.

Existing housing programs in the suburbs must be incorporated into a wider framework directed at creating a more sustainable and affordable housing developmet. The national, sustainable housing strategy should lay out the country's long-term housing vision, with key strategic objectives based on solid evidence.

This should include aspects related to a methodology for establishing policies and applicable regulations to implement the objectives, as well as the indicators that will be used to track progress toward them, in order to encourage developers and middle-income populations to take action.

Data Collection

Primary data on sustainable housing regulations and problem-solving approaches will be gathered from the literature as well as from a variety of local and international sources.

Secondary data will be collected through questionnaires, field observation, and interviews with relevant professionals such as architects, project managers, consultants, contractors, and users of middle-income housing, regarding sustainable housing characteristics and qualities.

A questionnaire was distributed among middle-income housing users, using an online Google form to obtain their perspectives and suggestions. This quantitative research was conducted to collect data to compare views on the present regulations, and the magnitude of their applicability to housing and to collect suggested improvements.

The mixed method is to be implemented in order to evaluate data gathered by literature survey and questionnaire for regulations assessment.

Figure 2: Methodological Approach to the Regulatory Framework

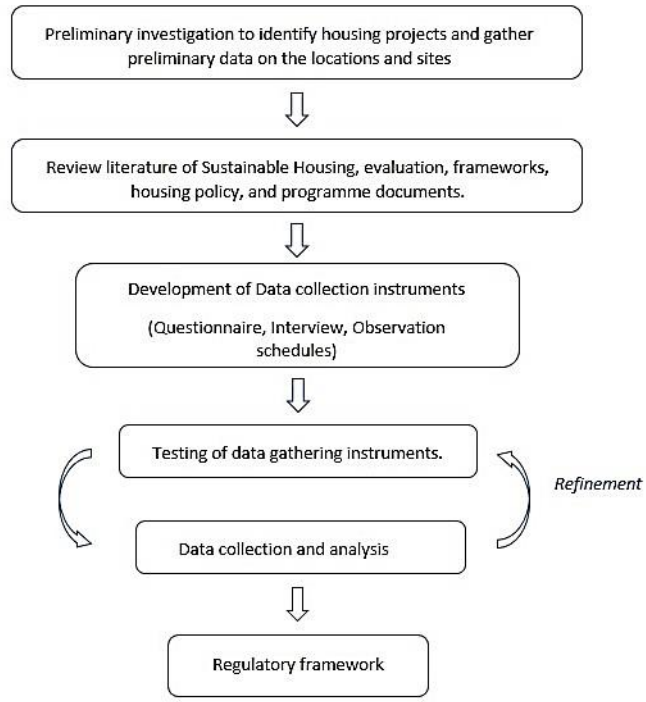
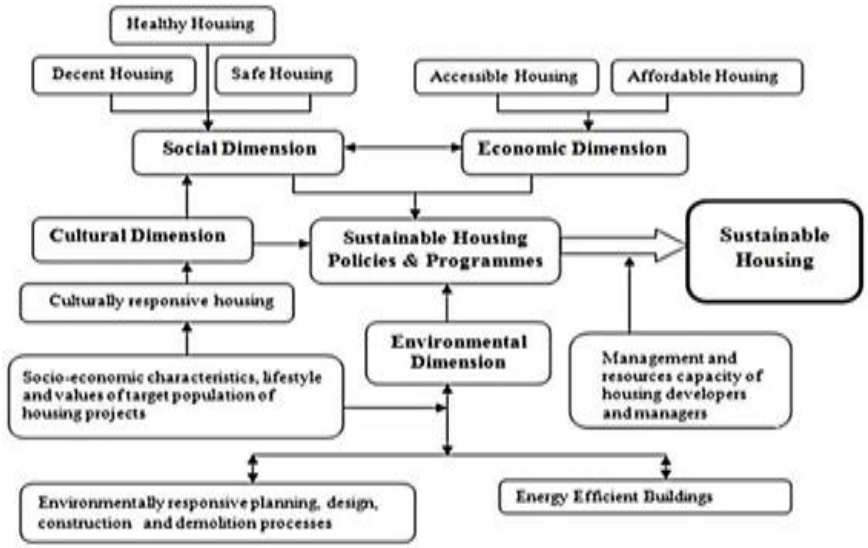


Figure 3: Conceptual Framework Approach to Sustainable Housing



RESULTS AND DISCUSSION

Regulations are exceptionally important in the built-environment development sector Communities haphazardly encroach on the natural environment in order to fulfill their demands devoid of regard for the limited resources available. There are multi asserted factors namely, the planning, introducing policies, and strategies among the relevant current processes affecting existing housing developments and new affordable housing developments related to sustainable development. Examining existing literature and housing projects in the country, it was evident that most of the housing developments are not affordable or do not address economic benefits, social well-being, or environmental concerns to achieve sustainable aspects. Therefore, it is important to deal with this issue with technically knowledgeable skillful professional hands.

This research is emphasizing the importance of initiating a sustainable approach which applicable to Sri Lankan middle-income housing developments in urban areas. Thus, in order to succeed the Sustainable Development Goals, it is essential that we emphasis on the regulatory framework that can be adopted for sustainable middle-income housing developments in urban areas.

CONCLUSION

The work presented in this paper has pursued to development and examination of a regulatory framework for the assessment of sustainability in middle income housing developments. Studies revealed dimensions of sustainable housing and characteristics of middle income population in urban areas. Considering other research conducted related to this subject area and findings from data analysis determined the importance of the regulatory framework to develop sustainable middle income houses in an identified urban context.

The significance of this regulatory framework has been tested by industry experts as well as users of the actual context. It has been found that the regulatory framework is context associated with and responds to the changing requirements, although it could be a flexible, incremental framework. Furthermore, there are qualitative and quantitative methods to measure and test sustainable indicators in the framework.

At this stage, the assessment regulatory framework can be applied to new or existing housing developments to test and refine its applicability. Finally, it will be a base for future research which needs to adopt a more integrated

systems-based regulatory approach for sustainable housing developments in different contexts and areas in the country.

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SPIRITUALITY IN ACHIEVING TRUE PURPOSEOF ORGANIC INDUSTRY

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ABSTRACT

Organic industry plays a significant role in enhancing both human and planetary health and hence contributes to sustainability. That is the very purpose of organic consumers for consuming organic. However, evidence suggest that the purpose of those who involve in organic production (growers) & processing are solely profit maximization. Therefore, they are unlikely to sacrifice any part of profit for the wellbeing of society and environment. Profit orientation likely to adopt unethical practices by behaving unsustainable ways. Unsustainable practices of organic production and processing are in conflict with the consumers' purpose of being organic. This is where spirituality becomes important. The spiritual development is an inner- process which transforms the mind of people from self-centeredness to self-transcendence in which health and sustainability of the planet are valued in addition to profit. The present paper, with the help of evidence derived from the literature on the science of spirituality and the organic industry argues that spiritual transformation of stakeholders in organic industry is essential in achieving its purpose.

Key words: Organic Industry, Spirituality, Inner Transformation, Sustainability, Organic.

INTRODUCTION

True purpose of being organic has being human and planetary health. The purpose has a significant contribution to sustainability which is very purpose of organic consumers for consuming organic. hence it is contributing to the sustainability. Money orientation of stake holders such as producers and processors are likely to adopt unethical practices leading to unsustainable behaviors which is a conflict with interest of those whos' true purpose of being organic. Organic in the modern day is a systematic management system to ensure healthy and sustainable product. The management system needs to be in compliance with standardized compliance requirements set out against specific rules and regulations. Those who produce, process or involve in any act withing the organic network needs to be in compliance with the standardized requirement failing which the final product can not be considered as organic. However, it is evident that those who are in the organic system, especially producers and processors, are behave unethically, which means that there is something beyond regulatory and compliance requirements being enforced over organic industry for achieving the true purpose being organic. This is where the spirituality become important because of the spirituality is something which affect on the human behavior by a process of mind transformation.

Emerging concern in business studies now a day has been notion of "Spirituality." Many books, public seminars & lectures based on empirical studies that discovered many dimensions of spirituality has been a significant concern of entrepreneurs who are keen to be sustainable in what is being done. Therefore, a clear idea about the spirituality and its dynamics on human mind and behavior to deal with self and others to be genuine in what they are doing is a prime importance. It is essential to understand how a person become spiritual and what does the spirituality make towards the health and sustainability to serve the true purpose of being organic. Therefore, understanding the significance of spirituality on the relationships & behaviors to make a person's involvements sustainable toward achieving a good heath and sustainability by serving the true purpose of being organic concepts for the health and sustainability is the main purpose of this study. This study support to understand how a business transforms into a sustainable business to deliver sustainable product or a service when members of organic industry are spiritually developed for which a deep study on ontology and epistemology of the spirituality and its impact on true purpose of organic industry in terms of health and sustainability is a must.

The research has been planned to be conducted over certified and uncertified

organic industry in Sri Lanka. The industry consists of famers, processors, traders, suppliers, certifiers, and consumers of organic product which are confirmed to be sustainable and healthy, and then to conclude with the significance of spirituality for the true purpose of being organic. The present paper, with the help of evidence derived from the literature on the science of spirituality and the organic industry argues that spiritual transformation of stakeholders in organic industry is essential in achieving its purpose.

LITERATURE

Agriculture has been very efficient with the use of agrochemicals and machineries. The use of chemicals in the agricultural industry have become exceptionally higher beyond accepted limits degrading human health and the ultimate sustainability (Wani, 2019).

Simultaneously food production has grown tremendously over the past years (Vidanapathirana R., 2014). Consumers are becoming more health-conscious owing to theharmful effects caused by the presence of chemical pesticides in food products (Mie, 2017). Cancer, hormone disruption and birth defects have been caused by the toxicity of chemical pesticides in food products. According to an UNreport in 2017, around 200,000 people have died every year by toxic effects of pesticides in food products (Boedeker *et al*., 2020). Health of people worldwide have been impacted by the growing number of food poisoning. The impact itself have been a driving force towards organic industry.

Organic

The term "**Organic**" has been defined as a production system that sustains the health of soils, ecosystems, and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic Agriculture combines tradition, innovation, and science to benefit the shared environment and promote fair relationships and good quality of life for all involved (IFOAM General Assembly, 2008)

Global trade of organic food has grown tremendously over the past years (Vidanapathirana R., 2014). However, status of being organic does not decided only by non-application of chemicals. The organic management system for labeling the final product, that is granted for ecological production when the whole process has been certified by accreted third party organization as per a set standardized requirement (Vidanapathirana, 2012).

Organic is a growing global concern due to increasing food related health

issues. Organic industry is consisted of many industries such as agriculture, processing, manufacturing, forestry, trading, sales & marketing, regulatory authorities, inspections & certification organization, consumers etc. Organic industry has been divided in to two stages such as "production" and "processing" (European Commission Regulation, 2021). Production stage is also known as agricultural stage. The agricultural activities starting from land election up to harvesting is known as production stage. Processing stages starts from the output of production stage and ends up with the final labeled product which are ready for the consumptions. The final product from every industry includes, but are not limited to, foods feeds, ingredients yarns, fabrics, clothes and home textiles, latex, and rubber products. According to the data collected by IFOAM-Organic International and FiBL, seventy-two countries had fully implemented organic regulations as of 2020. Twenty-two countries had regulations which were not fully implemented, while fourteen countries were in the process of drafting legislations (Kirchner, 2021). Organic standards have begun to be developed by regional groups of organic farmers and their supporters as early as 1940s (Vidanapathirana, 2014). Standard for organic have long been used to create an agreement withing organic agriculture about what an "Organic" claim on a product means, and to some extent, to inform consumers (Vidanapathirana, 2014). The basic standard of IFOAM for production and processing of organic of an organic product is one of the most significant expositions of the aim and principle of organic farming (Rigby, 2001). Regulatory authority of every country or region for organic industry has produced their own standard to standardize the industry. Dr. Radolf Steiner has stressed the fact that the degradation of health is not only due to addition of systemic agrochemicals, but also due to spiritual shortcomings in the farming systems adopted (Bandara, J. M. R. S., 2007). Growing, producing, and processing of an organic food or product is more on to a spiritual practice rather than just a technical involvement, in which the right code of practice with genuine commitment is a must (Hoesly, D., 2019). This is where spirituality becomes important.

Spirituality

Spirituality has been defined as "a way of being and experiencing that come about through awareness of a transcendence dimensions and that is characterized by certain identifiable values in regard to self, others, nature, life, and whatever one considered to be the ultimate" (McDonald, 2015). The spiritual development is an inner- process which transforms the mind of people from self-centeredness to self-transcendence in which health and sustainability of the planet are valued in addition to profit. The internal

transformation during the spiritual development is affected by some external influence. According to APA Dictionary of Psychology, self-transcendence is "the state in which an individual is able to look beyond himself or herself and adopt a larger perspective that includes concern for others." It is the realization that you are you are not a separate independent entity but one small part of a greater whole, and acting accordingly. What we see as separate objects are an illusion. This view is supported by quantum theory and the theory of biocentrism (Lanza, 2009). The illusionary separateness is an obstacle to sustainable behavior. It has been pointed out that the root course of our unsustainable behavior is our spiritual underdevelopment followed by perceived separateness from fellow human beings and the natural environment (Ulluwishewa, 2018). Spirituality can be achieved though many ways with or without religious influence. However, religiosity and spirituality are distinct (Yusuf, 2020). Serious efforts are needed to be made to achieve spirituality through activation of inner dimensions of the mind that encourage one to think deeply. (Ulluwishewa, 2014., Kurt Y, Sinkovics, 2020). This has helped people to search for the ultimate reality to achieve ultimate transcendent higher power (Kurt et al., 2020).

All religions can be seen as different pathways to achieve spirituality. However, there are non-religious science-based pathways that are popular in the west. Those practices are done with no expectation, but for rewiring the brain by doing for others. That are practiced by those who claimed that they are spiritual but not religious. Non-religious pathways are, psychotherapy, past life regression therapy, spirituality-based counselling. spirituality based music, yoga, volunteer service, environmental services, transformational workshop, transformational discussions, reading such books.

Therefore, it is important to understand what spirituality in rational terms is. McDonald (2015) have identified one hundred items measures for operationalizing spirituality. Those measures have been then categorized in to five main dimensions as a directional framework for future research. Those are, Cognitive Orientation toward Spirituality, Experiential/ Phenomenological Dimension, Existential Well-Being, Paranormal Beliefs and Religiousness. Based on evidence of his findings, he further argued that those five dimensions have significant relation with, health, personality, social behavior of people.

In view of that, those behaviors which does not go in line with natural process of the environment, ethical behaviors of the society, and standardized & disciplinary norms of economics are known as unsustainable behaviorswhich are literally mean the inability of present humankind to sustain indefinitely (Peattie, K. 2010). The root course of unsustainable behavior is because of

our perceived separateness from fellow human beings and the natural environment, which results in self-centeredness, greed, and fear. Ideas of our feelings sometimes as personal opinions are well explained collectively by (Berejnoi, E. 2019). It states that shifts of exterior effects are also required to achieve long lasting existence, which has been termed as sustainability. However, the change itself is insufficient to come across pleasure by achieving sustainability. The focus of ours shouldalso be at external effects as well as on inner changes which develop intrinsicvalues to drive a person for a better interaction with surrounding plants, animals, and the environment altruistically (p.167).

