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Message from Vice Chancellor

It is my great pleasure to write this message to the proceedings of the 7th International Conference of the Sri Lanka Forum of University Economists hosted by Sabaragamuwa University of Sri Lanka. The theme of the SLFUE 2018 – “Reshaping Development: New Horizons of Economics” to address the need of innovative development practices as to survive in a turbulent economic environment is timely needed area in development practices. The prestige of this conference is enhanced by all the members of Sri Lanka Forum of University Economists collaborating in this laudable academic endeavor. I am aware that given the hardships that may pile up in relation to the commencing and organizing a task of an International Conference of this nature will never look so simple especially for a University which has been located far away from the main metropolitan.

It is noteworthy that the inclusion of an academic culture in the Sri Lankan University system, especially in fairly young Universities such as ours, is an essential and in integral component of the knowledge building process in which we can futuristically visualize a glimpse of hope for a better world through the fog of desperation. The challenges for a sustainable development for this part of the world seems to have laid heavily on the shoulders of the academics and the intellectuals who, through teaching and research, can contribute a lot to the knowledge building process with which the development, in a context of a globalized world, can be materialized in the long run. In this atmosphere, the International Conference can symbolically mean a lot to us who readily embrace the breeze of the advanced society but not without the humanness that such a society should essentially articulate with material advancements.

Prof. M. Sunil Shantha
I would like to take this opportunity to extend my heartfelt thanks to Prof. H.M.S Priyanath and Dr. A. Aruna Shantha, Co-chairs of the Conference, Dr. M.A.C.S.S Fernando, the Coordinator of the Conference, and all other members of the organizing committee for their efforts in making the conference a success. Let me also take this opportunity to congratulate the Sri Lanka Forum of University Economists and extend my best wishes for the conference.

**Professor M. Sunil Shantha**

Vice chancellor
Sabaragamuwa University of Sri Lanka
It is with a great pleasure I issue this massage on the occasion of the 7th International Conference of the Sri Lanka Forum of University Economists (SLFUE). The SLFUE focuses on new horizons of Economics for sustained economic development which has a present value. As I strongly believe this will definitely be a very important occasion for the academia to have a discussion on addressing challenges and issues relating to macroeconomic policies, human capital, social welfare and equity, business and finance, trade, investment and global economic integration, industrial development, SMEs and entrepreneurship, technology, society and language skills toward a Knowledge Economy, public policies, agriculture, infrastructure, environment and disaster management etc. in different perspectives enabling them to find out the ways for restructuring the development process there by ensuring the sustainable development of the country.

I take this opportunity to thank all the members of SLFUE, Vice Chancellor and the Chair of the Conference, Co-chairs, Coordinator, Secretary and the Organizing Committee for shouldering the responsibility of consolidating this grand event along with all the staff of the Department of Economics and Statistics, Faculty of Social Science and Languages. All those who helped in organizing this conference are really appreciated. I wish this conference a great success and I am very confident that this will certainly become a great turning point in SLFUE’s whole endeavours.

Dr. Manoj Ariyaratne
Dean/ Faculty of Social Sciences and Languages
MESSAGE FROM THE CO-CHAIR-2018 Dr. A. Aruna Shantha

It is with great pleasure and pride as the Co-Chair, I write this message for the Proceedings of the 7th International Conference of the Sri Lanka Forum of University Economist – SLERC 2017 hosted by Sabaragamuwa University of Sri Lanka. As the Chair of the SLFUE for the year 2018, Sabaragamuwa University of Sri Lanka embarked upon the challenge in organizing the SLERC 2018 and the unique opportunity of hosting an international conference is indeed a great privilege and pride for the Sabaragamuwa University of Sri Lanka in general and SLFUE members of the University in particular.

The theme of the conference “Reshaping Development: New Horizons of Economics” is a very timely topic. As a country, we aspire to enhance our economic prospects and graduate towards an upper middle income economy in the near future. This cannot be achieved without the support of all stakeholders in the field of economy. At the same time, with a fast changing world, both due to Globalization and effects of climate change, many countries are left behind, and even worsening the already existing inequalities within countries. Hence, reshaping development, which provide all people access to gainful economic opportunities, is essential in eradicating poverty, creating productive employment and improving income distribution, thus resulting in an equitable growth process. Such initiatives will ensure new horizons of economics. I trust deliberations at this conference, along with experiences from other countries, will yield positive outcomes through guiding our policy makers to take decisions.

For the local and overseas delegates who attend this Conference, perhaps for the first time, the beauty and glory of the environment and the historicity of
the cultural monuments wait to make you surprise to a higher magnitude. At the same time, we assume that they will enjoy the company of the academics of the same level in sharing and mutually exchanging their contradictory views as we believe that disagreements can make thing more enlightened and can thereby fertilize this soil more.

SLERC 2018 would not have been possible without the generous support and dedication made by all academic and non-academic staff members in the Department of Economics and Statistics, SUSL. I wish to extend my sincere gratitude to Prof. M. Sunil Shantha, Vice Chancellor of the Sabaragamuwa University of Sri Lanka for his invaluable contribution. I also extend my sincere gratitude to Dr. W. Manoj Ariyaratne, Dean, FSSL, SUSL and the organizing committee for their untiring efforts and dedication to make this event a success, I further extend my special thanks and gratitude to the Reviewers, Session Chair persons and Rapporteurs whose contribution was invaluable in order the Conference to become a successful event.

I wish everyone a very rewarding experiences at this international Conference and enjoyable stay in Belihuloya.

Dr. A. Aruna Shantha
Department of Economics and Statistics, SUSL
MESSAGE FROM THE CO-CHAIR-2018 Prof. H.M.S Priyanath

It gives me a great pleasure in issuing this massage on the occasion of the 7th International Conference of the Sri Lanka Forum of University Economists (SLFUE). The SLFUE in determining its theme for this conference focused on new horizons of Economics for sustained economic development. Addressing challenges and issues relating to macroeconomic policies, human capital, social welfare and equity, business and finance, trade, investment and global economic integration, industrial development, SMEs and entrepreneurship, technology, society and language skills toward a Knowledge Economy, public policies, agriculture, infrastructure, environment and disaster management etc. in different perspectives would lead to restructure the development process. Therefore, I am confident that the deliberations and findings of this conference will be more relevant and productive, and definitely help to create a sense of urgency among the policy makers and general public to pursue policy reforms for achieving sustained economic development.

I take this opportunity to thank all the members of SLFUE, Vice Chancellor and the Chair of the conference, Dean, Faculty of Social Sciences and Languages, administrative officers, coordinator and all the staff of the Department of Economics and Statistics and all those who helped in organizing this conference. I wish this conference to become a great turning point in SLFUE’s future direction.

Prof. H.M.S Priyanath
Department of Economics and Statistics, SUSL
MESSAGE FROM THE COORDINATOR  Dr. M.A.C.S.S Fernando

It is a great honor and privilege for me as the Coordinator to write this message for the Proceedings of the 7th International Conference on Economic Research (ICER) 2018 organized by Sri Lanka Forum of University Economists and hosted by Sabaragamuwa University of Sri Lanka.

As a university located far away from Colombo, organizing this international conference was a bit challenging to Sabaragamuwa University of Sri Lanka. However, the conference organizing committee appointed from my department, the Department of Economics and Statistics were very much supported and dedicated so I could arrange everything without a huge effort. We were honored to have Prof. H. M. Gunathilake, Visiting Professor at University of Hawai as the Keynote Speaker of the conference.

We received nearly 100 papers and after the review 57 papers were accepted. These papers were presented in different tracks of ten oral sessions and the tracks covered ten useful contemporary topics in economics. The knowledge explored and disseminated through the conference proceedings, oral presentations, and comments and discussions on these, extend the existing body of knowledge in the Economics discipline and offer a range of important practical implications that will significantly contribute to the socio-economic development.

As the coordinator of the conference, I extend my sincere gratitude to Prof. M. Sunil Shantha, the Vice Chancellor of Sabaragamuwa University and the Chair of the conference, Prof. H. M. S. Priyanath and Dr. Aruna Shantha, Co-Chairs of the conference, all my colleagues in the Department of Economics and Statistics as the organizing committee, and the academic-support, administrative, and non-academic staff, for their wonderful support...
and tireless effort. Special gratitude is paid here to the sponsors: Bank of Ceylon, National Lotteries Board, and Lanka Electricity Company Private Limited.

Finally, I would like to thank all the authors, presenters, reviewers, volunteers and persons who directly or indirectly contributed to the conference. Without their cooperation and full support, this conference would not have been possible.

Dr. M. A.C.S.S Fernando
Department of Economics and Statistics, SUSL
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Business and Finance to Foster Growth
Impact of Branch Expansion of Banks on Deposit Mobilization in Sri Lanka

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Introduction

Strong, well-developed and efficient financial system is the key driven factor in economic development of countries and it has a positive impact on the economic growth. The financial system in every economy is dominated by the banking sector. Banks play intermediary role of mobilizing funds from savers and subsequently lending them to investors. However, banks cannot exist without deposits. According to Garo (2015) deposits are referred to as the oxygen of banks.

Banking is one of the oldest professions in the human history (Alam, 2015). Now banks are the main financial intermediaries which mobilize and channel financial resources among economic agents (Bello, 2005). Deposit taking institutes, mainly the licensed commercial banks generally depend on bank deposits since bank credits derive mainly through deposits. Therefore, deposit mobilization is an integral part of banking activity. Mobilization of Savings through deposit collection has been regarded as the major task of the banking industry. (Shettar, 2014). Assessment of factors determining the deposit mobilization will have significant impact on the development of the banking industry. (Workineh, 2016). Among the factors affecting deposit mobilization Banqui (1987), Samuel (2014), Bhattacharyay (1986), Murthy and Haresh (1991) advocate that branch expansion of banks to be one of the main factors which affect the deposit mobilization.

There is a relationship between branch expansion of banks and deposit growth of banks (Banqui, 1987). Banks make their expansion decisions on the basis of level of competition, deposit potential, regional income and development of infrastructure (roads). However, since deposit mobilization is the main role of banks, branch expansion is also decided
on the level of deposit mobilization (Samuel, 2014). According to the study of Paul and Bhattacharyay (1986), branch expansion is a significant factor which affects deposit mobilization.

According to Murthy and Haresh (1991), among many factors affecting deposit mobilization, to deposit money in a bank, depositor first takes into consideration, the location of the branch (whether bank is rural, urban or semi-rural), secondly, the region to which the bank belongs.

Research Problem
Since 1977, there has been large expansion in the number of bank branches in Sri Lanka due to the open market policy. Those developments in financial system severed to the growing needs of the customers. However, the branching decisions of the banks should address the customers’ requirements to mobilize more deposits. Since banks should be able to attract high deposit volumes in order to be competitive and profitable, the research problem of the present study would be,

What is the impact of branch expansion on deposit mobilization?

Objectives
The main objective of the study was to identify the impact of branch expansion of banks on Deposit Mobilization and specifically, the study intended to identify the influence of living area on branch expansion decisions of banks.

Methodology
The sample size of this study was 120 people and they were selected by following the simple random sampling method. In order to select the sample area, researcher considered one urban area, one rural area and a one semi-urban area. Dutugemunu Street, Dehiwala was selected as the urban area. Moreover, Ihala Biyanwila, Kadawatha was selected as the semi-urban area. Mandawala, Kirindiwela was selected as the rural area. The study used both primary as well as secondary data. Questionnaires...
were used as the instruments of obtaining primary data and journals and annual reports of Central bank of Sri Lanka were the instruments of obtaining secondary data. Mean comparison has been carried out in order to analyze the difference of ranking importance of the given sub items. Finally, simple regression analysis was performed to assess the impact of the branch expansion of banks on deposit mobilization. The present study was based on the following hypothesis.

**H**₁: There is a positive and significant relationship between branch expansion of banks and deposit amount (Deposit Mobilization)  
The independent variable, branch expansion was measured by Likert scale five model under four sub factors. The response measures alone five scales namely, 5 – Most important 4 – Important 3 – Neutral 2 – less important 1 – Not important at all.

Table 1: Sub-factors of Branch Expansion Factor

<table>
<thead>
<tr>
<th>Branch expansion</th>
<th>Bank has several branches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The closeness/ nearness to home/workplace and convenient location</td>
</tr>
<tr>
<td></td>
<td>Bank Size and External Appearance of the bank</td>
</tr>
<tr>
<td></td>
<td>Its reputation and brand name</td>
</tr>
</tbody>
</table>

Source: Author Developed

Average monthly deposit amount as the dependent variable, has been converted to a categorical variable by assigning values for it.  
< 10,000 - Low Deposit Amount, 10,000 – 20,000 – Moderate Deposit Amount, > 20,000 – High Deposit Amount  
However, the degree of result of the measurement scores are based on the decision rule of the following.  
\[ \frac{1+2+3+4+5}{5} = 3 \]  
If the mean value is >3 it defines high importance while if the mean value is <3 it defines less importance.
Results and Discussion

Mean Comparison

Table 2: Rating of importance of sub-items

<table>
<thead>
<tr>
<th>Branch Expansion</th>
<th>Urban</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank has several branches</td>
<td>4.18</td>
<td></td>
</tr>
<tr>
<td>The closeness/ nearness to home/workplace and convenient location</td>
<td>4.24</td>
<td></td>
</tr>
<tr>
<td>Bank size and external appearance</td>
<td>4.08</td>
<td></td>
</tr>
<tr>
<td>Its reputation and brand name</td>
<td>4.05</td>
<td></td>
</tr>
</tbody>
</table>

Source: Research Data, 2016

Table 3: Rating of importance of sub-items by living area

<table>
<thead>
<tr>
<th>Branch Expansion</th>
<th>Urban</th>
<th>Semi-Urban</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank has several branches</td>
<td>4.48</td>
<td>4.10</td>
<td>3.70</td>
</tr>
<tr>
<td>The closeness/ nearness to home/workplace and convenient location</td>
<td>4.40</td>
<td>4.48</td>
<td>3.88</td>
</tr>
<tr>
<td>Bank Size and External Appearance of the bank</td>
<td>4.05</td>
<td>3.70</td>
<td>4.03</td>
</tr>
<tr>
<td>Its reputation and brand name</td>
<td>4.30</td>
<td>4.20</td>
<td>3.65</td>
</tr>
</tbody>
</table>

Source: Research Data, 2016

When the branch expansion is concerned it was measured by, bank has several branches, the closeness/ nearness to home/workplace and the convenient location, bank size and external appearance of the banks and its reputation and brand name. Among these sub items the highest mean value (4.24) denoted the closeness/ nearness to home/ work place and convenient location. Today people have busy schedules. Therefore, they are always concerned about their convenience in each and every activity they are involved in. However, when the bank branch is closer to the residence it also minimizes the transaction cost associated with it. According to Athappttu (2009), there are two kinds of transaction costs, the menu cost and the shoe-leather cost. Shoe leather cost refers to the cost of time and effort (more specifically the opportunity cost of time and energy) occurring due to the additional trips to the bank. When the ranking importance based on the area of living is concerned, the study found that, urban respondents ranked the sub factor, “Bank has several
branches” (4.48), as the most important sub factor while semi-urban and rural respondents ranked, “The closeness/ nearness to home/workplace and convenient location” (4.48) and “Bank Size and External Appearance of the bank” (4.03) as the most important factors under branch expansion respectively.

Hypothesis testing

$H_1$: There is a positive and significant relationship between Branch Expansion of Banks and Deposit Amount (Deposit Mobilization)

Table 4: Simple Regression analysis of Branch Expansion and Deposit Amount (Deposit Mobilization)

<table>
<thead>
<tr>
<th>Pearson Correlation</th>
<th>$R^2$</th>
<th>$\beta$</th>
<th>Sig.</th>
<th>Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.746</td>
<td>0.556</td>
<td>1103.53</td>
<td>0.000</td>
<td>923.81 – 1283.25</td>
</tr>
</tbody>
</table>

Source: Research Data, 2016

Pearson correlation analysis was performed to identify whether the two variables are positively correlated with each other and whether the relationship between the variables is significant. According to the above table person correlation coefficient is 0.746 which indicates strong positive correlation between these two variables.

After identifying that there is a correlation between these two variables, to test how the dependent variable changes when the independent variables is varied, simple regression analysis was performed. According to the above model $R^2$ is 0.556 and it can be defined as, more than 50% of variance of the dependent variable; deposit mobilization is explained by the independent variable; branch expansion. In addition to that this model is significant by 5% significant level. Therefore, there is strong evidence to reject the null hypothesis and accept the $H_1$ alternative hypothesis. Confidence Interval refers, if the particular analysis carried out 100 times, out of 100 times 95 times the value of the $\beta$ stay within the range of the indicated confidence interval. Furthermore, it indicates the validity of generalization of the sample as a whole.
Conclusion

The aim of this study was to examine the impact of branch expansion of banks on deposit mobilization in Sri Lanka. The study employed a sample survey technique, where 40 were selected from each living area recognized as the urban, semi-urban and rural. Both primary and secondary information were used in this study. Primary data through questionnaires was analyzed using Statistical Package for Social Science (SPSS version 16.0). The results were presented using correlation analysis and regression analysis. Findings reveal that branch expansion has a positive and significant impact on deposit mobilization.

References


Evidence based Management Practices in Existing Healthcare Management Literature

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Introduction

Healthcare is the maintenance or improvement of health via the prevention, diagnosis, and treatment of disease, illness, injury and other physical and mental impairments in humans. “HcMgt is the profession that provides leadership and direction to organizations that deliver personal health services and to divisions departments, units, or services within these organizations” (Kane, 2006). As per 2018 publication of U.S. Bureau of labor statistics, the employment of healthcare managers is expected to grow 20% from 2016 to 2026 and 16% through 2018. This figure proves that the HcMgt is a growing field considering all other occupations. This demand is rising in the field of healthcare services due to the existing large baby-boom population and active late in life (Labor, 2018). Healthcare managers or executives have the vital task of directing entire healthcare system and each key actor has different opinion and a unique vision to drive the system. Reducing the gap between the findings of research and practice of those findings in self-governing healthcare system is the utmost dream of the healthcare managers: Sum of all procedure collectively is called EBMgt (Zadeh, 2016). Therefore, purpose of this exercise is to systematically review existing trend for the theme, its leading applied areas and theoretical and performance gap which would offer possible future research directions in the field of healthcare management. Evidence Based Medicine (EBMed) helps to provide better patient care service to the people and EBMgt incorporates hospital strategies, organizations and management practices. Both are vital to improve the quality of the healthcare (Hasanpoor, 2018).
Research Problem

The lack of theoretically supported knowledge and evidence-based insight is a predominant gap identified in the field of Healthcare Management (HcMgt). Several of the researchers had tried to focus this issue from different angles but still it remains at its’ initial level. Researchers seem to believe that patients are been left to face dangers in healthcare until the healthcare providers construct a safer care environment to them (Patrick et al2010). Evidence Based Medicine (EBMed) is immensely applied in the field of healthcare but Evidence Based Management (EBMgt) is a novel concept to the field. Knowledge on origin and the time line of important events in practicing EBMgt, the extent of its spread in the world, developing trends and existing theoretical and performance gaps in the scientific literature is vital for the researchers who are interested in the field of EBMgt.

Objective

The healthcare administrators and managers are responsible for the decisions that they make. The ultimate goal of the decisions should facilitate the smooth functioning of the organization with better customer/patient satisfaction and improved healthcare organizational profit. Therefore, they need reliable and strong evidence to make firm decisions which are largely available in published scientific literature. This systematic review was done to explore the trends in publishing research on EBMgt in the field of HcMgt while identifying the available theoretical and performance gap in HcMgt in existing scientific literature. It also explores the distribution of numbers of publications in three different areas related to HcMgt (‘Medicine, Sciences and Epidemiology’, ‘Policy & Public Affairs’ and ‘Social Sciences & Interdisciplinary’).