RESEARCH PROBLEM/ STATEMENT:

Organic plays a significant role in enhancing the health of both human and planet. However, Evidence suggests that the intention of those who involve in organic industry are solely profit maximization. They are unlikely to sacrifice any part of profit for the wellbeing of society and environment. Profit orientation likely to adopt unethical practices by behaving unsustainable ways. Unsustainable practices of organic production and processing are in conflict with the consumers' purpose of being organic.

Organic products are sold at expensive price than conventionally produced products (Jonn, 2015). However, the authenticity of the product cannot be judged from appearance of it by consumers. There are some producers of organic products who are genuine enough to practice what they intent to practice throughout the production process by themselves withan internal motive to practice so before using the term for their products as “organic”. The same terminology has found to be open the door toall types of fraudulent practices by another group of selfish people. One example for which was the distinct price difference between sales prices among organically grown and conventionally grown products. Such fraudulent acts might increase the growth of organizations in terms of revenue generations and profits leaving a question about long lasting existence of the organization as well as the health of both human and planet. Past researchers have pointed out various factors affecting to the growth of SMEs but not specifically for organic industry. For example,(Wellmilla et al., 2011) pointed out that there are main factors that affect forthe success of entrepreneurs include age, experience, and education level of the entrepreneur. However, most of such research have not concern about effect of the spirituality as a factor for business/ organic business sustainability under Sri Lankan context or global context. This literally means the inability of present humankind to sustain indefinitely and is witnessed by the socio-political-economic-environmental dimensions we

seearound us. (Ulluwishewa, 2018).

Number of factors affecting business success of small and medium enterprises have been identified. Those are SME characteristics, management and know-how, products and services, customer and market, the way of doing business and corporation, resources and finance, strategy, and external environment (Chittithaworn, C. 2016). Action plan of national policy framework for small and medium enterprises (SMEs) development made by the ministryof industries and commerce in Sri Lanka in 2016, it is mentioned under national strategy for SME sector development that four main strategic elements are recommended to develop SME sector. And in the meantime, tenmajor areas of business supports are identified for SMEs. Those are Finance, Technology, access to information market, business development services, linkage information, infrastructures, legal and regulatory frameworks, industrial relations and labor, entrepreneurship skills, and environmental issues, however no concern about spirituality and non on organic sector globally and at national level in Sri Lanka.

Sri Lanka, being a country with rich agricultural heritage based on the Indigenous knowledge in nature management schemes practiced in ancient Sri Lanka, has been involving in eco-friendly nature farming practices evolved as a tradition, fed by their religion, and traditional believes with naturally available farm inputs with no chemical applications as fertilizers, or pests and diseases controls. Those farms and products were safe & healthy products with no contamination with harmful chemicals. Later, with the green revolution, the agriculture was gradually developed from subsistence nature farming to industrial agriculture. Then the agriculture became very efficient with mechanization and effective with many improved varieties and application of synthetic inputs supporting the improved varieties to deliver a maximum output in tums of yield per land area. Those excess yields were sold locally and internationally as a row product or as a processed product using technologically advanced processing technics and additives to enhance the shelf life. The use of chemicals in the agricultural industry as fertilizers, insecticides, weedicides, pesticides, growth regulators, growth inhibiters, vitamins, antibiotics, hormones etc. have become exceptionally higher beyond accepted limits for human health and the ultimate sustainability. Accumulation of chemical residues in soil, water, air, and in animals through food chains have been turning to irrevocable health issues for human, environment, society, and economy. As a preventive action the Sri Lankan government has declared chemical free cultivation from 2021 by banning Imports of chemical inputs for agriculture. Therefore, cultivations are to be

carried out with other inputs such as compost, natural minerals extracted form mines and extraction from naturally available ingredients.

However, those cultivation practices with no chemical applications cannot be justified as organic because of the organic is a labeling system that is granted for ecological production when the whole process has been certified by accreted third party organization (Vidanapathirana, 2012). According to the study undertaken by J.M.R.S. Bandara (2007) on Nature Farming Indigenous knowledge (IK) in nature management schemes practiced in ancient Sri Lanka during farming has been very prominent.

Most of studies related to the spirituality have been carried out in the Western Countries not in developing countries, especially in Sri Lanka. In a paper publishes by Harshan (2015) on "*The impact of Business Networking on SME Performance: Development of a Conceptual Framework"* have concluded that the conceptual framework model developed by him is expected to be used to examine the Sri Lankan context of business network in future because of it is especially important since the values, attitudes, cultural motives etc. of Sri Lankan people that affect business motives are entirely different from other developing countries which have been cited in relevant literature. Similarly, Wincent (2004) many others have developed and tested similar models, however, it has not been tested in Sri Lankan context thus far. Therefore, it has been a valid argument that a study to find the impact of the level of spirituality of stakeholders of organic orientation make a significant difference on the level of business sustainability under Sri Lankan context. All above evidence shows that the spirituality and the Sri Lankan context have not been a considerable concern for research studies on business sustainability of business in Sri Lanka.

There is a common misunderstanding among the public that spirituality is aboutsomething related to religious. Therefore, most of the time the term spirituality is perceived as religiosity. However, spirituality and religiosity are two different aspects. Therefore, a demystification of spirituality has been a significant concern. Modern agriculture being practiced with intensive use of agro-chemicals and heavy machineries is known as conventional agriculture. The intensive use of agro-chemicals in conventional agriculture likely to degrade the health of both human and earth (Wani, T.A.,2019). The degradation is not only due to addition of systemic agrochemicals, but also due to spiritual shortcomings in the farming systems adopted (Bandara, J.M.R.S., 2007). However, religious practices based on rituals and believes which are differentfrom religion to religion. Therefore, depending on the type of religion and the state of mind and behaviors is soften specific to farmers

whose behaviors,method of faming and ambitions evolves from the tradition fed by the religion. However, limited empirical studies have been conducted to demystify the difference between spirituality and religiosity among farmingcommunities.

Organic products are a reliable source of foods grown and processed in sustainable way with organic management practices without harmful agrochemicals. Growing, producing, and processing of an organic food or product is more on to a spiritual practice rather than just a technical involvement, in which the right code of practice with genuine commitment is a must. Organic foods are becoming more popular in the western world where majority of developed countries are located. This popularity is being built up due to the healthy and sustainable nature of the entire supply chain starting from raw materials leading all the way up to a product. Certified organic companies are supposed to have been every well administered and managed to be sustainable & organic and proven to be sustainable & Organic by certification itself offered after an audit & inspection carried out against a sustainable organic standard. Therefore, those companies can be considered as technically sustainable and organic. However, the question remains is whether they are sustainable, and the people of those organizations are genuine enough to serve true purpose being organically certified product producer to the nation? Therefore, a systematic empirical study is a timely requirement to find the sustainability and status of organic nature. Such a study is helpful to identify potential differences between "certified sustainability" and "empirical sustainability." The empirical sustainability is the sustainability achieved in compliance with an empirically tested and accepted dimensions of definitions for the sustainability. And investigating the roll of spirituality of member of organic network on sustainability and to finding the impact of spirituality to makes inner changes of members is also a significant importance. However, very limited or no research have been carried out thus far

- to find out if there is a significant difference between certified sustainability and empirical sustainability of certified organic companies in Sri Lanka and in the world.
- to find the level of empirical sustainability of certified organiccompanies thus far.
- to find the level of spirituality of member of organic industry.
- to find the effect of spirituality for serving the purpose of being organic.

With respect to the quality & compliances management, a considerable

attention has been given now a days to European, American, and Japanese models such as "total quality management," "business excellence models" and "national quality awards" frameworks. However, performance management systems and business excellence models and frameworks have given little to no consideration for social, environmental, human, and ethical dimensions of organizational performances. Moreover, organizations have been confronting many unsurmountable challenges, changes and pressures that make it very necessary to look for an organizational excellence alternative, namely spiritual organization (Al- Qutop et al., 2014). Similarly, the organic production and processing are also covered by the same country specific set of standards which are based on three main sustainable pillars people, Planet and Profit. Apart from the sustainable dimension of those standards, Considering the spiritual dimension of those standard to assess the level of spirituality of the organic industry is a significant importance.

RESEARCH QUESTION

The following research question are set for finding specific answers. The answers are then further analyzed and evaluated for discussion towards a better conclusion for the research problem.

- What is organic and industry?
- How does something become organic and why?
- What are existing issues with the organic industry?
- Is there any gap between the expected purpose and the existingstatus of being organic?
- What are potential reasons to have such a gap between the expectedand existing level of organic status?
- What is spirituality and its characteristics?
- What is the role of spirituality in achieving the purpose of organicindustry?

OBJECTIVES

The overall objective of the research will be to assess the significance of spirituality of stakeholdersin organic industry in achieving the true purpose of being organic.

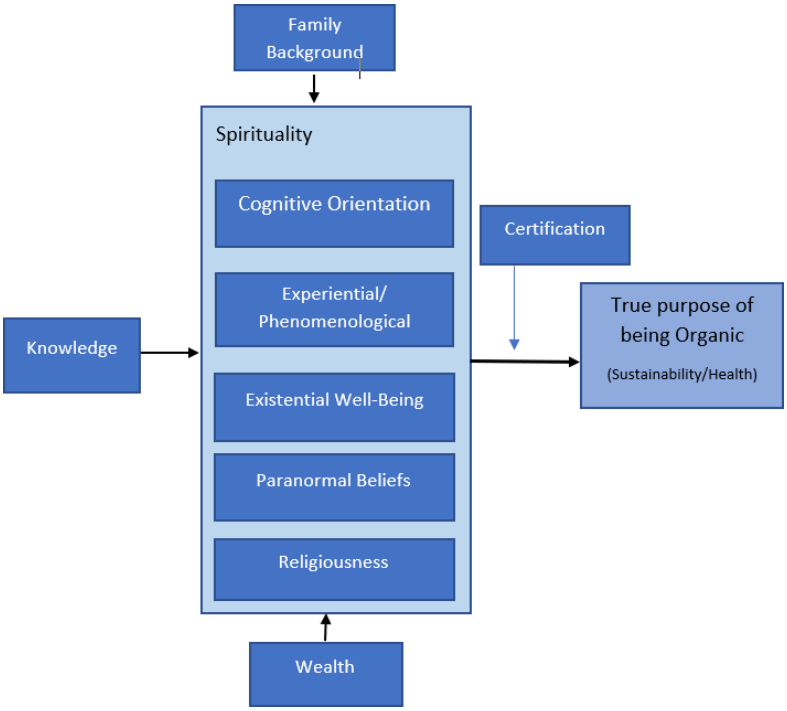
However, the following specific objectives will be also set in order to achieve in to a better conclusion after finding answers to questions.

- To investigate what is organic and organic industry.

- To investigate the true purpose of being organic consumer.
- To evaluate existing status of the organic industry.
- To empirically identify reasons for the gap between existing statusof organic industry and true purpose of being organic.
- To understand spirituality in rational terms and to investigate howspiritual growth transforms people from self-centeredness to self- transcendence.
- To assess the significance of the level of spirituality of people andto understand the relationship of the level of spirituality to commitment to the purpose of being organic.

CONCEPTUAL FRAMEWORK

Figure 1: Conceptual Diagram



HYPOTHESIS

Evidences from literature confirms that there is a obvious impact of being spiritual by key stakeholders of organic industry towards achieving the true purpose of being organic. The spiritual underdevelopment of stakeholders is unlikely to contribute to the true purpose of being organic. Therefore, the null hypothesis has been set as follows

H_o: Organic industry without spirituality in its key decision-makers is unlikely to serve the true purpose of being organic.

On the other hand the spiritual development will transform someone to self transcendence at which the health of both organisms and earth is valued and hence behaves sustainably. Therefore, the research will be focusing on testing the below hypothesis as an alternative.

H_1: Organic industry with spirituality in its key decision-makers is likely to serve the true purpose of being organic.

METHADOLOGY

The research has been designed as mixed research in which pure and applied type of research are conducted. The pure or inductive type of research will be conducted for exploring the ontological dimensions of "spirituality" and "organic" with the aim of demystifying spiritual development as a quantified scale against which how do the behavioral and psychological arrangements effect on the final purpose of being organic. Then the findings will be tested against related theories to empirically justify with literature support using a applied research method as a deductive type. In that effort of using both applied and pure methods, both qualitative and quantitative method will be used to collect primary data.

The organic industry will be used as the population for data collection. The organic industry consisted of two main groups of stakeholders. Those are certified organic producers and non-certified organic producers. Both groups will be considered as components of organic population for data collection of this research. Population of certified organic producers (Growers) and processors will be identified from records of the Department of Censusand Statistic, Agriculture Department, and from certification bodies who certify organic projectsin Sri Lanka.

Data collection will be done using two different methods. Data of the pure type of research part will be collected using direct interviews and case studies as qualitative research. Whereas the data of applied part of the research will be collected using a structured questionnaire.

Structured questioners and direct interviews will be used for primary data collection. Questioners will be distributed among owners within the sample, who shall be key decision makers of the Organic Industry. Self-administrative (hand over and ask them to fill and return later) method will be used. Contact persons telephone numbers will be also collected for future verifications of doubts. Information will be collected as primary data using

questionnaire. The questionnaire will be developed by using questions selected from past research to collect information for empirical analysis. Guidance about the questioner will be given only about the questioner and how to answer. Answers will be supposed to be given by the respondent by themselves as an independent individual. The following sources will use as secondary data (Books, Journal articles, Newspapers, Internet)

Quoter sampling based on the activity within theorganic industry, will be used as representative samples over industries. (Non-probability sampling) Convenience sampling methods will be used as sampling method. Sample quantity of individuals' despondence from the industry from the total population of registered and non-registered organic producers and processors list will be selected at random as the sample. The equiprobability method of systematic sampling will be used by progressing through the list to pick individuals. The sampling will be started by selecting an element from the list at random and then every element in systematic order in the frame will be selected. However, a convenience sampling method will be used for collecting data from the industry in place of someone whose details in the list are not traceable enough to locate them to their actual location.

Data Analysis will be done using statistical techniques such as, descriptive statistic and inferential statistic techniques. Descriptive statistic technique such as mean, median, standard deviation will be used to analysis and describe the basic features of the data in the study to provide simple summaries about the sample and measures. Coefficient of correlation, independent t-test, regression analysis will be used as inferential techniques to analysis the data of the research to infer the properties of the population. The data will be analyzed using SPSS 23.0, AMOS.

DISCUSSION AND CONCLUTION

There is a significant requirement of an organic industry as far as consumers health and the health of the planet is concerned. The consumers' purpose of being organic is personal health and planetary health. However, the organic producers' purpose of being organic has been the profit. This is a significant conflict between the consumers' and producers' purposes of being organic. These conflicts make the organic industry fail to achieve its purpose.

Organic producers can be motivated either extrinsically by greed for having organic status & profit in terms of a premium, fear of losing profit, and of getting caught to organic inspectors for non-compliance or intrinsically by spiritual qualities arising from their feeling of connectedness/ Oneness with self, others, and nature. While those who are spiritually underdeveloped are

likely to be motivated extrinsically those who are spiritually developed are likely to be motivated intrinsically. It is the intrinsically motivated organic producers/ stakeholders who contribute to achieve the true purpose of the organic industry.

The potential role of spirituality in transforming the minds of organic producers so that equal priority is given to people, customers, planet and profit and the purpose of organic industry is achieved. In that effortof being spiritual for serving the true purpose of organic, understanding what spirituality is, a significant importance. Accordingly, this research would contribute to investigate as to how spiritual growth causes inner transformation from self-centeredness toself-transcendence and how this inner transformation makes organic producers value customers' health and the heath of the plant. Finally, findings of the research would contribute to develop strategies to makeorganic producers spiritual.

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INTEGRATING URBAN FARMING INTO THE SRI LANKAN RESIDENTIAL ARCHITECTURE AND BUILT ENVIRONMENT

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ABSTRACT

Sri Lanka is facing a devastating food crisis in recent years due to the economic collapse in the country. Day by day, access to food is decreasing while the prices are increasing. Urban agriculture is viewed as a workable solution for urban food issues in developed nations. However, Sri Lanka is still in the early stages of urban farming. There is still a need for investigation into the potential applications of urban framing technology in Sri Lanka's built-up urban environment. The project will examine how to set up urban farming systems that might be used in high-rise structures, homes with yards, and low-income slums, as well as develop instructions for the general public on urban farming. Additionally, it will look at how urban farming practices might be related to residential building architecture. Following the preliminary research, a series of product prototypes will be made using soilless farming techniques. These will undergo testing and modifications to

Keywords: Building construction technology, urban agriculture technology, urban farming, architectural design

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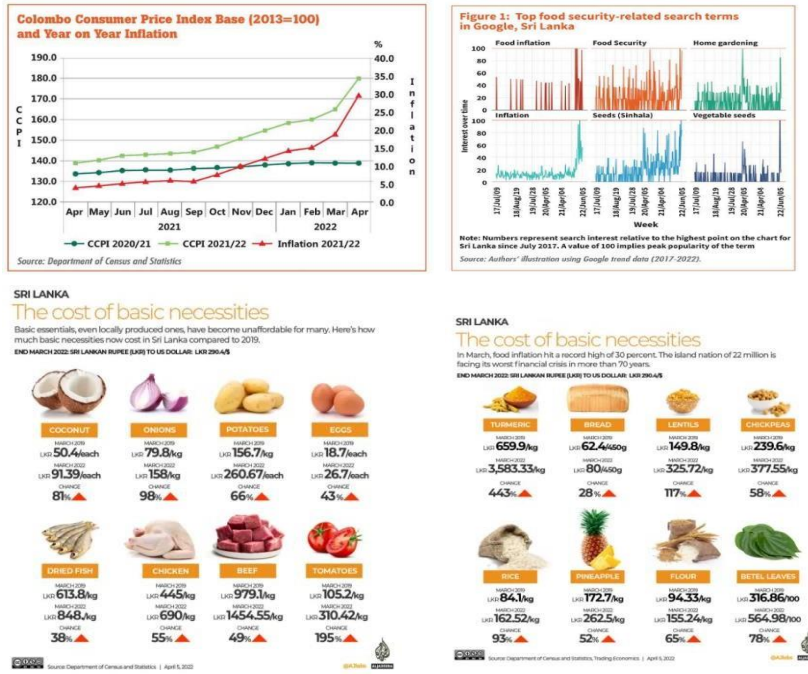
INTRODUCTION

According to the FAO Publications Catalogue 2021, one of the greatest challenges facing the globe now is food insecurity. According to recent estimates, 750 million people worldwide (9.7% of the world's population) experienced serious food insecurity in 2019. (“The State of Food Security and Nutrition in the World 2021,” 2021) While the 746 million people who are suffering from severe food, a further 16% of the world's population, which is

1.25 billion individuals have suffered from moderate food insecurity. Those who are moderately food insecure do not regularly have access to nutritious and sufficient food, even if they are not hungry. (FAO et al., 2020) According to the United Nations' 2020 report, Asia has the most food-insecure people, but Africa has the fastest-growing number of people facing a food crisis. The COVID-19 pandemic pushed over 130 million more people into chronic hunger by the end of last year (IBRD & IDA, 2022)

And Sri Lanka is no exception when it comes to the food crisis. Sri Lanka faces several socio-economic issues, including the impact of a nutritional "triple burden" that includes undernutrition, obesity, and vitamin and mineral deficiencies(UNICEF, 2020). According to Asian Human Rights Commission Sri Lanka "repeatedly tops the lists in South Asia when it comes to hunger,". In the years between 2006 and 2010, the number of children facing malnutrition was estimated to be 843.913, or 21.4 percent of the total, with a rate of 15%, wasting among children under the age of five is among the highest in the world (Fernando Basil, 2022). When the latest Demographic and Health Survey was published in 2016, undernutrition rates remained mostly stable for nearly a decade (Department of Census and Statistics, 2017).

Figure 1: Statistics of Food Crisis in Sri Lanka



In terms of food security, Sri Lanka is ranked poorly on both the Global Food Security Index (GFSI) (The Global Food Security Index, 2020) and the Global Hunger Index (GHI) ("Global Hunger Index 2021: Sri Lanka," 2021). With an average of 192 Kcal per day from 2014 to 2016, Sri Lanka had the worst caloric shortage in South Asia, according to FAO statistics. Afghanistan (26.8 percent) is the only nation in South Asia to have a higher prevalence of malnutrition than Sri Lanka (22 percent). Furthermore, Pakistan (30.5 percent) and Afghanistan (36.6 percent) are the only two countries in South Asia that have higher rates of food insecurity than Sri Lanka (29 percent) (Harding et al., 2018)

Additionally, the capacity of households to buy enough food, both in terms of quantity and quality, was significantly reduced as a result of the numerous income shocks (Pieters et al., 2013). Disruptions in the supply chain were a factor in the prolonged high levels of food prices that followed the initial period of mobility restrictions. Economic shocks become a major cause of food crises in 2020 as the indirect result of COVID-19 (Swinnen & Vos, 2021). Supply chain disruptions worsened food price increases, particularly in the early aftermath of travel restrictions, and prices stayed high for a very long time afterward (Aday & Aday, 2020). Extreme weather conditions did contribute to food crises, albeit to a lesser extent than the other two main causes. Even so, in 15 countries in 2020, weather extremes continued to be the leading contributor to acute food insecurity, with about 16 million people experiencing a Crisis or worse (FAO, 2015).

Slums and informal settlements, where socioeconomic development is frequently already less than in rural areas, will continue to be particularly vulnerable to rising food insecurity in urban settings (Szabo, 2015).

The agricultural land available in Sri Lanka is around 45% of the country including home gardens, which is 18.18% (*Department of Census and Statistics*, 2022). The yield is unable to cope with Sri Lanka's current demand. Therefore, to cope with the demand our country imports food products from countries like India, Canada, Russia, Australia, and 90 other countries. The total sum is 352.03 million dollars for vegetables, certain roots, and tubers for the year (World Integrated Trade Solutions, 2017). As a country with a negative trade balance, this number is taking a toll on our economy.

Urban agriculture is viewed as a workable solution to the urban food crisis in many affluent nations. Urban agriculture significantly reduces urban food insecurity issues, which are only likely to become more important as poverty

and population urbanization in developing countries continues to rise in prevalence (Kulatunge S et al., 2021) Urban agriculture has the potential to significantly contribute to alleviating urban poverty and food insecurity, although this potential should not be overestimated given that its revenue share and overall agricultural production are often very small. But its significance should not be understated, especially in most of Africa and in many other countries where agriculture is a major source of income for the urban poor (*Unlocking Africa's Agricultural Potential*, 2013).

Food production in cities is not a novel concept. Farmers in ancient Mesopotamia and Persia may have set off parcels of land within towns to grow food and dispose of waste, according to archaeological data (Mccauley, 2020). In both Asia and Europe, city farming has a long history. It was formerly popular because it kept the products near to the user at a time when transportation was difficult, and communication was weak (Khaled & Mcheick, 2019). City farming was formerly a means of survival. today it is still a means of existence for many of today's poor urban people, but it also gives freshness, dietary variety, and nutritional food.

Rural agriculture cannot offer the advantages that urban agriculture can. It can occur on rooftops, in backyards, in communal fruit and vegetable gardens, and underused or open areas. Urban farms frequently raise a variety of produce, including fruits, vegetables, herbs, and spices. Urban gardening is thought to directly benefit or make money for at least 100 million people (Medici et al., 2020a) Urban agriculture has several significant benefits. Some of these include the increased income for farmers, as a way to combat unemployment, environmental advantages such as reduced runoff, the opportunity to avoid spending money on wastewater treatment and solid waste disposal, the reduction of the need to import food, and a reduction in urban poverty (FAO, 2001).

According to a survey conducted in Africa, urban and peri-urban agriculture at home or in public places significantly contributes to food security, additional income, and a healthy diet. Market gardening, according to the FAO, has an impact on the food supply and the way of life of people in several nations with the greatest potential for future growth (FAO, 2017)

And in a case study analysis on urban farming in rooftop gardens, rooftop greenhouses, and a community rooftop garden in Bellaterra, Spain, it was revealed that the economic cost and environmental costs are significantly lower. Life cycle cost and life cycle assessments proved that urban agriculture could

improve both environmental and economical sustainability. It also prompts the discussion of the importance of the techniques and management needed in urban farming (Sanyé-Mengual et al., 2018). Another study was conducted in Beijing, China to calculate the difference between the carbon footprints of traditional farming systems and urban farming systems. Home-delivered agriculture projects had a lower Carbon footprint per unit of profit (0.093e0.097 kg CO2-eq per CNY) than conventional farming (0.111 kg CO2-eq per CNY). The traditional farm's lower Carbon Footprint per unit of product weight was largely attributable to high yield, whereas the HDA initiative's lower CF per unit of profit was primarily owing to superior economic performance through income optimization (FAO, 2018)

RATIONALE AND JUSTIFICATION OF THE RESEARCH PROBLEM

Urban agriculture is a concentrated enterprise that uses horticulture, animal husbandry, aquaculture, and other techniques to produce fresh produce, and other agricultural items, both in urban areas and the peri-urban areas that surround them. Urban agriculture systems can be found in ground-level farming, rooftop farming, hydroponics, greenhouses, and other cutting-edge technologies. Urban agriculture could produce food for local use, especially for perishable foods and high-value crops. A growing trend in urban environments is the commercial-scale production of non-food crops like flowers and green walls. Urban agriculture, a phenomenon involving urban economies, culture, science, and technology, is significant for food security and is present in smart cities. Urban agriculture is a sign of an advanced economy in a city. Contrary to traditional agricultural methods, urban agriculture takes substantial use of resources like money, infrastructure, manpower, and technology. To increase agricultural production and interregional trade, it also practices industrialized, market-oriented agriculture that can benefit from established markets, information, and transportation networks in other countries (Medici et al., 2020b).

Urban agriculture is less common in developing and lower-middle-income nations, but it has considerable growth potential in these regions. The success of urban agriculture in cities like Hanoi, Shanghai, Beijing, Mexico City, and Dakar has shown how agricultural education can aid in reducing poverty, ensuring food security, improving nutrition, generating additional income, protecting the environment, and raising awareness of the importance of agriculture. Up to 80% of the fresh vegetables in these cities may come from Hanoi and the area around, according to the Netherlands' Resource

Centers on Urban Agriculture and Food Security Foundation (Teng Paul, 2020).

When taking the scale of commercial urban farming projects, complexity, and budget of the current urban farming projects globally into consideration, it is rather hard to implement these projects in a context like Sri Lanka. The urban farming buildings should be provided with sufficient energy for plant growth. This additional cost should be taken into consideration in such projects. It is not effective to use solar panels in such projects in the urban context as there will be shade from other buildings surrounding it. And as the building interiors have less access to light, artificial lighting should be provided. This artificial lighting will interfere with the air conditioning systems, so again there will be high energy costs. Additionally, transporting supplies such as fertilizer up onto the towers or hauling artificial growth equipment, water, or other resources down as needed (Ellingsen Eric & Despommier Dickson, 2008) And in tall structures, particularly heavy amounts of water will be transferred to higher floors (Perez Victor Mendez, 2014). Water transportation is crucial for controlling the sewage system in addition to supplying the building with the necessary water supply. However, it is possible to derive ideas and transform them into functional systems for Sri Lankan urban concepts.

GENERAL AND SPECIFIC OBJECTIVES

General Objective

This study's overarching goal is to incorporate urban farming tactics and infrastructure into the residential design and the built environment. It will look into how Sri Lanka's urban residential design and built environment may include green agricultural practices.

Specific Objectives

1. to determine how urban farming in Colombo can be included in the architecture of residential structures.
2. to determine how Colombo's present residential built environment may be merged with urban farming.

THE SIGNIFICANCE OF THE RESEARCH

We haven't yet looked into how urban framing technology might be used in Sri Lanka's urban residential built environment. Looking into the possibility of urban farming at the residential level of buildings will be advantageous as a solution to Sri Lanka's urban food shortage because the current research on urban farming focuses on high-tech and large-scale structures.

Numerous production techniques, including conventional and organic ones, are included in urban farming. A regionally connected system of methods for producing plants and animals will have the following long-term effects:

- generating enough human food, animal feed, fiber, and fuel to satisfy the needs of a growing population.
- environmental preservation and increased access to natural resources
- The economic viability of agricultural systems will be preserved.

Due to the current situation, a new food economy is forming in Sri Lanka. Urbanization, the loss of agricultural land, and growing consumer awareness and appreciation for high-quality foods were the catalysts. Large farms have chosen to leave the urban perimeter for cheaper land further away from the city core as cities expand into rural (Gamhewage et al., 2015). Small family farms struggle to thrive due to a lack of resources or a desire to relocate.

Through this research, a household solution to urban food scarcity will be developed using straightforward systems and architectural techniques. It will improve the nutritious value of the food that is eaten and the standard of living for those who reside in unlicensed low-income settlements. Urban farming will appeal to consumers who favor the development of an alternative, more sustainable food economy. These organic and soilless techniques will be able to start a new trend in farming. Additionally, it will be able to foster a rewarding leisure activity and a sense of community.

Three household categories will be the primary targets of the devices and initiatives.

- High-rise apartments
- Housing with small-scale gardens
- Low-income settlements and illegal settlements

Additionally, the strategies will be developed so that they will address certain issues unique to each type of residential housing.

RESEARCH PROBLEM AND RESEARCH QUESTIONS

Sri Lanka has a significant rural agricultural engagement whereas urban agriculture is still in its emergence stages. Although academics, the government, and non-governmental organizations have identified the potential for urban agriculture in Sri Lanka, the economic potential for urban agriculture is still unknown. Thus, Sri Lanka's existing urban agriculture practices are mostly for recreational purposes (Ranasinghe, 2010). The regulations and bylaws of the City of Sri Lanka prohibit the economic activity. This promotes and supports this hobby activity. There is no research specifically examining this aspect of urban agriculture, even though academics and agriculture specialists in Sri Lanka have expressed interest in assisting entrepreneurial urban agriculture in working papers, theses, and assessments (Gamhewage et al., 2015).

Therefore, this research intends to provide answers to the identified research problem.

1. What are the urban farming systems that can be created to be implemented in urbanized areas as a part of residential building architecture – what are the outdoor as well as indoor architectural strategies and systems that can be used in an urbanized setting as a part of the residential building and the separate systems that can be involved.
2. How to adopt and develop the technology of using green farming and building construction technology in Sri Lankan urban residential architecture and the built environment.
3. How to apply urban farming systems at different scales, to suit space available and the user's economical level – Space available in different residential spaces of different economic sectors requires specific urban farming systems.