Methodology

The main sources of evidences are published studies, real world evidences, and experts’ opinions: Those evidences are investigated by literature reviews, evidences generated by empirical studies, workshops generated experts’ opinions are used in main kind of decision making.
such as performance assessment, change management, transferring organizational knowledge and strategic planning (Afsaneh Roshanghalb, 2018). Therefore, in this analysis systematic literature review was identified as the research methodology.

Five Popular search engines: PUBMED, Emerald Insight, SAGE, EBSCO, and Roper Center for public opinions were used to gather the information for synthesis of systematic literature review. The advance search query (anywhere) “Healthcare Management” and (anywhere) “Evidence based Management” were used in the literature search until October 2018. Search engines were selected to touch all interdisciplinary areas of HcMgt such as ‘Medicine, Sciences and Epidemiology’, ‘Policy & Public Affairs’ and ‘Social Sciences & Interdisciplinary’. A total number of sixty-one (61) review papers were hit in the process but only twenty-two (22) papers were used for the synthesis. Repetition was checked and avoided. Information gathered were entered in data extraction templates developed using Excel sheet including citation identity, purpose, study design, methodology, and Limitation/conclusion. The data synthesis was initiated by correct placement of the information in the various domains by careful referencing. Since this systematic search focuses on broader topic of “Healthcare Management” and related theoretical gaps, common melodies were emphasized, examined, and refined in the light of their theoretical contribution. Though efforts were made to identify the Context- mechanism-outcome it was unsuccessful due to availability of limited number of citation hits. Therefore, selected themes were considered commonly.

**Results and Discussion**

The summary of methodology used and the contribution made by each search engine is given in the figure 1.
The total number of papers used for the final synthesis was twenty-two (22). Eleven (11) citations each was selected from PubMed advance and Emerald insight citation hits and none was selected from other three search engines. A better search specificity was reported from PubMed Advance search as 11 out of 12 (91.66%) citations were highly relevant to the key words used in search. Only 11/41 (26.82%) was selected from Emerald Insight search which showed less search specificity but high sensitivity when compared to PubMed search.
The figure 2 shows the trends in publishing research in the Field of HcMgt related to the paradigm of EBMgt from the beginning till Oct 2018.

![Graph showing trends in publishing research](image)

Figure 02: Trends in Publishing Research

The number of publications related to the EBMgt in the field of HcMgt has grown significantly from the year 2015. There were no relevant published articles in time line before 2000 and upward trend was observed thereafter.

**Discussion on Existing Literature gaps**

Complexity of the healthcare system has been amplified rapidly with growing modern technology and concerns on the safety culture. Therefore, Healthcare managers need enough talents to demonstrate, measure, and evaluate the identified outcome indicators relevant to them and to practice evidence base management within the different healthcare foci in addition to their academic and professional competencies gained though respective training. The organization of Healthcare Leadership alliance (HLA) has suggested five competency domains which are common for all healthcare managers. The five domains are ‘communication and relationship management’, ‘professionalism’, ‘leadership’, ‘knowledge of the healthcare system’ and ‘business skills and knowledge’ (ME., 2008).
HLA competency directory has been released and its limitations can be further addressed by any researcher who is interested in the field of EBMgt. The EBMgt collaboration is a modern application in the field of management. Literature suggests that the practicing managers should possess the state-of-art knowledge in decision making especially in the critical issues of the healthcare system or should lead the institution to implement sustainable solutions. Synthesis of consistency, significance, and actionability of management knowledge over the strong evidence are ensured in the processed model of Evidence based Management-collaboration introduced by the Center of the Evidence Based Management-Collaboration. Real time evidence searched through a systematic review using standard template via online data bases generates collaboration. Theory of collaboration can be used as a guideline to establish and maintain the operation of evidence Based management-collaboration (Zadeh, 2016). Applicability of concept development must be further analyzed to check the applicability.

EBMgt should be aligned with the evidence based practices. Clear, and sensible use of best available evidence from multiple sources (asking, acquiring, appraising, aggregating, applying, assessing) increases the likelihood of a favorable outcome in making decisions (Barendse *et al* 2014). EBMgt sources, EBMgt preditors, EBMgt barriers and EBMgt processes were identified as the key areas to be considered within the EBMgt framework (Ali Janati, 2017). Evidence based paradigm encourages experts to apply robust-reviewed source of evidence in the decision making in addition to instructions of management consultations and personal experiences (considered as nonscientific or non-rational) in the professional core diverting the decision making toward more transparent and traceable path. Major limitations of the evidence based paradigm are the non-addressing of the local public involvement, non-representing of patients’ experiences, non-addressing of the existing academic research-practice gap and non-respecting of valuable experience gathered by the professionals though the daily routine (Ledger J., 2010). The EBMgt helps immensely to knowledge base of the health care system. The organizational and management research could add valuable knowledge especially when it comes to the
management of complex issues like risk assessment, uncertainty and organization of the entire work force. The major obstacle of implementation of organizational and management research findings is the difficulty of it been implemented from top to bottom of the organization by convincing the top management. The organizational researchers and academics could overcome this issue of their findings not been considered or used by identifying different levels that they could incorporate management research findings. A collaborative approach with EBMgt will provide better solutions to a complex system like health care organizations.

The type of information used by the hospital administrators in decision making in the HcMgt and the kind of barriers that minimize the approach to EMMgt are vital problems in the analysis of EBMgt paradigm. Organizational data and personal experience were identified as the main sources of information used in decision making and lack of time to engage to find the evidences, lack of systematic review/information gathering skill and lack of implicit about the EBMgt were identified as the other significant barriers in USA. A study conducted by both medical librarians and academics found that the service of the medical librarians could be obtained to gather the best evidences to be used in decision making process in evidence based practice paradigm. The librarians could provide the opportunity to overcome the time limitations of the administrators to engage in data gathering process (Guo et al 2015).

EBMgt though widely accepted in management circles still lack the skilled personnel to gather knowledge, analyze and implement to the best of its value. The training of individuals on EBMgt is one of the solutions to this. There are several applications to training approaches including application of logic model which has been used to plan, implement an educational training and evaluate the outcomes of the training. The pre- and post-test and self-reflection surveys were conducted using the participants who involve in HcMgt. The participants’ knowledge and information searching skills on evidence based management was significantly increased after the training. This
shows the importance of training of individuals to improve the skills in evidence based management and the possibility of using logic model as a framework for planning and evaluation even though logic model has some limitations like it lacks the ability to predict or solve the actual problems occur during an event. However, the outcome of this study is highly theoretical and one may need to carry out a different study to find out whether those who improved their knowledge and skills are really put in to practice or whether they use EBMgt in their respective institutions (Guo et al 2016).

The acceptance of EBMgt and evidence based practices is gradually increasing. A study done in 2006 by Kovner and Randall to assess the attitude of the health care administrators on EBMgt shows a low level of attitude. But it has changed from that point to present significantly and the health care managers have a positive attitude towards the EBMgt. A study carried out in 2016 in USA to assess the beliefs and attitude towards practicing the EBMgt showed a significant correlation between attitudes and percentage of HcMgt decisions made using an evidence-based practice approach. HcMgt field is rapidly changing and the administrators have realized the need and importance of the evidence based approach to stay competitive in the field. There was a greater demand for training in this field as more than 75% of the health care administrators who participated in the study were interested in receiving training. The knowledge and the skills developed through training is the key to identify the best evidence that could be used to practice and improve the organization’s overall output (Guo et al 2016).

It is useful to find out whether the administrators use the evidence based management in decision-making process in their organizations. A study conducted among healthcare administrators in USA on this has shown a significant use of evidence in major decision-making with more than 90% of the participants self-reporting the use of evidence based approach for decision-making. The study also looked in to the type of evidence they use in this process, relationship between attitude towards the EBMgt and adoption of them. The professional experiences, organizational data and stakeholders’ values were the top three types of
evidence used for decision making weekly. The top two types of evidences used in monthly decision-making were case studies and scientific research. There was a statistically significant correlation between the healthcare administrators’ use of EBMgt approach and the attitude towards it (Guo et al. 2017).

The administrators and the managers are responsible for the decisions that they make. The ultimate goal of the decisions should facilitate smooth functioning of the organization with better customer satisfaction and improved organizational profit. Therefore, they need reliable and strong evidence to make firm decisions. It warrants an independent body/organization to review and evaluate the evidence and select/advice regarding the best data that could be used since there is no legally established organization that could measure the reliability and the validity of the evidence. There are accepted norms that could be used to assess the reliability and validity of data. The methodological fit, contextualization, replicability, transparency and the consensus of the experts and scholars are the five main dimensions that one could use. Greater their alignment, will make stronger the evidence. If such scenario is in place it will provide a greater strength for the managers to take decisions based on evidence. However, it should be noted that the decision making based on evidence may not be uniform universally. The managers will add their own experience in utilizing the evidence. Also, there are other factors that influence the decision making of an organization like preferences and values of the management and the various stakeholders and the different ethical constraints. In conclusion with all these influencing factors if an organization receives strong and justifiable evidence backed by an independent organization it will facilitate a use of such evidence in to a greater extent in decision-making (Vishwanath et al. 2012). Even though the EBMgt model is becoming popular and increasingly used all around the world still there is a lack of empirical data to back this model.
Conclusion

Practice of EBMgt is the newest trend in management in which HcMgt is not spared. The evidence though available through experience, records and reviews there is gross inadequacy in the collection, analysis and utilization of this data effectively. Therefore, improving the skills of the managers in data collection and utilizing them through workshops/training sessions are important. There are successful models that could be used for training. The amount and type of evidence used by health acre authorities need to be assessed separately through research. It is also proposed to formulate an independent body with experts and academics in the field to validate the data used in EBMgt. Currently the theory of the EBMgt heavily depends on the logic and the arguments. There are various factors that could be used to evaluate evidence that are used in EBMgt in HcMgt though there are no globally accepted norms. Such norms could be proposed through an independent organization comprises of experts and scholars in the management field. Comprehensive research involved by industry, organizations and scholars is much needed in this hour to provide strong backing for EBMgt in the field of HcMgt. Both PubMed advance search and Emerald Advance search engines are recommended for the novel researcher who interested for EBMgt practices in Healthcare industry.