LITERATURE REVIEW

Urban agriculture's present revival has its roots in community gardens from the 1970s (Maciej Serda, 2013). The actual revival started in the middle of the 1990s when American communities began linking urban farms and gardens to addressing food insecurity, claims Glowa. Later, urban agriculture became more associated with environmental justice activism, local food promotion, urban sustainability initiatives, community health campaigns, and food justice activism (Grewal & Grewal, 2012)

Modern Technology

As the name suggests, vertical farming is a sort of agriculture that enables agricultural production to occur inside vertical structures like buildings. Large-scale versions are frequently incorporated into existing structures, including office buildings, and are typically constructed from numerous vertically stacked surfaces. Additionally, they can be constructed within converted warehouses, shipping containers, or greenhouses (Vyas, 2021).

For a variety of reasons, vertical farming is a cutting-edge and possibly more environmentally friendly kind of agriculture. For instance, it consumes up to 95% less water than conventional farming, which is a substantial difference. This is true because a portion of the water used can be recycled and utilized again. Furthermore, evaporation losses are decreased (IGrow-Indoor Vertical Farming News-IGrow, 2021).

Additionally, it occupies less area (especially on the ground) and has little to no effect on the region's native soils. The Vertical Farming Institute asserts that 50 square meters (538 square feet) of conventionally farmed land yields roughly the same amount of vegetable crops as one square meter (10.76

square feet) of vertical farming floor space (VERTICAL FARMING - Vertical Farm Institute:: Leading Research Network, 2022).

Vertical farms can be operated without using pesticides and herbicides, which can potentially be very harmful to the environment. Vertical farms typically enable year-round crop growth due to the regulated environments they provide (Ku, 2019).

Hydroponics

Most methods of vertical farming use hydroponics, a method of plant cultivation that is widely used and is rising in popularity. Unlike traditional farming, where plants are grown in dirt, organic farming grows plants in nutrient solutions. In this kind of vertical farming, the plant's roots are submerged in a nutrient-rich solution that is circulated and occasionally checked (vertical roots, 2020).

Aeroponics

This method involves growing plants in an environment without soil or much water, such as an air or mist environment. In aeroponics, seeds or seedlings are "planted" in foam pieces placed into tiny pots that are exposed to light on one end and nutrient spray on the other. The foam holds the stem and root mass in place as the plants grow. One of the most water-efficient vertical farming techniques is aeroponics, which uses over 90% less water than even the most efficient hydroponics setups. Because they are kept in the water, the nutrients are also recycled. Additionally, it has been demonstrated that plants grown in this way absorb more vitamins and minerals, possibly improving their health and nutritional value. Plants grow more quickly because water contains more oxygen (Vyas Kashyap & Posch, 2021).

Figure 2: Hydroponic System

Source - https://amhydro.com/learn-hydroponic

Figure 3: Aeroponic System

Source: https://www.advancednutrients.com/articles/aeroponics-beyond-hydroponics-in-high-tech-gardening

Aquaponics

Another kind of vertical farming is aquaponics. In this technique, fish in indoor ponds excrete nutrient-rich waste that is used as a food source for plants grown in vertical farms. The wastewater is cleaned and filtered by the plants in return and then recycled back into the fishponds. Microbes are essential for turning fish waste products into nutrients that plants can eat. They coexist with fish and plants (Chaudhry & Mishra, 2019).

Figure 4: Aquaponics

Source: https://www.treehugger.com/best-plants-for-aquaponics-5186557

Urban farming in Sri Lanka

The only program in Sri Lanka that promotes the urban agriculture system is Divi Neguma home gardening (Jayampathi Senanayake NSB Epakanda

SMA Samarakoon, 2014)Following announcements in Mahinda Chinthana – Vision for the Future and Budget 2011, the Ministry of Economic Development launched the Divi Neguma program, which aims to help family units become self-sufficient, financially stable, and less reliant on the market for their daily food needs. The Divineguma Programme | Social protection was undertaken in three phases (Social Protection Organization, 2017)

1. Agriculture phase – home gardening
2. Small-scale industry phase – industries, handicraft sector
3. Livestock phase –fishery, poultry, and dairy sector

The Divi Neguma program's main goal is to improve people's economic standing and reduce their reliance on the market for their food needs. In addition, the program intends to

1. increase nutritional intake
2. Households' living costs reduction.
3. 25% increase in vegetable and food production
4. Increase per capita vegetable consumption from 134 to 175 grams per day
5. provide additional sources of revenue for families by selling surplus produce.
6. encourage village-level entrepreneurship

Agriculture was the program's initial phase, to produce 1 million home gardens. Based on household interest in participation in the program, 100 household units were chosen in every Grama Niladhari division. Seeds, fertilizer, and advice were provided by the government to help people start their gardens at home. 987,416 fertilizer packages and 1,112,236 seed baskets have been handed to the people by 2014 (Jayampathi Senanayake NSB Epakanda SMA Samarakoon, 2014)

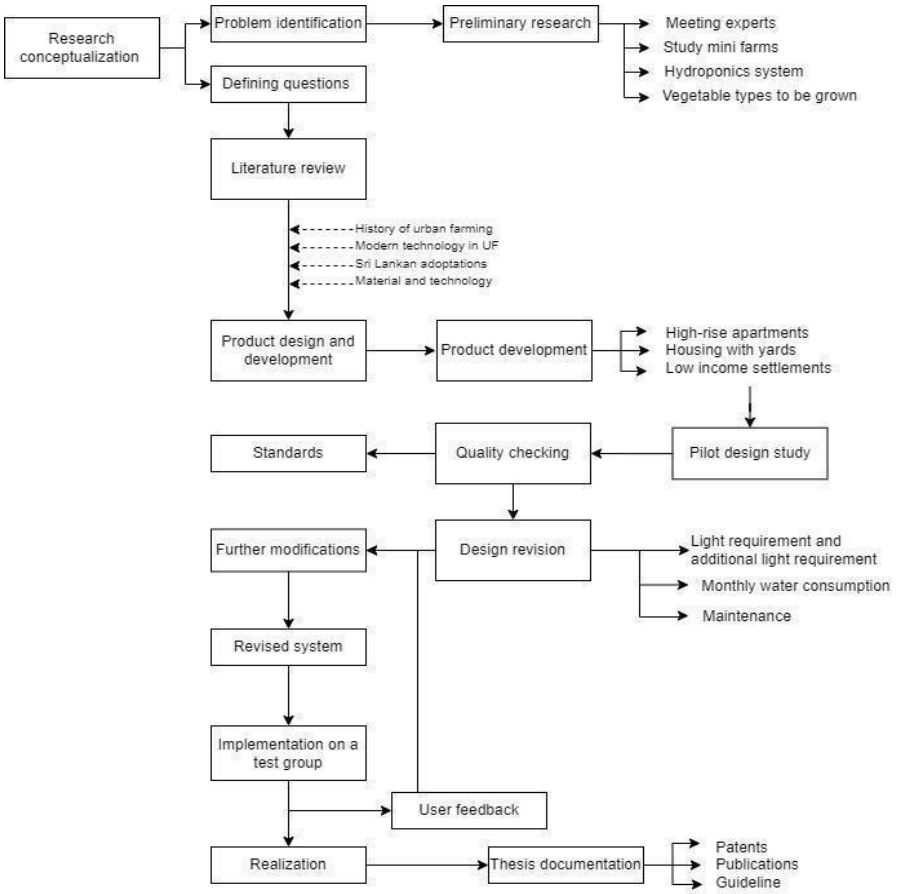
A study was done in the administrative capital, Sri Jayawardenapura Kotte. As a part of the ‘Divi Naguma’ program 384 urban women were assumed to be engaging in Urban farming. A sample group of 82 women, with 50% participating in Urban farming and the rest not, was taken for the survey. The survey was structured using a Likert scale. Women farmers inside the city have embraced urban agriculture as a feasible option as a way to produce microcredit and that urban farming is a viable option for tackling climate change in the event of a food shortage. The non-farmers had a poor opinion of the concept of urban farming. The results indicate that urban women Farmers were aware of the potential of urban agriculture and its ability to begin and end at any time of the year and it can be effectively managed with the resources at hand. The non-farming urban women were unaware of this potential(Gamhewage et al., 2015) In addition, urban women farmers have

recognized the fact that urban agriculture is a viable option. It is a method of landscaping that is also beneficial to the mind. They also do not contemplate urban agriculture as a source of annoyance in their private lives and responsibilities. Most importantly, urban farming women believe that their role in food security is crucial.

METHODOLOGY

After the problem identification and definition of research questions are completed a thorough data analysis will be conducted using a literature review. Areas of focus will include but will not be limited to the history of urban farming, the modern technology of urban farming, materials that are used in urban farming as well as urban farming in Sri Lanka. The data gathered will be compiled into an inventory. A data inventory is a catalog of datasets that includes metadata that identifies the dataset's contents, source, licensing, and other relevant details. The data inventory is a useful tool for any organization or project that deals with a variety of data types and sources (Beale, 2018).

Figure 5: Focus Areas of the Literature Review



Data Collection

Study Site

An initial survey will be conducted in the administrative capital of Sri Lanka, the Sri Jayawardenapura area. The sampling groups will be selected at random to ensure external and internal validity and it will also eliminate the sampling bias (McLeod, 2019). Sampling groups will cover three groups, residents of luxury apartments, middle-class families, and low-income families that are living in the areas.

Preliminary Survey

Both multiple-choice and Likert scale items will be included in the survey. The survey is intended to be conducted with 90 participants. The poll will provide 30 participants from each neighborhood with the option to take part. The survey will concentrate on elements that are crucial for designing micro-farms.

i. Availability of a balcony, rooftop, rear space, garden, and indoor space.

ii. Number of residents

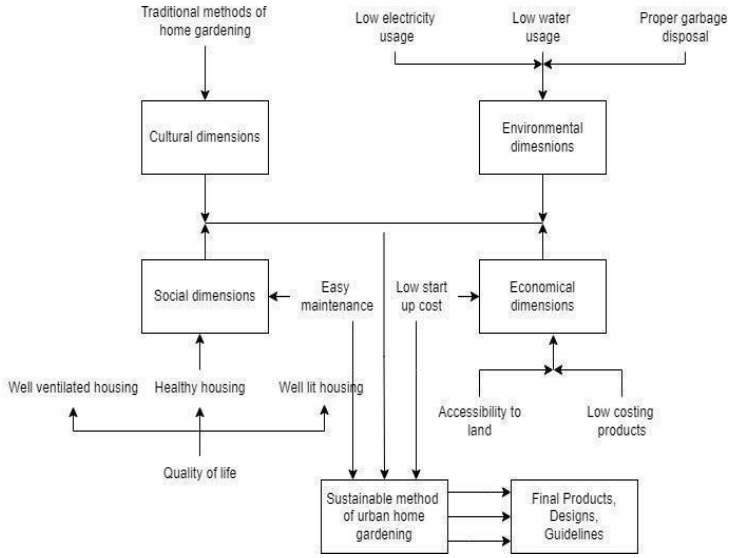
iii. Time that can be allocated for an urban farming project

To gain a comprehensive understanding of the knowledge and needs of the neighborhoods, interviews will be performed. There will be 30 participants in the interview, 10 from each type of residential setting. A transcript of the material gathered will be kept for future use.

Design and Development

Using the information gathered, prototypes of the systems will be created. The designs will be an integration of techniques like vertical farming using hydroponic, aquaponic, and aeroponic methods. The prototypes will be further developed into functional mini farms of various scales.

Figure 6: Design Breakdown



Testing

The pilot design will be tested against sets of standards to check its durability and structural stability. The monthly water and electricity consumption will be calculated. The demands of these systems such as water consumption and light requirements will be calculated. Modifications will be done to lower the energy usage of the systems.

Implementation of a test group

The revised systems will be implemented in a small test group. The users will be selected based on the previous sector spanning across all three neighborhood types. after the systems have been in operation for a month a survey will be conducted among the test groups to get an insight into the real-world application of the systems and devices. From the information gathered via user feedback, further modifications will be done. And the quality testing procedure will take place before the systems reach the public.

Documentation and expected outcomes

The findings will be recorded and documented. A set of guidelines on the systems will be published targeting the public of different neighborhoods as well as architects and designers. A set of publications and articles will be produced along with the Ph.D. thesis.

Dissemination of knowledge and proposed outcome Potential audience

The key audience includes the following categories.

- Real Estate Industry

- Architects and building designers
- Civil Engineering
- Urban design industry
- Government officials that are making decisions
- Government bodies related to agriculture
- People living in high-rise buildings
- People living in houses with a small garden
- People living in slums or low-income settlements

The dissemination plan would use techniques including graphical, electronic, print, and demonstrations. Newsletters and events would be held for study participants. Multiple channel dissemination will be chosen to disperse the knowledge to a broader audience. While the publications and journals might address a group of audience, having events, and demonstrations will have a higher impact on some of the intended audience categories.

The research outcome will include publications, journal articles, Ph.D. thesis as well as devices, designs, and patents. This will in detail explain the ways of enforcing urban farming techniques in urban planning.

ACKNOWLEDGMENTS

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BIO-INTEGRATED ARCHITECTURAL MODULAR FAÇADE FOR LIVING WALLS IN BUILT ENVIRONMENT

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ABSTRACT

Like the rest of the world, tropical urban cities are undergoing tremendous population expansion. Urban heat stress is on the rise, creating the Urban Heat Island, as a result of reduced vegetation and the development of the built environment using impermeable materials. In order to address the issue, vertical greenery systems are in demand as an adaptation to the built environment. Vertical living walls have become a popular trend globally elongated with many benefits. However, to gain the possible benefits, comprehensive knowledge is necessary as living walls are more frequently requested by many urban residencies in Colombo, adopted as an icon for sustainability, aesthetically pleasing and visually appealing expression. Nevertheless, the emergence of novelproducts should be catered to the local market with less complexity addressing a low profile in cost, maintenance, and durability.

The development and invention of a Bio integrated modular brick disclose an environmentally friendly living walling method which comprises a single unit where the unique design is adopted to solve the problems in the construction, installation, irrigation,drainage, water, and power supply of a vertical living wall system. A comprehensive literature review has been conducted to collect data on mortar and brick properties, vegetation and germination, irrigation systems, and structural properties. The self-interlocking feature of the masonry unit is designated in both the female and the male face of the unit, improving strength and balance. Also, the potting area can be utilized for soil and plants while the waterproofing layer is in between the planting area and the main structural part of the unit. Specially designed grooved have been catered for irrigation and nutrient supply pipelines with outlets. This vegetated masonry unit can be adapted to all exterior or interior facades and for boundary walls which is low in cost, and maintenance and high in durability.

Keywords: Bio-Integration, Modular brick, Urban Heat Island, Urban context, Vertical Living Walls

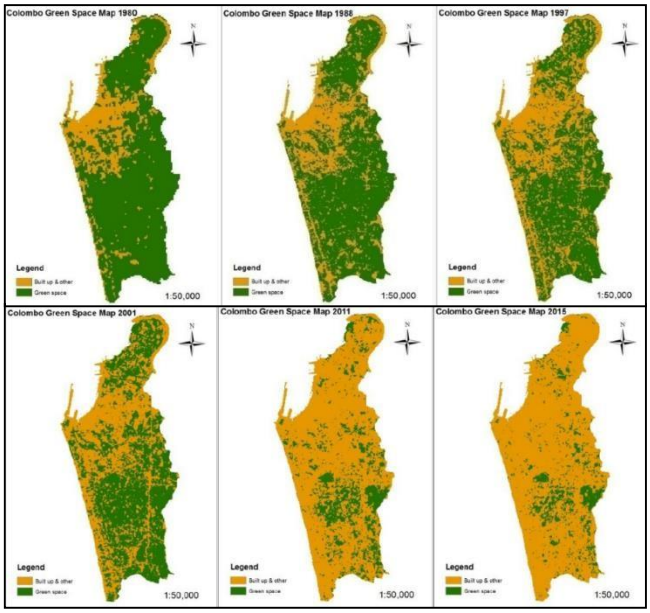
INTRODUCTION

The indirect influence of COVID-19 significant cause, economic shocks became a more important driver of food crises in 2020. Food price surges were exacerbated by supply chain disruptions, especially in the immediate aftermath of travel restrictions, and prices remained high for a long time afterwards. Sri Lanka has a significant rural agricultural engagement whereas urban agriculture is still in its emerging stages (Figure 1). The government of Sri Lanka promoted the public to engage in home gardening and has launched several programs in support. However, people living in urban areas, especially in Colombo city, are facing difficulties implementing the home garden concept due to a lack of space.

The present economic crisis exacerbated by the Covid-19 pandemic which torpedoed tourism and remittances, Sri Lanka facing a shortage of foreign exchange. This situation led to an unprecedented acute economic and energy crisis, where food and energy supply have been disrupted. Due to the non-availability of fuel to generate thermal power, residential, commercial, and industries facing many difficulties due to power outbreaks. Surprisingly, space cooling accounts for more than 75% of total electricity consumption in a typical building in Sri Lanka. Residential buildings have become the most prominent energy end-use sector in an economy, absorbing 50% -70% of operational energy for internal cooling and for Heating Ventilation and Air Conditioning (HVAC) (Geekiyanage & Ramachandr, 2018). The building façade is the main component of the building envelope that separates the building interior from the outside and it has a greater potential of being the climatic filter where double skin envelop are identified as a better option to maintain comfortable indoors (Rajapaksha et al, 2015).

However, urban areas are heating more than rural contexts, where naturally available vegetated surfaces (such as grassand trees) are replaced with non-natural heat-absorbing, non-reflective, water-resistant impervious surfaces (such as concrete, and asphalt) made with anthropogenic materials which absorb high percentages of incoming solar radiation. Addressing the matter, most cities adopt vegetative surfaces in terms of urban forestry such as green roofs, living walls,green facades, and green turf areas.

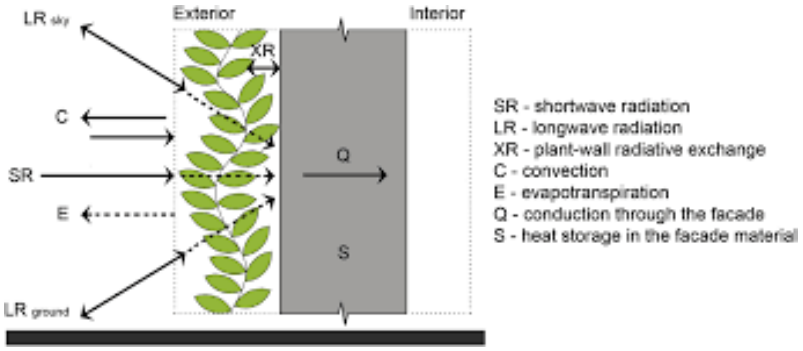
Figure 1: Colombo Green area map from 1980-2015 (*Li & Pussella, 2017)*



Results of the on-site investigation of the existing Vertical Greenery System revealed Living Walls to be better in thermal performance with a record of maximum temperature reduction of 10.16°C, 3.31°C, and 2.11°C in an external wall surface, internal wall surface, and internal air temperature respectively (Rupasinghe & Halwatura, 2020). Figure 2 shows the energy balance of a vegetative façade.

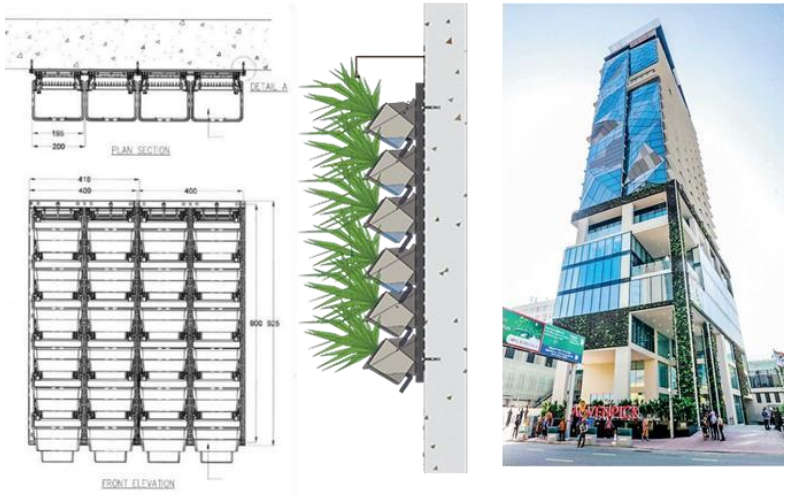
Furthermore, the 'Green wall' or the 'Living wall' can be an advantageous solution with substantial potential to work as an approach to the Vertical Farms solution. Vertical Farms are a new concept and philosophy for the way humanity thinks about agriculture. A goal for Vertical Farms is the eventual ability to grow to produce in city centres to avoid transportation issues and to preserve existing natural life by slowing deforestation (Villanova, et al., 2013).

Figure 2: Thermal evaluation of a vegetative façade (*Surasova, et al., 2013)*



However, living walls are very expensive and cost-effective in the local market because of the structure, materials, and maintenance. Responding to the phenomenon a new bio modular brick has been developed integrating vegetationinto the façade. The brick consists of interlocking sections, plant pot area for substrate, and the plant. Along with the modular brick, the overall façade system will be developed and designed with Drainage systems, irrigation with separate sections, spate brick designs for corner bricks of the wall, and a drip tray to collect excess water. This researchstudy further intends to define an initial approximation of the energetic benefits resulting from the implementation of a Vertical Farm Façade. Design strategies can be outlined from design and development, construction and project competition, and application of the end product.

Figure 3: Living wall system details in the Sri Lankan market and Mővenpick hotel *(Wall Span, 2017)*



RESEARCH GAP

The use of green walls as a façade system is commonly seen in other countries. Though only a handful of buildings in Colombo are equipped with living walls, their popularity as elements promoting Green Infrastructure is increasingday by day. It is important to assess the economic and thermal interpretation of these living wall systems in terms of installation and maintenance cost and thermal performance of the material used in the green wall structure which gives a negative impact on the cooling demand of the building.

Thus, it is necessary to address these factors and research an eco-friendly structure and easy installation where one can determine the true efficiency of living walls as a climate-sensitive building element in dense urban cityscapes like Colombo.

PROBLEM STATEMENT

Buildings take a great amount of energy to cool the interiors, especially in the urban context. One of the major factors resulting in such conditions is the use of impervious materials in building construction which absorb more heat during the day and sag-net the hot air during the night. This paves the way for high electricity consumption when cooling indoor spaces.

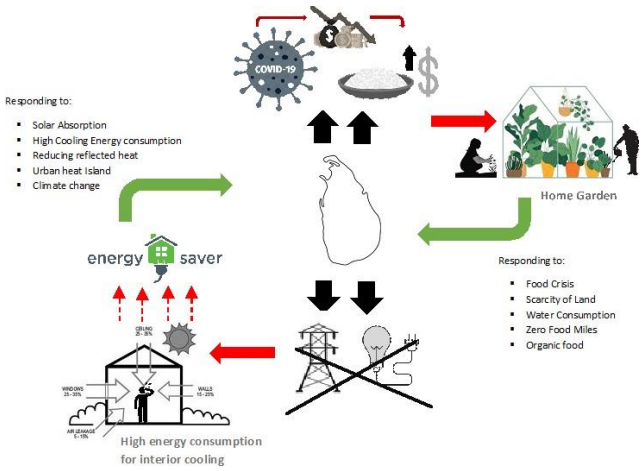
ANALYSIS OF THE PROBLEM

Addressing the matter many use living walls in both local and international settings. Living walls create a specific niche in the design of urban greening. They provide green space for areas where land is expensive, unavailable, or unsafe for growing edible plants. Additionally, Vegetation cools buildings and the surrounding areas through the processes of shading, reducing reflected heat, and evapotranspiration. This helps in cooling the exterior façade surfaces which simultaneously moderates the energy load used on cooling interiors.

THE RATIONALE FOR THE RESEARCH QUESTION

However, construction systems and the products of living walls in the local market are very expensive. Design and research efforts are needed to make vertical gardening technologies cost-competitive and logistically practical.

Figure 4: The Aim of the Study



THE OBJECTIVES OF THE STUDY:

General Objective

The majority of living walls that exist today are superficial – they are applied to the surface of an existing structure rather than integrated within it. They are non-structural and have no real architectural purpose besides being aesthetic. Although explorations of modular planter units exist in varying capacities with high cost and maintenance, the main objective of this research is, 'to develop a Bio integrated modular brick for urban vertical living walls in Sri Lanka'.

Specific Objectives

1. To study available vertical living wall technologies in the world.
2. To study how vertical living walls can be bio-integrated into the structural wall systems in Sri Lanka.
3. To develop a novel prototype modular brick for urban vertical living walls in Sri Lanka.
4. To check the durability and the quality standards of Bio integrated architectural modular façade.
5. To study experimentally the thermal performance of the novel Bio integrated architectural modular façade compared to existing technology.

Primarily, the study will focus on exploring a design that is both innovative in its form and function, but otherwise universally applicable beyond the

context of its own creation.

RESEARCH APPROACH

Scientific Impact

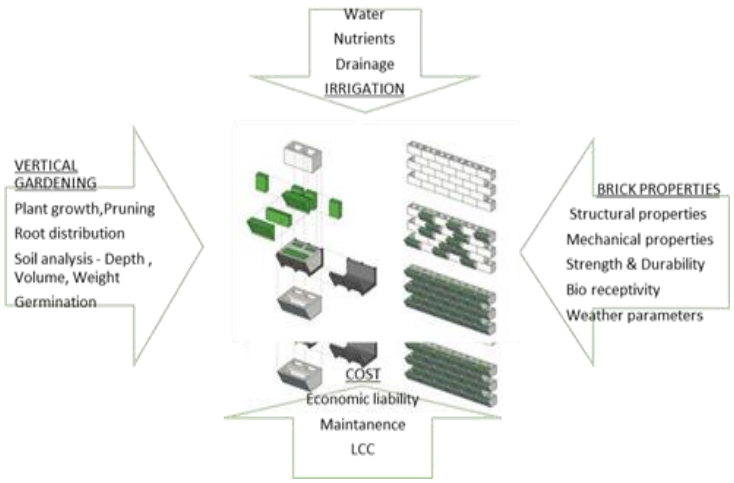
From the beginning of the study to the final product, a sequence of developments will be carried out. Novel technologicalaspects such as vertical gardening technologies, integration, waterproofing, durability, environmental impact tests, and industrial applications will be studied and developed to bring a successful bio-integrated brick to the general market and adapt to urban building facades.

Moreover, the application of such green infrastructure provides ecosystem services such as wind and temperature moderation, mitigation of the urban heat island effect, carbon sequestration, acoustic damping, air pollution reductions, stormwater filtration, and retention of enhanced urban aesthetic and positive psychological response, increased habitat for urban pollinators and small wildlife, food production and soil protection.

Societal Impact

The adaptation of vertical gardening in urban buildings and households enhances many Socio and Cultural Services. The social awareness of the final product and poster campaigns helps in many anthropogenic benefits such as mentalhealth, spiritual connection, artistic expression, the creation of a sense of place, recreation and well-being, regional identity, aesthetics, tourism, mobility and human health.

Figure 5: Expected Innovative Design Objectives



Economic Impact

The existing local living wall products and construction systems are very high expensive. Only limited social capacity has the ability to obtain a living wall system. However, the development of the bio modular brick addresses all the social categories while economically helping in, the proliferation of property values, reducing energy costs, expansion of food supply, and reducing the damage risk. Also, the study will be focused on local products, local tests, SL Patents, industry applications, local manufacturing and industry optimization.

A LITERATURE REVIEW

In 2021 Global Hunger Index ranked Sri Lanka as 65th out of 116 countries, with an overall 'Moderate' hunger rate. Wasting among children aged under five is among the highest in the world, standing at a percentage of 15%. "Country's vulnerability to the effects of climate change means extreme weather events such as droughts, floods and landslides continue to comprise food security and nutrients" (Keck & et al, 2021).

Plantation always depends on the climate situation and temperature is the most important thing. Therefore, land surface temperature variation can predict crop yield and their success or failure (Department of Geography, 2016). The high land surface temperature which led to the formation of the Urban Heat Island phenomenon shows a greater impact on urban areas than on surrounding rural areas. UHI induces through low surface albedo, building geometry and absence of greenery and it deteriorates the thermal comfort and well-being of city dwellers and occupants (Herath, et al., 2018).

A study conducted in Colombo and Gampaha districts identified as Urban Heat Islands (Fernando, 2018). The study highlighted that the remarkable incident which relates to UHI is the difference in thermal properties of the surfaces where non-vegetated or built-up areas show high-temperature variations while low temperatures at vegetated or water areas, can be seen. The whole land area of 74.12 km2 in the Colombo and Gampaha districts shows growth of mean land surface temperature ranges from 25.01°C to 27.66 °C from the year 2001 to 2015. This is due to the growth of the urban population and built-up areas. The study further underlined the importance of vegetation as green areas show relatively fewer temperature variations throughout the years.

Living walls and Urban heat Island

A study has examined the implication of green infrastructure on enhanced microclimatic conditions in the Colombo Metropolitan area (CMA) by modeling with microclimatic software (Herath, et al., 2018). It shows a reduction of 1.86° C drop in temperature by using 50% of green walls on the vertical plains in a city. Unlike green roofs, green walls cancontrol the heated air mass trapped in the street canyon and the study further highlighted the

importance of green wallsin urban infrastructure as a heat mitigating strategy is very successful as it can contribute to an effective temperature drop in microclimate. Therefore, wider vegetative surfaces can decrease air temperature by direct shading of surfaces,by restraining solar heat gain from evapotranspiration and converting solar radiation to latent heat. Moreover, they can reduce the building surface temperatures through the evapotranspiration process and increase latent cooling by adding moisture to the air from covering and shading building facades. This would achieve a higher energy savingand ensure optimum thermal conditions for the city dwellers and occupants in Colombo Metropolitan Area.

A research series initiated by Rupasinghe and Halwathura, have carried out a field study implementing Vertical Greening Systems (VGS) in two administrative buildings in Colombo and Kandy to achieve the maximum benefit in terms of thermal performance. Out of VGS types, the results of the study reveal that Living Walls are better in thermal performances where temperature recorded a maximum reduction of 10.16°C, 3.31°C and 2.11°C in external wall surface, internal wall surface and internal air temperature respectively (Rupasinghe & Halwathura, 2020). Further, a simulation study conducted on living walls adapting to buildings in the Colombo context signified a possible maximum internal temperature reduction of 4.89°C during the day. Moreover, introducing living walls to the building façade shows a reduction of internal temperature which directly reduced the year-round energy consumption of the building by decreasing the cooling load which makes the building energy efficient. As Sri Lanka's energy consumption for space cooling accounts for more than 75% of electricity use in a typical building (Geekiyanage & Ramachandr, 2018), the adaptation of living walls to building facades helps in saving the country's total energy consumption.

It can be concluded that greenery or vegetation can influence the existing microclimatic condition in a city, can be used as a UHI mitigation strategy and reduce the cooling load in building energy consumption in Sri Lankan urban context. Furthermore, Herath et al. emphasized the importance of research studies which are required to assess the economical interpretation in terms of cost and maintenance to select the best suitable alternatives among different options for future studies (Herath, et al., 2018).