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Evidence-based management of ambulatory electronic health record system implementation: an assessment of conceptual support and qualitative evidence. (n.d.).


Does Service Quality Affect the Customer Satisfaction?

An Empirical Study of the Customers who have Bank Accounts in Both Public and Private Banks

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Introduction

The Sri Lankan commercial banks compete with each other giving same kind of better service to their valued customers. Therefore, quality of the services is considered as key component among the banks in order to provide better service to the customers. In a competitive market situation banks in both public and private sector in Sri Lanka, apply different and important strategies to improve the quality of their services. Hence, these different qualities affect to different level of customer satisfaction. However, most empirical studies identified that, there was some differentiation of the service quality on customer satisfaction regarding both public and private banks separately in Sri Lanka. Therefore, this study focuses to compare the effect of service quality on customer satisfaction of both public banks and private banks in Sri Lanka. Findings of this research contribute to the formulation of marketing strategies of private and public banks in Sri Lanka.

Research Problem

Many researchers in the global economic context have identified the importance of the comparative study of service quality between private and public banks in order to enhance customer satisfaction considering the customers who have in both public and private bank accounts. However, considering the Sri Lankan context, there were lacks of studies to comparatively show how the effect of distinct service quality of both private and public banks influence to satisfaction of the customers. Examining customers’ satisfaction towards the service quality delivered by both public and private banks can address the empirical and practice-related knowledge gap in Sri Lanka. Therefore,
this study has figured out its research problem as how far perceived service quality of both public and private banks affected the perceived customer satisfaction considering the customers who have in both public and private bank accounts.

**Objectives**

The main objective of this study was to explore the effect of service quality on customer satisfaction of customers who have both public and private banks. There were two specific objectives of this study to find out the effect of Human Related Service Qualities (Reliability, Responsiveness, Assurance and Empathy) on customer satisfaction and, to identify the effect of Non-Human Related Service Quality (Tangibility) on customer satisfaction.

**Methodology**

The study used quantitative approach to achieve its research objectives. Study population covered the all the customers who handle both public and private bank accounts. Sampling Frame cannot be identified to this population. Hence, the convenient sampling method was adopted as data collection method. Data was collected through one hundred and forty one (141) customers who handle both public and private bank account in Gampaha District. Data was collected for a structural questionnaire. Dependent variable of this study was customer satisfaction and independent variable was service quality. Customer satisfaction is reflected from six dimensions such as attitude, fulfillment of expectation, recommendation, re-purchase, satisfaction with use and switching while service quality is reflected from five dimensions such as assurance, empathy, reliability, responsiveness (Adhikari & Das, 2016; Selvakumar, 2015) and tangible (Carman, 1990; Crompton & Mackay, 1989). The study divided data set into two based on answers related to public bank and answers related to private bank and analyzed separately using Partial Least Square - Structural Equation Modelling (PLS-SEM) because the study attempted to evaluate the differences between service quality and customer satisfaction of both public and private banks. PLS-SEM helps to examine the interrelationship between
multiple independent and dependent variables and facilitates the
evaluation of relationships between more than one construct
simultaneously. Measurement model is evaluated employing reliability
and validity tests and the efficiency of the structural model was
evaluated by multi-collinearity issues, $R^2$, effect size ($f^2$) and predictive
relevance ($Q^2$). The smartPLS (version2) software was used to analyze
data.

**Result and Discussion**

Based on PLS-SEM measurement model, the study initially evaluated
six latent variables which consist with one dependent latent variable
(customer satisfaction) and five independent variables (assurance,
empathy, reliability, responsiveness and tangible). First, the study
evaluates the reliability and validity of each dependent and independent
latent variables dividing data set into two as answers related to public
bank and answers related to private bank. The study tested five
hypothetical relationships between five dimensions of service quality of
commercial banks and customer satisfaction.

According to statistical analysis, assurance does not represent
significance relationship with customer satisfaction ($\beta = 0.031$) for
public banks. However, assurance represents low positive significance
relationship with customer satisfaction ($\beta = 2.15$) for private banks.
Although there is lack of similar previous study in the literature, some
studies have provided similar findings. Morawakage & Kulathunga
(2013) also mentioned that assurance of public banks were not
statistically significance related to the customer satisfaction in Sri
Lanka. Hennayake (2017) explained that public banking sector in Sri
Lanka has moderate positive significance relationship between
assurance and customer satisfaction. Empathy of public banks has low
positive significance relationship with customer satisfaction ($\beta = 0.29$)
while empathy of private banks has no significance relationship with
customer satisfaction ($\beta = -0.094$). Hennayake (2017) and Morawakage
& Kulathunga (2013) identified that empathy of public banks has
moderate positive relationship with customer satisfaction. According to
this analysis reliability has low positive significance relationship ($\beta =
0.19) with customer satisfaction for public banks and no significance relationship (β= 0.036) with customer satisfaction for private banks. Hennayake (2017) and Sivesan (2012) identified that, this reliability factor is the most influential factor to improve customer satisfaction regarding public banks in rural sector. However, reliability factor not influence to customer satisfaction in urban sector (Morawakage & Kulathunga, 2013). Both public and private banks in Sri Lanka identified that responsiveness has significance positive relationship (β= 0.16) and (β= 0.53) with customer satisfaction. This positive impact of responsiveness towards customer satisfaction is supported by the previous researchers Hennayake, (2017) and Sivesan, (2012) in Sri Lanka. According to results, study founded the positive significance relationship of tangible to enhance the customer satisfaction of both public and private banking sector representing the path coefficient value (β = 0.27) and (β = 0.29) separately. Hennayake (2017) and Morawakage & Kulathunga (2013) identified that customers in both public and private banks in Sri Lanka are satisfied with the physical aspects, tools and equipment provided by the banking sector.

**Conclusion**

The results of this study indicated that, four dimensions of service quality such as empathy, reliability, responsiveness and tangible are statistically significance with public banks while only three dimensions such as assurance, responsiveness, and tangible are statistically significance with customer satisfaction. Exclusively, the study identified that customers in both public and private banks are highly satisfy with non- human related service qualities provided by banks. The results further implied that, public banks have flexible operating hours to work and established convenient locations to works. And also public banks have introduced different loan schemes to the customers, understanding their purpose. Further it represents public banks’ ability to deliver service as promised and speed of handling the problem weather the banks has customers’ best interest at heart and weather the banks offer products that are best suited for customers. As well as accuracy of service provided of public banks helped to enhance the customer
satisfaction. And also this study shows that, assurance of public banks is statistically insignificance with customer satisfaction. However, assurance of private banks has significance low positive relationship with customer satisfaction. Therefore, it was founded that customer expectation exceeds well in assurance provided by private banks in terms of giving importance to customers’ suggestion and views, secured transaction, accurate record maintains, meeting customers regularly etc.

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Relational Qualities, Opportunism and Business Performance:

A Study of Gem Dealers in Sri Lanka

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Introduction

Sri Lankan Gem business is a traditionally developed industry (Read, 1990). Today, it has become a successful business which is unique among the rest of the businesses in Sri Lanka. Entire gem business process is relational and completely relies upon informal practices, and thus relational qualities among businessmen are very crucial. Exchanges of this business are usually done through the lending basis, but paying recruits on the exact date as promised is a well-known custom among gem dealers (Wijebandara, 2008). It does not involve any legal movements or legal contracts. Interactions between buyers and sellers or the exchange parties are mainly driven by the trust factor (Wijebandara, 2008).

In most relational models of business relationships, trustworthiness is defined as the fundamental building block and also as the central element in the exchange process (Brashear, Boles, Bellenger, & Brooks, 2003). Apart from that, they commonly share strong relational bonds and norms to maintain long-term healthier business relationships with their partners (Gilsing & Nooteboom, 2005). Many scholars have examined how these different qualities of relational governance or practices would affect the growth of a business (Priyanath & Premaratne, 2017). However, in the gem business, there has been a lack of empirical evidence to understand how the relational qualities between exchange partners affect the business performance.
Research Problem

According to Williamson (1985), individuals are often involved in business activities with an intention of making profits. Thus, they will never be inclined to share trusting behaviours on exchanges, in such occasions opportunistic responses can occur with the profit motive as an adverse consequence. In business networks, the party with less information always is about to be mislead by the party with more information on behalf of profit maximization (Nelson, 1970). However, there is no market which shares perfect knowledge and information in reality that people’s rationality is always bound to only what we know (Priyanath & Buthsala, 2017). Ostrom (1998) have pointed out opportunism as a factor which may incur adverse effects on business outcomes while putting a greater emphasis on relational attributes which may influence to mitigate opportunism and govern economies. When parties intend to share relational behaviours in interactions, they need not have a suspicion that the opposite party will deceive them, with faulty information (Dyer & Chu, 2000). Hence, they need not involve in any legal procedures to safeguard their transactions from deceptions. It may affect lowering transaction cost i.e. legal fees, communication charges, informational cost, etc., and rise in the business progress. All these shreds of evidence confirm the significance of relational capital attributes to govern an economy for its success. However, consideration regarding the connection between relational attributes such as interpersonal trust, relational norms, the strength of ties, cognitive capital on the business performance has not yet been evidently clarified. Therefore, it is not clear which quality is most effective in the business development process as well in minimizing opportunism.

Objectives

The main objective of the study is to explore the effect of relational qualities on the business performance of gem dealers in Sri Lanka. Specific Objectives of the study are;

- To find out the effect of interpersonal trust on business performance of gem dealers in Sri Lanka.
To examine the effect of relational norms on business performance of gem dealers in Sri Lanka.

To find out the effect of strength of ties on business performance of gem dealers in Sri Lanka.

To examine the effect of cognitive capital on business performance of gem dealers in Sri Lanka.