RESEARCH DESIGN AND METHODOLOGY

Literature review

A comprehensive literature review will be carried out to understand the followings:

Following the research question and challenges, data will be collected on, mortar and brick properties, vegetation and germination, irrigation systems, and structural properties through scientific literature reviews, manufacturers

catalogues or applicable books and interviewing experts in different fields, such as civil engineers, Landscape architects, agricultural specialists and other specialists who will be essential during the design stage. Interviews focused on unstructured, semi-structured and structured interviews on how to develop an eco-modular brick until the final product test.

Along with the preliminary study, data should be focused and gathered on undesired events of biological growth on buildings and structures which cause damage to building materials. Data will be collected concentrating on the following factors in the table 1:

Table 1: Collection of data

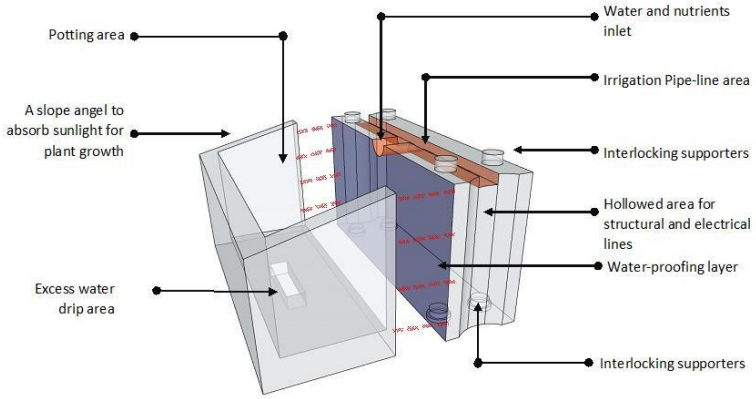
Subject	Data
Construction materials	Materials -Aggregates, binder, additives
Mechanical properties	Mechanical resistance, porosity, viscosity, workability, comprehensive strength, waterproofing and PH values
Outdoor and indoor germination and perenniality	Test specimens
Microclimate and Exposure	Rainfall, temperature, humidity
Bio receptivity of materials	Sediment, humus, and moisture
Vegetation	Plant types (Vegetables, Fruits, Greens and herbs), rooting systems, seed substrate, depth, volume and weight of different plants, evapotranspiration rate, leaf area index
Irrigation technology	Water and nutrients supply, drainage
Accessibility	Monitoring and maintaining systems
Cost	Materials, accessories, substrates, life cycle cost, manufacturing, and installation

Design Considerations

Using the information gathered, a prototype modular eco brick will be designed and created to fulfill the demand for green facades. The designed eco brick will respond to moisture transport behavior including, water absorption, moisture retention, permeability, and related Characteristics. The Design development focuses on the main components as demonstrated in

figure 6 in the modular brick, such as potting area and plant growth, pipeline for the irrigation system, water-proofing layer, structural interlocking sections and water dripping area are the main concerns.

Figure 6: Design considerations



Then the effects of components (binder, aggregates, additives) on the physical and mechanical properties of the brick and mortar are assessed; following, the bio-receptivity of the mortars will be evaluated. As the requirements are posed, the mechanical strength and durability will be estimated and studied thoroughly. The brick-motor combinations are to be tested in the following phase. Revised designs will be implemented in a small test group.

Testing the Concept and Validation

A prototype module will be created, and the first trial will be taken in an indoor test room. Specimens will be tested (mechanical and physical strength) with designated SLS standards which require minimum compressive strength to ensure durability. Also, flexural tensile strength is an important design consideration for a modular brick which would better withstand harsh weather events.

After all design developments and mechanical tests, a specific type of binder/aggregate ratios will be selected in volume, the grain size distribution of the aggregate, the thickness, Gaps, the results of different minerals, which undergo significant expansion when heated, types of binders to be used, either alone or in combination will be finalized and standardized. Designs will be measured for the slump, density, and porosity.

A few sets of trials will be taken in to match the standards and results. Finally, outdoor experiments will be conducted for observations and developments. Weather and climate will be recorded during the test trials. Ambient temperature during both day and night, humidity levels, precipitation levels and rainfall patterns will be monitored. This prototype modular brick will be further improved to suit the demands of the residential, commercial and all

sectors.

Living Wall Construction Methodology

By using the developed and finalized brick module, a mockup wall will be built vertically in an outdoor testing areafacing four cardinal orientations. The mockup wall will be 3m x 3m in height and width. An irrigation system will beinstalled, balanced, and functioned by using portable water. Plant selection has become a major factor which suits thetropical climate. Plant and substrate selection will be the next step of the study. Earth or compost, coconut fiber, humus, Rockwool mineral fibers or other substrates will be tested in different layers. During the integration of the bio-integrated modular façade, the use of water, air, moisture barriers, insulation properties, integration of primary structure, distribution of mechanical, electrical, and plumbing facilities and potential to resist lateral and shear forceswill be studied and developed for a better upshot.

The wall will be observed and monitored daily for about 3 to 4 months of timeframe. Time-lapse photography for data collection and records. Moreover, for analysis of plant development, substrate evolution, irrigation functioning, water consumption, water resistance, drainage challenges and durability and vulnerability of each module.

The Experiments on Different Specimens.

To understand the strength performance with different combinations;

1. Trial and error basis application of different stabilizers and compare with cement. The mix will be selected maintaining different grade combinations. Gravel, sand, and cement are constant and vary in the use of water. Sample blocks will be tested (the strength and the durability).
2. Cast blocks and mold will be kept for 28 days for curing and to achieve maximum strength.
3. After 28 days testing will be carried out to check the strength.
4. Results will be compared with the wet and dry strength requirement for load-bearing walls.
5. From this, it can understand how the strength can be achieved with water and aggregate content.

Materials and mix proportions, development of best composition combination.

a) The mix properties of cement and aggregates will be taken into consideration after confirming their abilityto develop the strength.

b) The trial mix will be used maintaining gravel, sand, and cement constant. And the composition of added mixtures will change according to the development of strength and other required

properties mentioned inthe research proposal. Experiments with a water composition ratio of water will be tested on lab scale.

c) And the activity of water with a combination of aggregates will be studied to understand how thewater will react to cement composition.

The design of the modular brick will focus on a hollow type block having a hole in the middle of the open at both sides. The total void area will be fixed to about 15% of the gross cross-sectional area. The voids can be filled with steel bars and concrete achieving high strength and earth-quick resistance. The air space provides good thermal insulation.

Durability test and weather testing for the mixture developed and the applications.

a) The wall or the block work made of the above-mentioned mixture will be tested to measure its durability.

b) The durability will be measured by using simple weather testing of using cast walls exposed to free weather.

c) The durability of the castle wall will test using accelerated weather testing whereas the accelerated rain will be poured into the wall and test the depth of the pit produced by the accelerated rain.

d) Possible fire testing (only the weight loss ratio after the exposure to the constant fire reproduced by the furnace)

A list standard for testing cement blocks and we shall develop our methodology to measure the workability of cement aggregate mixture. Not only sorptivity there are more than 12 standards that should be tested to prove the quality. The following tests are conducted on the following stabilizer stabilized blocks/ bricks to determine their suitability for construction work.

- Absorption test
- Crushing strength test
- Hardness test
- Shape and size
- Color test
- Soundness test
- Structure of brick
- Presence of soluble salts (Efflorescence Test)

Absorption Test on modular bricks

An Absorption test is conducted on the brick to find out the amount of moisture content absorbed by the brick under extremeconditions. In this test,

sample dry bricks are taken and weighed. After weighing these bricks are placed in water withfull immersion for a period of 24 hours. Then weigh the wet brick and note down its value. The difference between dry and wet brick weights will give the amount of water absorption. For a good quality brick, the amount of water absorption should not exceed 20% of the weight of the dry brick.

Crushing Strength or Compressive Strength Test on Bricks

The crushing strength of bricks is determined by placing the brick in a compression testing machine. After placing the brick in the compression testing machine, apply load on it until the brick breaks. Note down the value of the failure load and find out the crushing strength value of the brick. The minimum crushing strength of the brick is 3.50N/mm^2, if it is less than 3.50 N/mm2,then it is not useful for construction purposes

Hardness Test on Bricks

A good brick should resist scratches against sharp things. So, for this test, a sharp tool or fingernail is used to make a scratch on the brick. If there is no scratch impression on the brick then it is said to be hard brick.

Shape and Size Test on Bricks

The shape and size of bricks are a very important consideration. All bricks used for construction should be of the same size.To perform this test, select 20 bricks randomly from the brick group and stack them along their length, breadth and height and compare. So, if all bricks are similar in size, then they are qualified for construction work.

Color Test of Bricks

A good brick should possess bright and uniform color throughout its body.

Soundness Test of Bricks

The soundness test of bricks shows the nature of bricks against sudden impact. In this test, 2 bricks are chosen randomlyand struck with one another. Then, the sound produced should be a clear bell-ringing sound and the brick should not break. Thenit is said to be a good brick.

Structure of Bricks

To know the structure of a brick, pick one brick randomly from the group and break it. Observe the inner portion of the brick clearly. It should be free from lumps and homogeneous.

Efflorescence Test on Bricks

A good quality brick should not contain any soluble salt in it. If soluble salts are there, then it will cause efflorescence on brick surfaces. To know the presence of soluble salts in a brick, placed it in a water bath for 24 hours and dry it in shade. After drying, observe the brick surface thoroughly. If there are any white or grey color deposits, then it contains soluble salts and is not useful for construction.

DISCUSSION

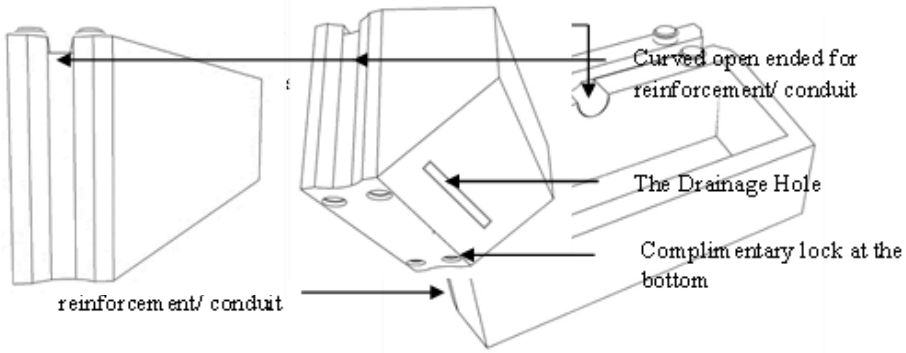
Design and development

Design and development of the vegetated modular brick unit to facades in building architecture where the masonryunit acts as a potting area for plants and is also structurally supported and interlocked as a component. The vegetated modular unit is designed to cater for a planting area, space for irrigation pipelines and outlets, and structural interlocking elements. The self-interlocking is achieved by using a shear key and lock mechanism in the modular unititself. The shape of the shear key is elemental as a nob shape where the complimentary lock is provided on the oppositeside of the brick (at the bottom of the brick). Load transfer is achieved by shear transfer and gravity. The block layeringcourses in away interlocked and overlapped with each other.

A separate corner unit will be provided in the design. The overlapping of units helps in catering more sunlight to the vegetation. The curved open-ended facilitated reinforcement/conduit features at both sides of the unit. Conducting or water and nutrient supply pipes are arranged along the hollowed space created by open-ended corners of interlocked units.

The groove at the face of the brick caters to water supply pipes extending in the horizontal direction and installed water pipe outlets for drip irrigation and at the central groove which falls to the potting area. A plurality of branch pipes connects the plant layers. A potting area with an angle of 15 degrees at the female face and 30 degrees at the male face is erected out from the masonry unit. The growing unit opens from the above and vegetation can be planted in the unit.

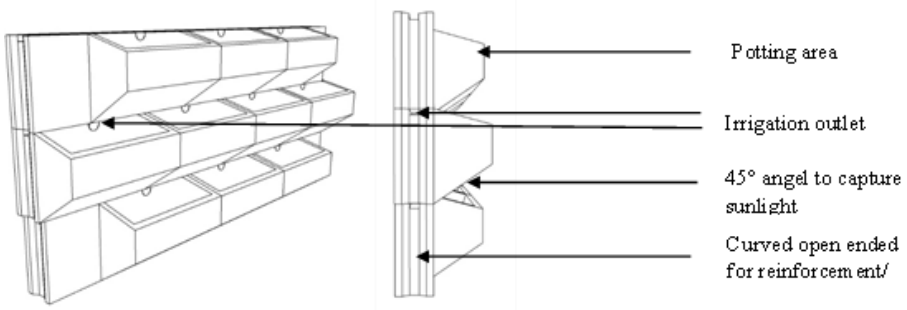
Figure 8: Side elevation and the perspective view from the bottom of the module



A drainage hole is provided at the bottom of the planting area. The water will be drained to the unit below enhancing the drip irrigation system. This designated drip line is provided with a light metal mesh with smaller squares to stop the erosion of soil from one unit to another. The waterproofing layer is applied between the potting area and the main body of the unit. Moisture absorption is restricted for better structural durability.

The materials, aggregates, cement, and water are mixed in appropriate proportions and formed in the unit by using a designed mould.

Figure 9: Perspective and side elevation of construction of a wall with interlocking vegetated modular brick



The invention overcomes the defects of the invention in the background art and creatively applies the vegetation to the exterior/interior wall system of the building. This creates an effective construction scheme adopting a unique system design. Also, this solves the problems of construction, installation,

water supply, power supply, irrigation, and drainage of the vertical greening system. With this construction method, an environmentally friendly and energy- saving product can be manufactured.

Finally, it should be noted that: although the present invention has been described in detail concerning the foregoing embodiments, it will be apparent to those skilled in the art that modifications may be made to the embodiments or portions thereof without departing from the spirit and scope of the invention.

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Towards Developing a Comprehensive Framework to Measure Financial Reporting Quality of Licensed Financial Institutions in Sri Lanka

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Abstract

The purpose of this paper is to develop a comprehensive framework to measure the financial reporting quality of licensed financial institutions in Sri Lanka using a quantitative design under the philosophy of positivism. The quantitative strategy used in this part requires collecting data through a self-administered content analysis to provide a quantitative or numeric value of instruments to measure financial reporting quality. The analysis of the literature reveals that there is a gap in a comprehensive analysis of financial reporting quality in terms of the IASB (2018) framework. The previous studies had not considered all the dimensions of reporting quality in a single study instead there were classification errors across dimensions. Further, previous studies have developed around the work of Van Beest, Braam, & Boelens (2009) in terms of the IASB (2008) framework. Since then, the IASB conceptual framework has evolved and modified to the current version (IASB,2018). However, this aspect has not been considered. This study does not consider the financial reporting quality of all licensed financial institutions because unlisted and foreign branches of licensed financial institutions publish only audited financial statements instead of preparing comprehensive annual reports.