Methodology

The current study mainly used the quantitative method in the main survey progress, with a structured questionnaire conducting face-to-face interviews by 100 registered gem dealers in Ratnapura district, Sri Lanka to collect primary data. Most statisticians agree that the minimum sample size of 100 is sufficient for achieving meaningful results for any type of study. Usually, about 10% of the population is a good maximum sample size, as long as the size of the population does not exceed 1000 (Bullen, 2014). Though, there are 891 registered gem dealers recorded in reports, most of the businessmen don’t provide active participation in this business lest this business faces several uncertainties. Furthermore, for this reason, the researcher had to select very close well-known gem dealers to conduct this study as well as the survey questionnaire contained many personal and very subtle questions regarding assets, profit levels, etc. employing convenience sampling, gem dealers, who are most entrusted and easily contacted have been chosen to the sample. The business performance was assessed by the respondent’s opinion on their financial and non-financial performance as well as their satisfaction on this business career. Opportunism was assessed through their opinion on the exaggeration of needs, sincerity in dealings, and good faith of the exchange parties. Interpersonal trust, relational norms, and cognitive capital were reflected using three, four, two constructs respectively. A tie strength index was calculated to measure the strength of ties between partners. Collected data were first evaluated with descriptive statistics, afterward using Partial Least Square Structural Equation Modeling (PLS-SEM) using Smart PLS version 3 under two models; measurement model, structural model. Under first modeling, validity and reliability of higher and lower order
constructs were measured. Collinearity diagnostics, the significance of path coefficients, evaluation of $R^2$ value, effect size and predictive relevance were considered in evaluating the structural model.

**Results and Discussion**

According to the fallouts of descriptive statistics, it was visible that the entire data set is normally distributed. Results of the path coefficients exposed that inter-personal trust between gem buyers and sellers have significant positive impacts on business performance. Johnston, McCutcheon, Stuart, & Kerwood (2004) empirically justified that trust correlates positively with business performance, thus it increases the partnership behaviours and rationale in outcomes through cooperative manner. Relational norms between gem buyers and sellers also have a significant positive effect on business performance.

The study further exhibited that the tie-strength and cognitive capital have a positive association with business performance. All the reflective variables of relational qualities have a negative correlation with business opportunism while norms and cognitive capital denoted insignificant negative impacts. Scholars such as Priyanath & Premaratne (2017) have empirically justified that relational factors like trust can reduce transaction cost in exchanges while decreasing opportunism. Furthermore, in this study the mediate variable; opportunism reported an insignificant negative relationship with business performance.

<table>
<thead>
<tr>
<th>Hypo.</th>
<th>Relationship</th>
<th>T Stat</th>
<th>Co-effici.</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Trust -&gt; Busi_Per</td>
<td>3.5268</td>
<td>0.3867**</td>
<td>Supported</td>
</tr>
<tr>
<td>H2</td>
<td>Trust -&gt; Oppor</td>
<td>1.8444</td>
<td>-0.3545**</td>
<td>Supported</td>
</tr>
<tr>
<td>H3</td>
<td>Norms -&gt; Busi_Per</td>
<td>2.9891</td>
<td>0.3120**</td>
<td>Supported</td>
</tr>
<tr>
<td>H4</td>
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<td>0.2271</td>
<td>-0.0347</td>
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<tr>
<td>H5</td>
<td>Tie_Stre -&gt; Busi_Per</td>
<td>1.4588</td>
<td>0.1212</td>
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</tr>
<tr>
<td>H6</td>
<td>Tie_Stre -&gt; Oppor</td>
<td>5.3470</td>
<td>-0.3970**</td>
<td>Supported</td>
</tr>
<tr>
<td>H7</td>
<td>Cog_Capi -&gt; Busi_Per</td>
<td>1.4674</td>
<td>0.1086</td>
<td>Not supported</td>
</tr>
<tr>
<td>H8</td>
<td>Cog_Capi -&gt; Oppor</td>
<td>1.6492</td>
<td>-0.2032</td>
<td>Not supported</td>
</tr>
<tr>
<td>H9</td>
<td>Oppor -&gt; Busi_Per</td>
<td>0.7909</td>
<td>-0.0831</td>
<td>Not supported</td>
</tr>
</tbody>
</table>

Source: survey data, 2018
Conclusion

This study argues that relational qualities among gem dealers in Sri Lanka enhance their business performance by mitigating the business opportunism. Illustrating on relational aspects, the study has provided with enough empirical evidence and explored the effect of characteristics of a relationship between gem dealers on their performance, and found indications for the mediating role of opportunism factor. The study identified the impact of interpersonal trust is greater than other variables while highlighting it as the most powerful relational quality among gem dealers’ characteristics.

Additionally, findings of the survey provides practical insights in understanding how improved relational and cognition views of exchange would increase dynamic capabilities and help to enhance the business performance. Overall, this work makes several contributions to research areas on the relational exchange by examining the influence of relational qualities in improved exchange partnerships. For instance, this study makes a theoretical contribution by linking relational capital attributes; trust, norms, tie-strength with cognitive attributes; shared knowledge, shared vision with dyadic relationships and business performance. The main implications of this study are the insights it provides about the relationship between relational qualities and levels of business performance and pointing out that developing positive and strong interconnected business network is a key element to enhance economies performance at any level.

References


Money Laundering and Terrorist Financing: The Role of Domestic Financial Institutions

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Introduction

A financial crime is a regulatory, reputational, or monetary act or attempt against financial services institutions, corporations, governments, or individuals by internal or external agents to steal, defraud, manipulate, or circumvent established rules (Actimize, 2016). There is no a single broadly accepted understanding of the meaning for the term ‘financial crime.’ At its absolute broadest, the term has occasionally been used to refer to any type of illegal activity that result in a pecuniary loss. This would include violent crimes against the person or property such as armed, robbery or vandalism (IMF, 2001, p 5). Financial abuse has the broadest meaning, encompassing not only illegal activities that may harm financial systems, but also other activities that exploit the tax and regulatory framework with undesirable results (Wilson, 2014, p 37).

Money laundering is frequently referred to as a financial crime. It is generally defined as “transferring illegally obtained money or investments through an outside party to conceal the true source”. (IMF, 2001, p 7). Money transfer referred as moving money electronically or physically to a specified account or person from another specified account or person. Remittance transfers are commonly known as “international wires,” “international money transfers,” or “remittances”(CFPB, 2016).

The evolution of the technology has facilitated numerous methods to transfer money a person to another. The world is no longer a collection of independent financial market. It’s a global bazaar, backed by an electronic infrastructure that permits the instantaneous transfer of funds from anywhere on the earth to anywhere else (Robinson, 1996). It is
broad and complex task for any financial institution to scanning/monitoring formal and informal transactions to protect their servicers from criminals.

Launderers are keen to abuse financial institutions and products to fulfil their objectives. Many scholars (Oxford, UK; Centre for the Study of Economic Crime, Johannesburg; Rand Afrikaans University) had written and researched on the topic of money laundering. Some research has been focused on the phenomena itself, its impact, extent and quantification, some on the laws and regulations that were introduced to try and curb it (Hlophe, 2012). However, reviewed literatures revealed a research gap between measures and the practices deployed by financial institutions to prevent money laundering and terrorist financing. Hence this particular research is focuses on the measures and the practices adopted by financial institutions to prevent money laundering and terrorist financing in Sri Lanka.

The financial institutions are the first line of defense against money launderers, their contribution is a great support to prevent money laundering.

This research study is to identify Why Financial Institutions get abused by money launderers, despite their efforts at complying with applicable laws and regulations assigned by regulators?

**Problem Statement**

Money laundering is the process used to disguise the source of money or assets derived from criminal activity. This illegal activity can include drug trafficking, smuggling, fraud, extortion and corruption. Criminals must launder the profits and proceeds from these crimes to be able to enjoy them (Kevin, 2015, p. 1). It is estimated that a $2 trillion worth of money laundering around the globe in a year. Just to conceptualize how much that is, let’s look at it this way. A single $1 bill is approximately .0004 of an inch. One million single dollar bills would be approximately 2/3 of a mile high, or about the size of two Empire State Buildings stacked on top of each other. The height of one trillion dollar bills would
be approximately 134,000 miles high. That is a little more than halfway to the moon. So, $2 trillion would take us right up to the Sea of Tranquility. One small step for man, huh? (Kevin, 2015, p. 4).

Terrorist financing operates somewhat differently from money laundering but no less insidiously. While terrorist groups do generate funds from criminal activities such as drug trafficking and arms smuggling, they also frequently obtain revenue through legal means. Money laundering is a result of any illegal activities such as smuggling, terrorist activities and many more. Funds could be transforming through various channels (legal/Illegal) by using different techniques. Money Laundering usually does not have direct victims, it can even be interpreted as a ‘Victimless Crime’ (Unger, 2007).

Amarathunga (CBSL, 2015) stated that over six million cash transactions and electronic fund transfers, and 783 suspicious transactions were reported by Reporting Institutions. A total of 426 Suspicious Transactions Reports (STRs) were referred to law enforcement and regulatory authorities for further investigation during the year (FIU, 2015). According to the Asia Pacific Group on Money Laundering (APG) report of Anti-money laundering and counter-terrorist financing measures in 2015 highlighted following two as the main risk area in Sri Lanka.

1. Drug trafficking
2. Corruption

As per the National Money Laundering and Terrorist Financing Risk Assessment report of Sri Lanka in 2014, the risk levels pertaining to each institution been categorized. The vulnerability for money laundering risk for the institutions falling under “other financial sector” having a Medium High (MH) risk and Medium Vulnerability for “Banking sector”. The designated Non Finance Businesses and Professions having a medium high vulnerability for money laundering risk.
The proposed study is to identify the role of domestic financial institution to prevent money laundering and to propose a framework that would mitigate the risk within financial domain.

**Objectives of Study**

The objectives of this study consist with following,
- To examine the understanding about ML/TF among front work force in financial institutions.
- To identify the level of awareness about ML/TF among front office work force in non-financial (retail) money transfer service providers.
- To detect the extent of ML/TF measures adopted by financial institutions.
- To identify whether any gap exists between ML/TF measures and practical adoption in financial institutions.
- To develop a frame work for financial institutions to minimize financial abuses through inward remittances.

**The Research Question**

Why Financial Institutions get abused by money launders, despite their efforts at complying with applicable laws and regulations assigned by regulators?

**Hypothesis:**

Based on the said objectives, the following research hypotheses are developed to tested,

**H₁:** There is no significant difference in the awareness of ML/TF among front work force between financial institutions.

**H₂:** There is no significant difference in the awareness of ML/TF among front work force between non-financial (retail) money transfer service providers.

**H₃:** There is no significant risk of abuse financial and non-financial institutions due to lack of sufficient trained front work force.
H₄. There is no significant difference between ML/TF measures and practical adoption of it.

Methodology

The aim of this research study is to investigate the role of financial institutions to prevent money laundering and terrorist financing. As with all research, a mixed method approach is considered as more productive than a single method. It has been identified that (1) Detection of suspicious transaction, (2) Effectiveness of the screening process and (3) Effectiveness of the measures against ML & TF are the dependent variables that exist as loopholes within the financial institutions. The variance of these dependent variables by the three independent variables of (1) awareness of ML & TF, (2) awareness of institution’s policy and procedures and (3) training and experiences on ML & TF.

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Dependent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness of ML &amp; TF</td>
<td>Detection of suspicious transaction</td>
</tr>
<tr>
<td>Awareness of institution’s policy and procedures</td>
<td>Effectiveness of the screening process</td>
</tr>
<tr>
<td>Training and experiences on ML &amp; TF</td>
<td>Effectiveness of the measures against ML &amp; TF</td>
</tr>
</tbody>
</table>

A survey questionnaire and an interviews are the primary source of collecting data of this study. The data will be collect from both qualitative and quantitative nature. To test each objective of this study, deferent questions have been deployed based on the theoretical context, findings of the earlier studies and CBSL guidelines on AML. However, this research study ensured to employ best techniques to obtain and collect data and information. The collected data will be analysis by using a latest tool to produce final outcome of this research study. The diagram of the research design, sampling, population and the data collection have been further described in below.
Population

The population refers as the entire group of people, events, or things of interest that the researcher wishes to investigate (Bougie, 2013). The selected population of this study consist with licensed commercial and special banks, licensed financial institutions and retail outlets who are facilitating inward remittances to the public. As per the Central Bank of Sri Lanka, there are 25 commercial banks, 7 special banks and 45 financial institutions have been registered as at 31st October 2017 (CBSL, 2017). Thus, a large retail principal has selected with a network of 200+ retail agent partners.
Sampling

The sampling frame for this study is compliance department and the customer service department (counter force) of institutions. The type of sampling design in this study is probability sampling, as the elements in the population have probability of being selected as a subject. The proportionate of fifty percent (50%) random sampling system was deployed to select the subjects of this study. The sample is 16 licensed commercial and special banks, 4 financial institutions, and 1 non-financial institution with 100 retail outlets. The total sample for this study consist 142 subjects from total population, which accounted for 50% of domestic money transfer providing entities.

Data Collection

A survey questionnaire and an interviews are the primary source of collecting data of this study. The data will be collect from both qualitative and quantitative nature. The collected data will be used in up and down this ladder in order to fulfil the objectives of this research study effectively.

Results and Discussion

The Correlation between Micro Economic factors and Money laundering.

This study used the linear regression to understand various economic factors how influences due to money laundering process. Linear regression attempts to model the relationship between two variables by fitting a linear equation to observed data. In statistics, linear regression is a linear approach to modelling the relationship between a dependent variable and independent variables. The study assesses the coefficient of correlation between following variables which effect Sri Lankan Economy.

1. The coefficient of correlation between suspicious transaction reports (STRs) (referred to law enforcement agencies )LEAs) (X for money laundering and annual GDP growth) Y).

\[ r = -0.41 \] - Moderate negative correlation between variables.
2. The coefficient of correlation between the cases referred to Law Enforcement Agencies (LEAs) (X) and Unemployment rate (Y).
\[ r = 0.69 \] - Moderate positive correlation between the two variables.

3. The coefficient of correlation between the cases referred to Law Enforcement Agencies (LEAs) (X) and Foreign Direct Investment (FDI) (Y).
\[ r = -0.77 \] - Strong negative correlation between the two variables.

4. The coefficient of correlation between the distribution of grave crimes abstract (Y) and the cases referred to Law Enforcement Agencies (LEAs) (X) during 2013 to 2015.
\[ r = -0.98 \] - Strong negative correlation between the two variables.

5. The coefficient of correlation between the Imports (Y) and the cases referred to Law Enforcement Agencies (LEAs) (X) during 2012 to 2015.
\[ r = 0.40 \] - Positive correlation between the two variables.

**Findings - Pilot Test**

*Banks*:
The front officers do not update or not aware of updating KYC periodically.

*Financial Institution*:
The front officers not aware that the suspicious transactions should be reported to the FIU at CBSL. It’s a negative sign of their first line defense. The financial institutions do not provide sufficient training for their staff.

*Non-Financial/Retails*:
50% of retailers not aware that the suspicious transaction should report to FIU at CBSL. 50% of retailers not aware of the principle agent’s policy on AML & TF. 50% of retailers have not received training on KYC, CDD and EDD operations.
Conclusion

The research study revealed that a significant difference awareness between institutions about AML & TF. The front officers at each institution should be well trained and updated as its react as the first defense force against money laundering. The banks and financial institutions have policies and procedures as a requirement of Central Bank of Sri Lanka. However, the practical implementation and adaptation is weak due to lack of trainings. The non-financial institutions and the retailers are vulnerable to money laundering risk compare to banks. It is basically lack of knowledge of institution’s policies and knowledge of AML. However, financial sector should take serious attention of this and facilitate required trainings and awareness for their future protection.

References


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Impact of Banking Sector Development on Stock Market Development in Sri Lanka

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Introduction

The financial system of an economy facilitates the long run growth through optimal allocation of resources and investments within the economy. In this perspective, a well-functioning and an efficient financial system plays vital role in mobilizing funds from surplus to deficit units. Moreover, the asymmetric information between participants in the financial market, financial intermediaries play their role in reducing the transaction cost of financial transactions which derives from asymmetric information. The financial system can be bank based system or the market based system and time to time economists have debated on merits and demerits of these systems. For example, Goldsmith (1969) noted that Germany boosted their economy than the United Kingdom due to the bank-based financial system in 19th century. Moreover, in 20th century, Japan a country followed market based financial system reported notable economic growth and captured the foremost economic power in the world1.

According to the basics of finance, corporate companies have the possibility to fulfill their monetary requirements from three sources such as self-finance, the market sources and banks. Banks are part of the financial intermediary in the financial system and stock market and bond market also facilitates to gather required funds by issuing investment securities like equities and debentures. As stated earlier both banks and markets provide required funds to financial deficit units in the economy and the modern financial system is a mix of both banks and market system. Both Banks and markets produce valuable information for the market participants for them to make important financial decisions in

1Vogel, Ezra. Japan as Number One. 1979
different ways. Obviously banks are experts in screening the information about borrowers before the loan is granted and monitoring their activities closely until the loan is repaid. On the other hand, markets screen by aggregating investors’ information because market prices incorporate the information of market participants².

The traditional corporate finance theory of Modigliani and Miller (1958) suggested that corporate businesses finance their business with debt or equity. Corporate sector acquires funds from the banking sector as borrowings or selling business ownership to external parties, called equity. Therefore, the firm’s optimal capital mixture includes both bank borrowings and equities. Accordingly, debt and equity are substitute sources in finance for business enterprises and provides evidence to make sense on the role of the stock market and banking sector as competing elements in the financial system. In the recent past, academic dialogs have been focused on the importance of financial sector on the economic development. For example, Schumpeter (1911) noted that a well-developed financial system is important to enhance economic growth in a country. Similarly, Levine and Zervos (1998) provided evidence that stock market development signifies the economic growth. Advancing the arguments further, Apergis et al. (2007) revealed that banking sector development contributes to the growth of an economy. Thus, it is evident that both of stock markets and banks are the important components in the financial system and development of stock market as well as banking sector both are vital elements for the economic development. What motivated this paper is that, the empirical argument on the stock market development and banking sector development is still inconclusive in emerging economies. Grossman & Hart (1980), DeAngelo & Rice (1983) pointed out that banking sector performs better than the stock market due to the information acquisition about firms.

Currently, 26 commercial banks and 7 special banks are operating in the banking sector in Sri Lanka. On the other hand, the Colombo Stock Exchange (CSE) is functioning as a stock market covering 20 business

sectors with 296 listed companies. The CSE reported significant growth in the stock market over last two decades; market capitalization was rupees 66 billion for 190 listed companies in 1992 and it has grown to Rs. 2900 billion for 296 listed companies in 2017. In Sri Lankan context, the empirical literature on stock market development and banking sector development is lacking and no any conclusive argument regarding these sectors. Thus, this study attempts to analyze the impact of banking sector development on stock market development in Sri Lanka for concluding whether the stock market and banking sector competing for each other or together provides vital role for the economic development in Sri Lanka.

Methodology

The Autoregressive Distributive Lag (ARDL) approach is used to investigate the impact of banking sector development on stock market development in Sri Lanka with emphasis on the long-run relationship. This analysis is based on the annual data spanning through 1992 to 2017. The dependent variable is stock market development and it is measured by the stock market size. Proxy variable for stock market development is stock market capitalization ratio. Besides, that the explanatory variable of banking sector development is measured via credit provided to the private sector which consists with control variables namely, country good governance, equity foreign portfolio inflow, per capita income, and stock market liquidity. Due to the limitation of the World Governance Indicator data, this study utilized International Country Risk Guide (ICRG) as a proxy for country good governance.