Keywords – Financial Reporting Quality, Relevance, Faithful Representation, Comparability, Verifiability, Timeliness, Understandability

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INTRODUCTION

The availability of accurate and timely relevant information is very important to make decisions. Licensed financial institutions (LFIs) use an integrated reporting mechanism by which the financial and non-financial dimensions of performance are disclosed in annual reports. The LFIs commenced adopting International Financial Reporting Standards (IFRS) or compatible local standards which are based on fair values from the financial years commencing from 01.01.2012 (ICASL, 2020). The quality reporting aspect is important in the Sri Lankan context due to the following two reasons among others. First, the adoption of fair value-based reporting standards in Sri Lanka provides opportunities for the users of financial information to asses how it has translated financial reporting quality dimensions to influence the users. Second, Sri Lanka as an emerging economy expects to attract more foreign direct investments where the investors expect a high-quality financial reporting regime. On the other hand, the current financial crisis which forced Sri Lanka to default on foreign debts forces the country to take measures to improve the status of the economy. Therefore, a quality financial reporting regime may help to rebuild the confidence of investors. In this context, IMF (2022) suggests safeguarding financial stability by ensuring a healthy and capitalized banking system, and by upgrading financial sector safety nets and regulatory standards with a revised Banking Act. The quality of financial reporting is a prerequisite for strengthening sound banks because Iqbal, Ali, Umar, Ullah, and Jebran (2022) suggest that intense product market competition enhances the financial reporting quality.

The financial reporting quality is measured in two forms. The first group considers both accrual-based and real earnings management practices to measure reporting quality using various econometric models. (Cohen & Zarowin, 2010; Cheng, Lee, & Shevlin, 2016; Hsu & Yang,2022; Khalil, 2022). The second group focuses on measuring financial reporting quality using the qualitative characteristics of reporting in terms of accounting conceptual frameworks (Van Beest, Braam, & Boelens, 2009; Abdullahi & Abubakar, 2020; Haarburger, Yasseen, Omarjee, & Varachia, 2020; Oluwagbemiga, 2021). Tran (2022) also shows that qualitative characteristics play a more significant role in reducing information asymmetry than earnings quality. These studies have used IASB (2008) framework which has been replaced by the IASB (2018) conceptual framework. The literature on quality reporting has developed around the IASB (2008) framework (Van Beest, Braam, & Boelens, 2009; Abdullahi & Abubakar, 2020; Haarburger, Yasseen, Omarjee, & Varachia, 2020;

Oluwagbemiga, 2021). However, these studies have not considered the updated conceptual framework as a comprehensive study. In this context, this study expects to develop a comprehensive composite index to measure the financial reporting quality in terms of the qualitative dimensions proposed in the IASB (2018) framework. In summary, the main contribution of the study is that the comprehensive index will cover the main six dimensions of the measurement of financial reporting quality in terms of the IASB (2018) while introducing new items to capture materiality and extending new items to capture some other dimensions.

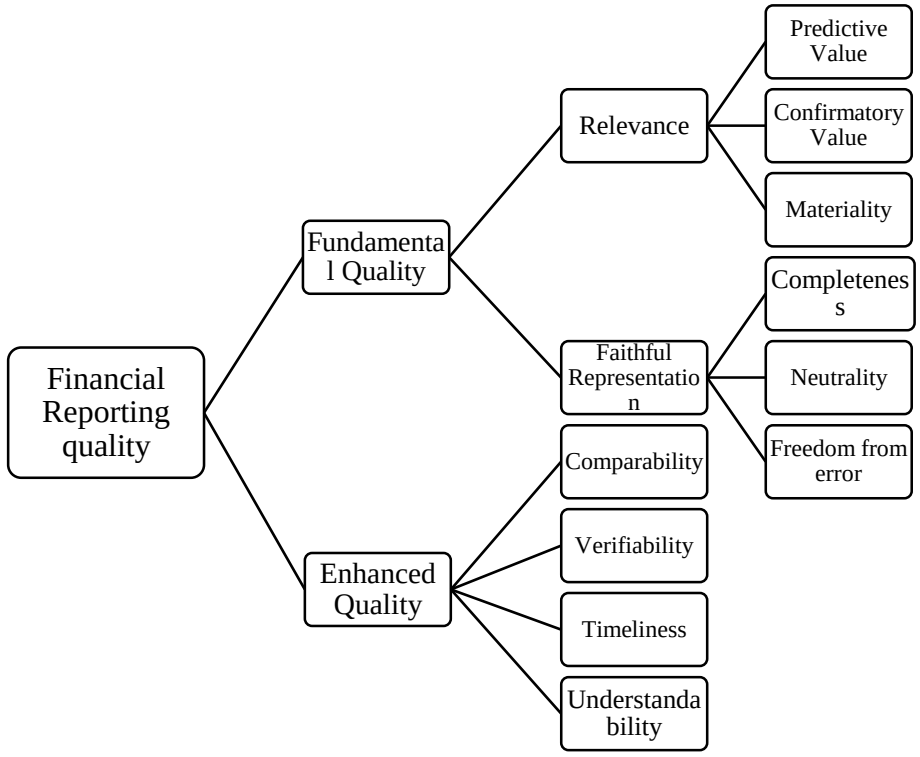
The remainder of this paper is structured as follows. Section 2 provides a theoretical framework for the study which discusses reporting quality and the identification of instruments to measure the main dimensions of the financial reporting quality. Section 3 explains our sample, and methodology which includes the measurement and operationalisation of variables and the statistical approach of the study.

FINANCIAL REPORTING QUALITY OF FAIR VALUE ACCOUNTING

The quality of reporting is a very important factor which reduces agency conflicts. Eccles and Krzus (2010) argue that better internal collaboration. and higher quality value reporting reduce agency problems and greater investment efficiency. Hence,

Huang and Zhang (2012) show theoretically that voluntary disclosure quality decreases agency conflicts, leading to higher returns on investment. And also, better reporting supports internal stewardship functions providing more information to the board of directors to supervise managers. However, in the global context, there is no comprehensive study which captures all the qualitative characteristics of financial reporting dimensions and sub components of the dimensions. This study expects to fill this research gap by developing a comprehensive composite index. IASB's (2018) framework includes six qualitative characteristics to measure the quality of financial reporting as shown in the following figure.

Figure 1: Componants of Financial Reporting Quality



Source: Compiled by the authors based on IASB (2018)

Van Beest, Braam, and Boelens (2009) which is known as the NiCe framework first used the IASB conceptual framework to measure the quality of financial reporting. The NiCe framework had operationalised the main dimensions excluding verifiability. However, it also failed to capture materiality under the relevance. IASB's (2018) framework identifies relevance and faithful representation as the fundamental qualitative characteristics of useful financial information. The usefulness of financial information is enhanced if it is comparable, verifiable, timely and understandable. In summary, IASB (2018) proposes two groups of qualitative characteristics of financial reporting quality i.e., fundamental and enhancing. The detailed measurements of these dimensions are shown in Annex **1.**

Fundamental Qualitative Characteristics

The core characteristics of financial reporting are considered the fundamental qualitative characteristics which include relevance and faithful representation (Reliability).

Relevance

Relevance is the capability of making a difference in the decisions made by users. Financial information is capable of making a difference in decisions if it has predictive value, confirmatory value, or both (IASB,2018). Further, the predictive value and confirmatory value of financial information are interrelated. The framework uses materiality as a component of relevance because the information is material if it is omitted or misstated which can influence the decision-making of users.

Predictive Value

Eugster and Wagner (2020) having studied the concept of "value reporting" find that firms with better value reporting quality to deliver better future operating performance and obtain greater economic value added. This means that the relevant information improves predictability which improves the ability of firms to generate future cash flows. The predictive value is considered an important indicator of relevance in terms of decision usefulness. Van Beest, Braam and Boelens (2009) introduce three items to measure the predictive value of financial reporting (R1,R2, and R3).

The first area of the measurement (R1) is to see the extent to which annual reports provide forward-looking information. The forward-looking statement usually describes the expectations of management for future years of the company. This information is useful for capital providers and other users of the annual reports since management has the access to private information to produce a forecast that is not available to other stakeholders (Bartov, Goldberg, & Kim, 2005). In the LFIs context, this information is more useful to the depositors since they have contributed to the majority part of the financial structure of banks. The second assessment criterion is to see whether annual reports disclose information in terms of business opportunities and risks (R2). A relevant financial report should include both financial and non-financial information which is useful to make decisions. Therefore, Jonas and Blanchet (2000) state that such information should be able to provide insight into business opportunities, and risks as well as a possible future scenario for the company. The third assessment criterion (R3) is developed to see whether a company uses the fair value as a measurement basis in reporting. Literature shows that fair value presents a better predictive value of financial reporting information than historical cost (Barth, Beaver, & Landsman, 2001; Hirst, Hopkins, & Wahlen, 2004). This happens because fair value presents current up-to-date information over historical cost which provides previous transaction costs. Therefore, Barth, Beaver and Landsman

(2001) state that fair value is one of the most important methods to increase relevance. Some other studies have considered different additional items to capture predictive value which this study also expects to use. R4: insight into the risk profile of the company (Osasere & Ilaboya, 2018), R5: information on corporate social responsibility (CSR)(Osasere & Ilaboya, 2018), R6:

Analysis concerning cash flow (Osasere & Ilaboya, 2018; Oluwagbemiga, 2021), R7: disclosure of intangible assets (Osasere & Ilaboya, 2018), R8: disclosure of "off-balance sheet" activities (Osasere & Ilaboya, 2018), and R9: information concerning the company's going concern (Osasere & Ilaboya, 2018).

Confirmatory Value

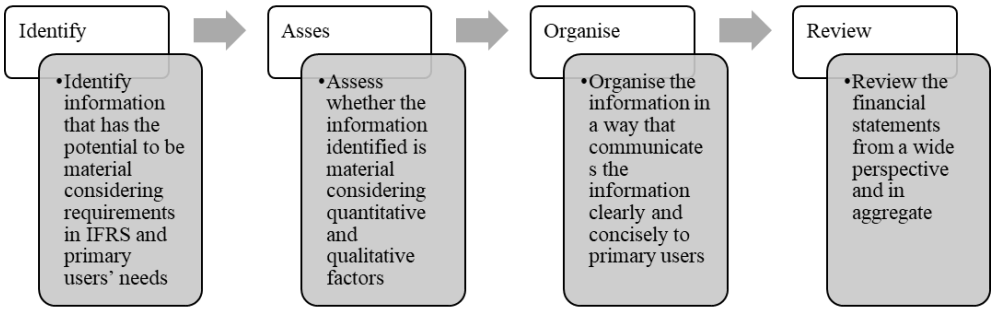
Confirmatory value is the second attribute that contributes to the relevance of financial information. IASB (2018) shows that information has confirmatory value if it confirms or changes past (or present) expectations based on previous evaluations. Jonas and Blanchet (2000) argue that if the information in the annual report provides feedback to the users of the annual report about previous transactions or events, this will help them to confirm or change their expectations. The annual report provides feedback information on how various market events and significant transactions affected the company(R10). Mbobo and Ekpo (2016) expand the confirmatory value of reporting by introducing an item to capture analysis and feedback on annual reports (R11). Al-Dmour, Abbod, and Al Qadi (2018) propose three items to expand the measuring confirmatory value of relevance. The first two items related to undue delay in the presentation of financial reports and presentation of financial reports as required by regulatory bodies of accounting. However, this study assumes that these two variables are related to measuring timeliness. The third item is related to the extent to which information helps you to confirm the profitability levels of the business (R12). Osasere and Ilaboya (2018) propose to use the disclosure of the extraordinary gains and losses (R13), information regarding personnel policies (R14), information concerning division (R15), and disclosure of the financial structure disclosed (R16) to capture predictive as well as confirmatory value.

Materiality

Materialy is the third component of relevance under the IASB (2018) framework. However, previous studies have not developed items to capture materiality. IASB (2018) states that materiality makes the information in

financial statements more relevant and less cluttered and provides the following four-step process to help users to make materiality judgements.

Figure 2: Process of Making Materiality Judgement



Source :Compiled by the authors using IASB (2018)

Accordingly, it is proposed to develop four items to capture materiality through the above process (R17, R18, R19, and R20). This study expects to use the above-discussed 20 items to capture relevance in terms of predictive value, confirmatory value, and materiality.

Faithful Representation

The second fundamental qualitative characteristic of financial statements is faithful representation or reliability. General-purpose financial reports represent economic phenomena in words and numbers which must not only be relevant but must also represent faithfully the phenomena it purports to represent to be useful. Faithful representation means a representation of the substance of an economic phenomenon instead of a representation of its legal form only (IASB,2018). A faithful representation seeks to maximise the underlying characteristics of completeness, neutrality and freedom from error. A neutral depiction is supported by the exercise of prudence which is the exercise of caution when making judgements under conditions of uncertainty. The information must be both relevant and faithfully represented if it is to be useful. The academic literature affirms that faithful representation is usually measured in terms of neutrality, completeness, freedom from material error, and verifiability (Jonas & Blanchet, 2000; Yurisandi & Puspitasari, 2015; Idowui & Adegbie, 2020; Mbawuni, 2019). Botosan (2004) argues that it is difficult to measure faithful representation directly by only assessing the annual report since information about the actual economic phenomenon is necessary to assure faithful representation. However, Maines

and Wahlen (2006), maintain that estimates and assumptions that closely correspond to the underlying economic constructs and the standards pursued can enhance faithful representation. This study will develop items to measure faithful representation considering three subcomponents proposed by IASB (2018) i.e., completeness, neutrality, and free from error.

Free from Error

Financial reporting becomes free from bias when it is disclosed the assumptions and estimates made in the preparation of the financial statements, as well as the choice of accounting principles. The users can not expect an annual report to be completely free from bias, since economic phenomena presented in annual reports are frequently measured under conditions of uncertainty. Frequently, many estimates and assumptions are used in the annual report. Therefore, it is important to examine the argumentation provided for the different estimates and assumptions made in the annual report (Jonas & Blanchet, 2000). If valid arguments are provided for the assumptions and estimates made, they are likely to represent the economic phenomena without bias (F1). On the other hand, the accounting principles which have been used to prepare financial statements are also important and will increase the likelihood that preparers fully understand the measurement method. Therefore, this will reduce the possibility of unintentional material errors in their financial report (Jonas & Blanchet, 2000; Maines & Wahlen; 2006). Moreover, when the selected accounting principles are clearly described and well-founded, it increases the probability to reach a consensus and detecting misstatements for the user of the financial report as well as for the auditor (Van Beest, Braam, & Boelens, 2009) (F2). However, some studies have used these two items to measure verifiability (Yurisandi & Puspitasari, 2015: Osasere & Ilaboya, 2018) despite it is not a component of faithful representation according to the IASB (2018).

Neutrality

Neutrality is the second component of faithful representation. IASB (2018) defines neutrality as "the absence of bias intended to attain a predetermined result or to induce a particular behaviour. Neutral information does not colour the image it communicates to influence behaviour in a particular direction". Jonas and Blanchet (2000) state that neutrality is about objectivity and balance.

Therefore, neutrality refers to the intent of the preparer; the preparer should strive for an objective presentation of events rather than focusing solely on the positive events that occur without mentioning negative events (Van

Beest, Braam, & Boelens, 2009). A financial report is assumed to be neutral if it highlights both the positive and negative events in a balanced way (F3). Osasere and Ilaboya (2018) consider additional two items to capture neutrality i.e., comply explain (F4) and disclosure of payment of bonuses to the members of the board of directors (F5).