Results and Discussion

A prior condition of the ARDL modeling is verified the integrated order of zero or one. Otherwise, it violates the assumptions of the ARDL model. In this view, the unit root test which was executed with the Augmented Dickey Fuller test. Accordingly, ARDL test reports that all series are non-stationary at level series except log series of per capita income (LPCI). However, all series became stationary at first difference series (Refer Table 1). It suggests that, all series are integrated order one
and zero, none of them is integrated above order one. To further proceed with modeling the test results suggested that the integrated order is in line with the ARDL assumption and the selected regressors are pre-qualified for the ARDL modeling. Prior to the cointegration testing, ARDL model is fitted by using the optimal lag length derived from the Akaike Information Criterion (AIC). Accordingly, the lowest AIC value indicates lag for one stock market capitalization ratio (LSMCR) and zero lag for other variables, namely, good governance (LGG), equity foreign portfolio inflow (LFPInflow), per capita income (LPCI), banking sector development (LCPS) and turnover ratio (LTR). Consequently, 1, 0, 0,0,0,0 is selected as the optimal lag length of fitted ARDL model. Then, the researchers applied the bound test approach to fitted model to observe whether the cointegration exists among the dependent variable and other regressors in the fitted model.

Table 1: Results of the Augmented Dickey Fuller Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level series</th>
<th>1st difference series</th>
<th>Order of integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>LFPInflow</td>
<td>-2.4397</td>
<td>-5.3308***</td>
<td>I (1)</td>
</tr>
<tr>
<td>LSMCR</td>
<td>-3.0501</td>
<td>-4.4468***</td>
<td>I (1)</td>
</tr>
<tr>
<td>LGG</td>
<td>-3.0717</td>
<td>-4.4609***</td>
<td>I (1)</td>
</tr>
<tr>
<td>LPCI</td>
<td>-4.5082***</td>
<td>-7.7396***</td>
<td>I (0)</td>
</tr>
<tr>
<td>LCPS</td>
<td>-2.8672</td>
<td>-4.7210***</td>
<td>I (1)</td>
</tr>
<tr>
<td>LTR</td>
<td>-2.7977</td>
<td>-5.0640***</td>
<td>I (1)</td>
</tr>
</tbody>
</table>

Notes: *** significant at 1% level.

Having established a long run association between stock market development and all regressors, the long run coefficients are estimated to determine the long run impact of banking sector development on stock market development in Sri Lanka. The long run estimate results are itemized in Table 2. The Table 2 shows that coefficients of good governance (LGG) and banking sector development (LCPS) are statistically significant at 5% and 10% significant levels respectively and rest of variables are statistically insignificant.

The result reveals that decrease in stock market development is accounted by increasing in banking sector development measure of credit to the private sector. This means that development of the banking sector does not promote the stock market in Sri Lanka. The prior
expected sign of the coefficient of banking sector development (LCPS) is positive or negative to determine stock market and banking sector are substitutes or compliments in Sri Lankan context.

Table 2: Results of Long Run Estimates of stock market development

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGG</td>
<td>-0.2109</td>
<td>0.0775</td>
<td>-2.7198</td>
<td>0.014**</td>
</tr>
<tr>
<td>LFPINFLOW</td>
<td>0.1279</td>
<td>0.0844</td>
<td>1.5154</td>
<td>0.147</td>
</tr>
<tr>
<td>LPCI</td>
<td>0.0894</td>
<td>0.0895</td>
<td>0.9982</td>
<td>0.3314</td>
</tr>
<tr>
<td>LCPS</td>
<td>-0.2679</td>
<td>0.1476</td>
<td>-1.8147</td>
<td>0.0863*</td>
</tr>
<tr>
<td>LTR</td>
<td>0.0332</td>
<td>0.1480</td>
<td>0.2248</td>
<td>0.8247</td>
</tr>
<tr>
<td>C</td>
<td>-2.2609</td>
<td>0.8472</td>
<td>-2.6685</td>
<td>0.0157**</td>
</tr>
</tbody>
</table>

Note: ** & * denotes significant at 5% and 10% significance levels.

However, the negative sign of the coefficient suggested that these two sectors are acting in two directions. It implied that development of the stock market slow down the development of banking sector and in the other way, development of banking sector drops the development of stock market. As such, the negative sign of coefficient confirms that banking sector and stock market are substitutes in Sri Lankan context in line with the findings of Garcia (1986). However, findings are inconsistent with the argument of Garcia & Liu (1999); Naceur et al. (2007). They revealed a positive relationship between stock market development and banking sector development by confirming the behaviour of bank sector and the stock market as complements. Moreover, this study gives a clue to believe that most of the private companies prefer external financing through bank credits rather than stock market listings. Further, it can be supported by the fact that the number of listed firms in Sri Lanka. It still 296 companies are listed in Colombo Stock Exchange out a large number of registered private companies.

Among the analysis carried out in this study, the long run coefficients measure the long run effect of regressors on stock market development. Long run impact will be changed in the short run. In the short run all variables will not change simultaneously. Thus, short run impact of
regressors on stock market development is examined using error correction approach in the ARDL. The estimates reveal that error correction term is negative and statistically significant which suggests that stock market capitalization ratio returns to its equilibrium after a change in banking sector development and other variables at a speed of 89.232%. However, none of the variables is impact on stock market development in the short run. It observed that banking sector development not influencing to promote the stock market development in short run.

**Conclusion**

This study motivated to shed lights on a new scholarly argument on the stock market versus credit market in a developing context of Sri Lanka over the period of 1992 to 2017. In achieving the purpose, this study analyzed the impact of banking sector development on stock market development by adopting the Autoregressive Distributive lag model. As per the analysis results of bound test, it exposed a long run association between the banking sector development and the stock market development. Moreover, the empirical findings of this study revealed that the banking sector and stock market do not move together in the financial system in Sri Lanka. However, both markets are acting as the competitors in the financial system for allocating limited financial resources in the financial system in long run. However, in short run, the role of banking sector in developing the stock market is insignificant in Sri Lankan context.

**References**


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Introduction

The Colombo Stock Exchange, which is established under the Companies Act No. 7 of 1982 and reregistered under Companies Act No. 7 of 2007, is the only secondary market for securities in Sri Lanka. CSE is licensed to operate as a stock exchange by the Securities and Exchange Commission of Sri Lanka (SEC).

The performance of the stock market relies on the activities of its investors. As highlighted under the background to the stock market, the prices of shares are purely determined by the demand and supply, i.e. the buying and selling activities of the investors. Sewell (2005) stated that behavioral finance offers explanations to investors who are curious to know about how emotions and biases drive share prices.

Even though a few researches are done world-wide focusing on the impact of behavioral finance, few have been done on the moderating role of financial literacy. In Sri Lanka, there are a few researches conducted on factors affecting the investor behavior. However, specific research on the moderating impact of financial literacy on behavioral finance factors and investment decision-making of investors has not been tested in Sri Lanka. Since this research has not been conducted by any local researchers, it provides the uniqueness of this study and plays a significant role in understanding the stock market.
Research Problem

When investment decision-making is concerned, the emotional inclinations of investors, their thought patterns, perceptions and psychological biases tend to affect their rationality (Jagongo and Mutswenje, 2014). Behavioral finance causes investors to be biased and as a result it affects their investment decision-making.

According to the studies done by Lusardi and Mitchell (2011), Atkinson and Messy (2012), Brown and Graf (2013), Thaler (2013) and World Bank (2014), much of the world’s population still suffer from financial illiteracy and therefore a remedy to such a problem is of immense need. Sri Lankan stock market has experienced the irrational decision making of investors. Decisions which wouldn’t be explained by traditional theory which assumes investors to always be rational and markets to always be efficient. Arunajith (2014), the writer of the article “Behavioral Finance: Force Behind Capital Market Behavior” for Sunday Times, stated that prior to 2005, Sri Lankan stock Market was known as the best performing markets in the region, whereas a closer look at the listed companies reveals “lackluster performance”. He further stated that behavioral finance explains why the Colombo stock price Index dropped immediately after the 2005 presidential elections. Lack of financial literacy in Sri Lanka, as identified by the Standard and Poor’s 2014 Global Financial Literacy survey (further discussed under the justification of the problem), is low and therefore the Colombo Stock Exchange (CSE) is actively engaged in conducting educational forums and guiding local investors to identify opportunities and engage in rational decision-making.

Financial literacy has scope for improvement among the Sri Lankans. According to the Standard and Poor’s 2014 global financial literacy survey, Sri Lanka has the highest gap between print literacy and financial literacy in the region (DailyFT, 2017). The survey further identified that South Asia records the lowest percentage of financial literacy. This indicates that financial literacy among the citizens of a country could affect its economic growth.
Previous researches conducted in Sri Lanka by Dunusinghe and Ranasinghe (2015), Ponnampenmuta (2013), Securities and Exchange Commission and University of Peradeniya (2012) and Perera (2016) depict that investors at CSE have a significant tendency of being led to irrational decision-making due to the effect of behavioral finance, i.e. emotions and biases. The findings also suggest that investors lack financial literacy.

In order to further support the existence of the problem, a preliminary survey was conducted on 20 respondents through convenience sampling, using a questionnaire. It was identified that every respondent was biased by at least one factor out of heuristics, prospect theory, herding or market factors. The following table 1 shows the results of the preliminary survey.

<table>
<thead>
<tr>
<th>Behavioral finance factors</th>
<th>% of respondents affected by each behaviourial finance sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heuristics – Representativeness</td>
<td>60%</td>
</tr>
<tr>
<td>Heuristics – Overconfidence</td>
<td>65%</td>
</tr>
<tr>
<td>Heuristics – Anchoring</td>
<td>70%</td>
</tr>
<tr>
<td>Heuristics – Gamblers’ Fallacy</td>
<td>55%</td>
</tr>
<tr>
<td>Prospect theory</td>
<td>55%</td>
</tr>
<tr>
<td>Market Factors</td>
<td>60%</td>
</tr>
<tr>
<td>Herding behavior</td>
<td>40%</td>
</tr>
</tbody>
</table>

(Source: Developed by author)

Furthermore, the preliminary survey also identified the following with regard to the levels of financial literacy of the respondents; 55% of the respondents possess financial knowledge, whereas only 35% of the respondents apply such knowledge in the process of investment decision-making. This research aims at identifying if financial literacy has a moderating impact on reducing the effect of the impact of behavioral finance on investment decision-making.

Therefore, this research aims to ascertain the influence of behavioral finance on investment decision-making of local investors at the CSE and
to what extent such influences could be reduced by the moderating impact of financial literacy.