However, there are some common items which have been used to capture completeness, neutrality, and free from error together. The type of audit opinion is one such item. Some studies reveal that the auditors' report adds value to financial reporting information by providing reasonable assurance about the degree to which the annual report represents economic phenomena faithfully(Bartov, Goldberg, & Kim, 2005). Maines and Wahlen (2006) argue that an unqualified audit report is a necessary condition to perceive the financial reporting information as reliable or faithfully represented. Therefore, the extent to which the type of Auditors report (qualified or unqualified) affects the quality of financial reporting (F6). Corporate governance is another area which is used to capture faithful representation considering all the components. Some studies examine the association between financial reporting quality and corporate governance, internal control, earnings manipulations and fraud, and find that poor governance and internal controls reduce the quality of financial reporting (Rezaee, Olibe, & Minmier, 2003; Habib & Jiang, 2015; Kaawaase, Nairuba, Akankunda, & Bananuka, 2021). Therefore, corporate governance information adds value to capital providers. More specifically, corporate governance information increases the probability of faithfully represented information (Habib & Jiang, 2015; Kaawaase, Nairuba, Akankunda, & Bananuka, 2021).

Completeness

Completeness means that all the information that is necessary for faithful representation is provided in reporting (IASB,2018) which can be achieved by providing all quantitative, qualitative, financial and non-financial information relating to numerical figures presented in the financial statements. Previous studies have used the following items to capture completeness, verifiability, and free from material error. However, this study proposes these items to capture completeness. Strong corporate governance practices improve the quality of reporting where users can get more information from the extensive disclosures from the annual report(F7). Oluwagbemiga (2021) considers the use of the same accounting policy for five years (F8), analyse the risk exposures in the annual report(F9), and full disclosure of the director's information (F10)

to capture faithful representation. Therefore, this study expects to use the above 10 items to capture faithful representation in terms of completeness, neutrality, and freedom from bias.

Enhancing Qualitative Characteristics

The second main category of financial reporting quality is enhancing qualitative characteristics which include comparability, verifiability, timeliness and understandability. These components enhance the usefulness of information that is relevant and faithfully represented.

Comparability

Information about a reporting entity is more useful if it can be compared with a piece of similar information about other entities and with similar information about the same entity for another period or another date. IASB (2018) states that comparability enables users to identify and understand similarities, and differences among, items. Unlike other qualitative characteristics, comparability does not relate to a single item but comparison requires at least two items. Comparability includes consistency which refers to the use of the same accounting policies and procedures, either from period to period within an entity or in a single period across entities (IASB, 2018). According to the framework, companies should strive for comparability by employing consistency. Jonas and Blanchet (2000) operationalize consistency by referring to coping with change and uncertainty. New information, rules or regulation generally cause companies to change their estimates, judgements, and accounting policies (Van Beest, Braam, & Boelens, 2009). This is captured in C1 and C2. The comparability of earnings figures is also important in the evaluation of the firm's performance over time (IASB,2018). If a company changes its estimates, judgements, or accounting policies it may adjust previous years' earnings figures in order to visualize the impact of the change on previous results (C3). Since consistency refers to using the same accounting procedures every year, this year's figures should be comparable to previous years' figures (IASB,2018). When a company provides an overview in which they compare the results of different years, even when no changes in estimates, judgements, or accounting policies occurred, this will improve the comparability of financial reporting information (Van Beest, Braam, & Boelens, 2009). C 4 captures this area. Comparability refers not only to the consistency of the use of accounting procedures by a single company but also refers to comparability between different companies (IASB,2018). When assessing the comparability of annual reports of different companies, the accounting policies used, the

structure of the annual report, and the explanation of transactions and other events are of special importance (Jonas & Blanchet, 2000). C5 is used to capture this area. The presentation of ratios and indices is also useful when comparing companies' performance. In the case of LFIs, the outside users do not have comparable information to calculate industry-specific ratios. For example, risk-weighted assets, and core capital in LFIs. Therefore, the disclosure of the ratios and indices is useful(C6). Osasere and Ilaboya(2018) use the information concerning shares of companies (C7) and benchmark information concerning competitors (C8) to extend the measurement of comparability. This study expects to use the above 8 items to capture comparability.

Verifiability

Verifiability is the second enhancing qualitative characteristic discussed in IASB (2018). Verifiability helps to assure users that information represents faithfully the economic phenomena it purports to represent. Verifiability means that different knowledgeable and independent observers could reach a consensus, although not necessarily complete agreement, that a particular depiction is a faithful representation. Previous studies have used this aspect in a limited manner under the dimensions of faithful representation (Abdullahi & Abubakar, 2020; Haarburger, Yasseen, Omarjee, & Varachia, 2020). IASB (2018) states that the verification can be direct or indirect.

Direct verification means verifying an amount or other representation through direct observation. Indirect verification means checking the inputs to a model, formula or other technique and recalculating the outputs using the same methodology. However, in some instances, It may not be possible to verify some explanations and forward-looking financial information until a future period, if at all. To help users decide whether they want to use that information, it would normally be necessary to disclose the underlying assumptions, the methods of compiling the information and other factors and circumstances that support the information. Verifiability is not the only important qualitative characteristic of accounting information. Verifiability is a component of reliability, which is one of two characteristics that contribute to the usefulness of accounting information. The other is relevance, which is equally important. Some studies have operationalised verifiability under different dimensions. The above-discussed F1 and F2 have been used to measure verifiability under the faithful representation (Yurisandi & Puspitasari, 2015; Osasere & Ilaboya, 2018). Further, Osasere and Ilaboya (2018) use one item to measure verifiability under comparability. Therefore, it can be observed that verifiability is captured

under other dimensions. It is also important to bear in mind that unless a perfect market exists and all assets possess available market values, fair value measurement introduces aspects of subjectivity and lack of verifiability and accountability to an extent beyond what is generally perceived to be a problem in terms of historical cost accounting. The immense variation in the level and structure of prices and interest rates constitute some of the factors which cause distortions to the financial statements when fair value is used. Therefore, managers may prefer to mark to market when markets are rising, but when the market declines there is usually an outcry that the market values do not, necessarily, represent intrinsic fair value. The Nobel prize-winning economist, Joseph Stiglitz (HCTC 2009:8), argues that the fair value system may be used to manipulate compensation.

However, Oluwagbemiga (2021) uses five items to measure verifiability. This study also expects to capture verifiability using the following items (V1 to V5).

Timeliness

Timeliness is the third enhancing qualitative characteristic discussed in IASB (2018) which means that information is available to decision-makers in time to be capable of influencing their decisions. Timeliness relates to the decision usefulness of financial reports which refers to the time it takes to reveal the information in annual reports. It is usually measured in terms of the number of days it takes for the auditor to sign the accounts after the end of the financial year (Mbawuni,2019; Ahmed,2020). Mbobo and Ekpo (2016) use the extent to which the early signing of the Auditor's report after the book-year end enhances the quality of financial reporting to measure the timeliness. A natural logarithm of the difference between the book year-end and the date of signing of the auditor's report is used to measure the item (T1). This item will also capture the undue delay captured by Al-Dmour, Abbod, and Al Qadi (2018) to capture relevance. Oluwagbemiga (2021) considers how many days the company has taken to hold the annual general meeting after book year-end to measure timelines (T2) Natural logarithm of the difference between the statement of financial position date and the date of the annual general meeting will be used. The analysis of the annual reports of LFIs reveals that it takes substantial time to hold an annual general meeting from the date of signing the audit report. Therefore, this study recommends using an item to capture this time difference (T3). Al-Dmour, Abbod, and Al Qadi (2018) consider to the extent which financial statements are presented annually as required by regulatory bodies of accounting to capture relevance. However, it is proposed to use this item to capture timeliness. Section 17 of

the Companies Act, No.7 of 2007 requires each company to hold an annual general meeting not later than six months after the balance sheet date of the company; and not later than fifteen months after the previous annual meeting. Section 38 (1) of the Banking Act, No.30 of 1988 requires every licensed commercial bank incorporated or established within Sri Lanka by or under any written law shall transmit within five months after the close of its financial year to the Director of Bank Supervision, and publish at least once within that period in a Sinhala, Tamil and English daily newspaper circulating in Sri Lanka, its audited financial statements. Therefore, this study proposes to use presenting financial statements as required by the regulator to measure timelines (T4). The timeliness will be measured using the above four items.

Understandability

Understandability is the last enhancing qualitative characteristic discussed in IASB (2018) which states that classifying, characterising and presenting information clearly and concisely makes it understandable. While some phenomena are inherently complex and cannot be made easy to understand, excluding such information would make financial reports incomplete and potentially misleading. Financial reports are prepared for users who have a reasonable knowledge of business and economic activities and who review and analyse the information with diligence. Therefore, understandability will increase when information is classified, characterized, and presented clearly and concisely to enable users to comprehend its meaning (IASB,2018). Previous studies following the NiCe framework use five items to capture the understandability. The first item (U1) considers how well an entity organizes the information in the annual report. When the annual report is presented in a well-organised manner the understandability of users will enhance. If the annual report is well-organized it is easier to understand where to search for specific information (Jonas & Blanchet, 2000). The disclosure of information through notes to the financial statements will be valuable in terms of explaining and providing more insight into earnings figures (Van Beest, Braam, & Boelens, 2009). Especially narrative explanations help to increase the understandability of information (IASB,2018). U2 is used to capture this aspect. The presence of tabular or graphic formats may improve understandability by clarifying relationships and ensuring conciseness (IASB, 2018). U3 will capture this area. The use of technical jargon may limit understandability. Therefore, it is useful to assess whether the financial statements are devoid of technical jargon. The extent to which the absence of jargon and technical terminologies enhances the understandability of

financial reporting, and thus its financial reporting quality (U4). The inclusion of a

glossary of unfamiliar terminologies will enhance understandability. The extent to which the presence of a detailed glossary of unfamiliar terms and abbreviations in financial statements enhances the quality of financial reporting (U5).

Al-Dmour, Abbod, and Al Qadi (2018) extend the measurement of understandability by introducing two items i.e., understandability of expenditure (U6), and business assets and nature (U7). This study will consider the size of unclassified expenditures as a ratio of total expenditure for U6 where the bigger ratio will reduce the understandability and the size of unclassified assets as a ratio of total assets for U7 where the bigger ratio will reduce the understandability. Osasere and Ilaboya (2018) use information concerning mission and strategy (U8) and understandability in the perception of a researcher (U9). Oluwagbemiga (2021) also adds the following additional items to capture the understandability. Foreign subsidiary translated to the financial reports (U10), availability of table of content (U11), quality of chairman's review (U12). This study proposes that the disclosure of more information enhances the understandability of financial reports. Therefore, the size of the annual report is included as an item to measure understandability. Accordingly, introduce U13 to measure this aspect. The understandability will be measured using the above 13 items.

The analysis of the literature shows that previous studies have used a mixed approach of using the IASB(2018) conceptual framework with some academic work. Therefore, this study expects to use the comprehensive IASB(2018) framework to assess the reporting quality of LFIs in Sri Lanka. The qualitative characteristics of useful financial information which are proposed by this conceptual framework are used to assess the financial reporting quality.

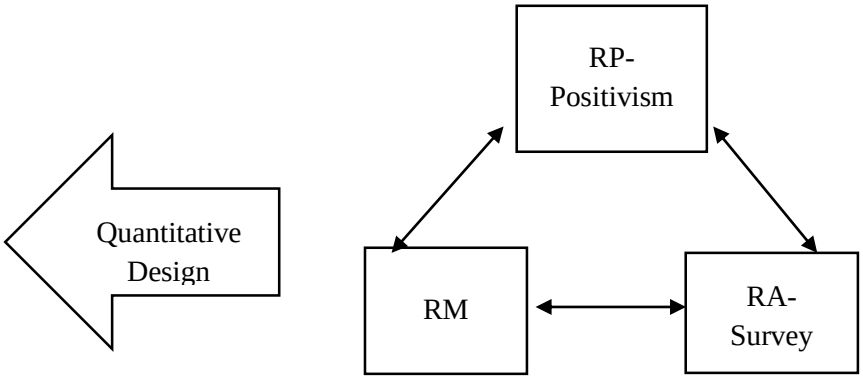
METHODOLOGY

Research Design

The study focuses on developing a comprehensive composite index to measure financial reporting quality in LFIs in Sri Lanka which is used as a quantitative design as shown in figure 3. This part of the research also will use the philosophy of positivism because the research is developed based on the hypothesis that fair value accounting will disclose value information to the users of financial statements. Theoretically, this is related to agency

theory which says value information reduces agency conflicts. Therefore, it is hypothesized that fair value accounting information provides high-quality financial reporting over the historical cost. This hypothesis forces us to use a deductive approach under the philosophy of positivism to achieve the research objective through an empirical analysis. Positivists suggest that knowledge can only be acquired through empirical research, which is based on measurement and observation. In other words, all knowledge is viewed as a posterior knowledge.

Figure 3: Research Design



Source: Compiled by the authors

RP - Research Philosophy, RA -Research Approach, RM -Research Methods. The research method will be discussed in terms of research questions, sample and data collection, measurement of variables, and data analysis. A quantitative strategy is used where the variables are measured through instruments to analyze data using statistical procedures. The quantitative strategy used in this part requires collecting data through a self-administered content analysis to provide a quantitative or numeric value of instruments to measure the variables.

Sample and Data Collection

The sample of the study comprises all listed licensed financial institutions and government-owned financial institutions operated during the period of study. Non-listed foreign licensed financial institutions will not form a part of the sample because such institutions do not publish comprehensive annual reports to capture quality reporting dimensions proposed by IASB (2018). These institutions include the branch offices of foreign financial institutions located in Sri Lanka of which comprehensive annual reports are published in

the respective jurisdictions where they have been incorporated. However, all the domestic financial institutions owned by the government will be included in the sample because they publish comprehensive annual reports to comply with regulatory requirements.

Table 1: Population and Relevant Samples of the Study

Description	LCBs	LSBs	LFCs	Total
Population	24	06	40	70
Sample for the study	11	6	30	47

Source: Compiled by the authors

Data Analysis

This study will adopt the empirically validated financial reporting quality measurement tool developed by the Nijmegen Centre for Economics (NiCE) to assess financial reporting quality and extend the list of items based on the fundamental and enhancing qualitative characteristics of financial reports proposed by the IASB (2018) conceptual framework (Van Beest, Braam, & Boelens, 2009). The financial reporting quality dimensions are measured using a five-point scale, coded 1 to 5 respectively, that reflected the magnitude of the financial reporting quality dimension being measured as developed by Van Beest, Braam, & Boelens, (2009) and subsequent literature.

This study will follow the procedure adopted by Oluwagbemiga (2021) to calculate indices for different qualitative characteristics as discussed below. The index for each qualitative characteristic is calculated by adding all the values of the items in that characteristic and dividing the total sum of items by the number of items in that category. The standardised score for fundamental qualitative characteristics will be calculated by adding the scores for relevance and faithful representation and dividing them by 2. The sale procedure is adopted to calculate enhancing qualitative characteristics by adding the total score of comparability, verifiability, timeliness, and

understandability, and dividing it by 4 indicating that in each case qualitative characteristics are weighted equally. Finally, the overall financial quality index will be computed as a composite index by adding the total score of fundamental and enhancing qualitative characteristics and dividing it by 2. This process is summarized in the following table.

Table 2: Components of Financial Reporting Quality Index

Qualitative Characteristic Index	Sum of the rating of items (A)	Number of Items (B)	Index =A/B
Fundamental Qualitative Characteristics Index = (2+3)/2			
Relevance	R1 to R20	20	
Faithful Representation	F1 to F10	10	
Enhancing Qualitative Characteristics Index = (5+6+7+8)/4			
Comparability	C1 to C9	8	
Verifiability	V1+V2+V3+V4+ V5	5	
Timeliness	T1+T2+T3+T4	4	
Understandability	U1 to U13	13	
Financial Reporting Quality Index = (1+4)/2			

Source: Compiled by the authors

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