Research Objectives

- **Objective 01** – To assess the degree of impact of behavioral finance factors on the investment decisions of local individual investors at the CSE

- **Objective 02** – To identify if there is a moderating impact of financial literacy on the relationship between behavioral finance and investment decision making of local individual investors at the CSE

- **Objective 03** – To assess the degree of moderating impact of financial literacy on the relationship between behavioral finance and investment decision making of local individual investors at the CSE

Methodology

This research is largely into positivism and deduction approach which encourages quantitative findings. However, the researcher also followed up the qualitative findings as well.

An Explanatory Sequential Method is used in this research. Therefore, in addition to the main survey, a qualitative approach was also used to analyze the face-to-face interviews conducted with CSE experts and experienced employees of stock broker firms in order to give an in-depth understanding of the content in a different perspective.

There are almost 800,000 CDS (Central Depository Systems) accounts trading stocks. According to Business Times (2016), Mr. Ravi Abeysuriya, President of the Colombo Stock Brokers and Group Director of the Candor Group, stated that CDS has more than 750,000 accounts but many are duplicates or dormant. The number of actively trading accounts is estimated to be around 25,000. The population of this research is estimated to be approximately 25,000 local individual
investors. The researcher has selected a sample size of 378 respondents to conduct her study using the table introduced by Krejcie & Morgan in 1970. However, due to time constraints only 372 responses were collected by the researcher for this study.

The non-probability sampling was used in this research. The CSE does not reveal any details with regard to the current investors. Therefore, there is no access to a list of investors or contact details of investors, due to which, it was unable to carry out probability sampling. Therefore, the researcher has chosen to use convenience sampling.

The researcher visited the CSE during trading hours (9.30am to 2.30pm) during two weeks and distributed the questionnaires to the investors present at the CSE.

The quantitative data was gathered through questionnaires. The qualitative data was gathered through a few semi-structured face-to-face interviews.

Results and Discussion

The correlation values indicated that each behavioral finance factor has a significant relationship with investment decision-making. In other words, all independent variables have a relationship with the dependent variable, investment decision-making.

Table 1 below shows the correlation values of each independent variable (behavioral finance factors) and investment decision-making.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Investment Decision-making</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heuristics</td>
<td>-0.895</td>
<td>Strong negative</td>
</tr>
<tr>
<td>Prospect theory</td>
<td>-0.716</td>
<td>Strong negative</td>
</tr>
<tr>
<td>Market factors</td>
<td>-0.413</td>
<td>Weak negative</td>
</tr>
<tr>
<td>Herding</td>
<td>-0.894</td>
<td>Strong negative</td>
</tr>
</tbody>
</table>

Source: Author calculation
These findings were further verified by the follow-up interviews conducted with experts at the CSE and stock broker firms. They all agreed on the strong negative impact of herding behavior. They also agreed on heuristics and prospect theory affecting investment decision-making. However, they did not mention market factors in their discussions.

It was discovered that the local individual investors at the CSE are usually affected by behavioral finance factors. The mean values obtained for each independent variable (behavioral finance factor) were; (i) Heuristics mean = 3.55, (ii) Prospect theory mean = 3.40, (iii) Market factors mean 3.85 and (iv) Herding mean = 3.55. This shows that all respondents have preferred between 3-Neutral and 4-Agree of the Likert scale under each independent variable.

The level of investment decision-making recorded a mean value of 3.33 which is between 3-Neutral and 4-Agree as per the Likert scale. This shows that the investment decision-making of local individual investors the CSE is at a moderate level.

The level of financial literacy recorded a mean value of 3.25 which is between 3-Neutral and 4-Agree, more towards 3-Neutral. The financial literacy level of Sri Lankan investors seems to be at a moderate level. This study revealed that there is a negative relationship between behavioral finance factors and investors’ decisions. A strong negative significant relationship was found to be existing between heuristics, prospect theory, herding and investment decision-making. A weak negative relationship was identified between market factors and investment decision-making. All null hypotheses were rejected and alternative hypotheses were accepted. This was evident from the negative r values which were obtained from the Pearson correlation results for each behavioral finance factor. This indicates that as investors are more influenced by behavioral finance factors, it adversely affects the investment decision-making of investors. Therefore, this study proves that there is a significant relationship between behavioral finance and investment decision-making.
To assess the moderating impact of financial literacy on the relationship between behavioral finance and investment decision-making, regression analysis and ANOVA were used. When financial literacy was introduced as a moderating factor, the R value increased by 0.63. Moreover, ANOVA value of 13.453 was significant at 5% significance level. This resulted in the acceptance of the alternative hypothesis and the rejection of the null hypotheses. It was concluded that financial literacy reduces the negative impact of behavioral finance on investment decision-making.

The qualitative findings further amplified the moderating role of financial literacy on the relationship between behavioral finance and investment decision-making. All interviewees agreed on the moderating impact of financial literacy.

**Conclusion**

From the main survey it was identified that all behavioral finance factors. This proved the first four hypotheses which tested the relationship between behavioral finance and investment decision-making. The analysis of the qualitative findings supported the quantitative findings. The impact of heuristics, prospect theory and herding were further emphasized. In addition to that, the analysis of the interview responses paved the way for the discovery of behavioral factors such as speculation and blind trust in stock brokers. The respondents’ opinions were based on their years of experience. Finally, this study proved that behavioral finance factors impact the investment decision-making of local individual investors at the CDE and that financial literacy moderates the relationship between behavioral finance and investment decision-making.
References


Dividend Policy, Corporate Governance and Firm Performance

(Evidence from Listed Manufacturing Companies in Colombo Stock Exchange)

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Sabaragamuwa University of Sri Lanka
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Introduction

A company can do two things when they have earned profit. The surplus can pay back to its investors as dividends and also firm can retain it within the business as addition to shareholders’ equity account as retained earnings. If the firm decides to redistribute the earnings to the investors, then the investors can decide whether reinvest it themselves or spend it.

According to Priya & Nimalathasan (2013) divided policy is more ordinarily tool of wealth distribution to its shareholders than it is a tool of wealth formation to stakeholders. According to Modigliani & Miller (1961), when a company is defining the value of the firm, the dividend policy is one of the irrelevant things. Investors looking for higher capital growth may prefer a lower payout. Barron, (2002) defined dividends are one of the most important things to its investors as it gives the signs that a company is creating profits.

Corporate Governance is a method of governing the company. At present the corporate governance practices of Sri Lankan listed companies are governed by the mandatory corporate governance rules included in the Colombo Stock Exchange (CSE) listing rules. The Institute of Chartered Accountants of Sri Lanka (ICASL) jointly with the Security Exchange Commission (SEC) issued revised (1997, 2003) Code of Best Practice on Corporate Governance October 2008 to be complied voluntarily by the companies in conjunction with the mandatory rules. Today the manufacturing sector is playing a vital role
in the world economy since the industrial revolution and it has great ability to achieve high rate of economic growth. In Sri Lankan context this sector has been one of the significant contributors to the nation’s GNP.

In order to understand Dividend policy & corporate governance on the performance of the business, a discussion on the important aspects of corporate governance and dividend policy, is required. The researcher considers only firm’s performance as dependent variable, corporate governance and dividend policy as the independent variables in this study. Through the observations, it is found that, there are some gaps, relationships and impacts on firm’s performance because of dividend policy and corporate governance. If the companies can understand and evaluate the importance and impacts of these variables, then the company can increase their performances and then they can enjoy more and more advantages in the market place.

**Research Problem**

Sri Lanka is a developing country in South East Asia. Good governance is a recent trend. As a result of several high-profile company collapses, corporate governance is being a vital area. In Sri Lankan context also, several high profile companies were collapsed such as Pramuka Bank, Mercantile Credit. Corporate governance is very significant area of any organization because shareholders and investors should know the company profile and that the company is making profits. In Sri Lankan context, although regulatory framework stand corporate governance practices are not mandatory for the companies. So, there is a problem what extent companies apply the corporate governance practices.

The dividend policy still remains as an unresolved problem in corporate finance even though the various studies have been done by various researches such as Farsio, Geary & Moser (2004), Arnott & Asness (2003) and Nissim & Ziv (2001). Some theories were suggested by those researchers to clarify the relevance and significance of dividend policy and whether it affects firm value, but there has no a universal agreement (Stulz, 2000, De Angelo et al., 2006, Pandey, 2005,). Researchers such

Numerous studies (Arnott et al., 2003; Nissim et al., 2001; Farsio, Geary et al., 2004) have been with relevant to dividend policy and firm performance, but specially in developed economies. But these conclusions and findings of those studies directly cannot be replicated in developing countries. There are a small number of empirical studies are done in Sri Lanka to establish the relationship between corporate governance, dividend payout and firm profitability. Prior researches are done by the researchers of different countries under various economic and social conditions. Sri Lanka is under difference economic, social and technological conditions. Therefore, it is a problematic thing of receiving those findings and results to Sri Lanka. This study therefore comes in to fill the gap by investigating “what is the impact of dividend policy and corporate governance on firm profitability in listed manufacturing companies in Sri Lanka?”

Objectives

Main Objective
– To investigate the impact of dividend policy and corporate governance on firm performance of manufacturing companies listed on CSE

Specific Objectives
– To determine the impact of dividend policy on firm performance of manufacturing companies listed on CSE
– To determine the impact of corporate governance practices on firm performance of manufacturing companies listed on CSE

Methodology

As shown in Conceptual framework researcher tries to understand the impact of dividend policy and corporate governance on firm performance.
The study uses annual reports information as secondary data of manufacturing listed companies in CSE, Sri Lanka. Therefore, this study is based on Quantitative research approach.

The population of the study is all companies listed in CSE, in Sri Lanka. There are 297 companies listed in CSE under the 20 business sectors as at 04th May 2017. In manufacturing sector there are 41 companies. Manufacturing sector has been one of the significant contributors to the nation’s GNP. So that this study uses the population as the 41 manufacturing companies listed in CSE to evaluate the impact dividend policy, corporate governance and firm performance. Companies are selected based on the data availability out of 41 manufacturing companies for the study. This study considers the annual reports and others during the period of 2012 -2016.

The size of the Board refers to the number of inside and outside directors. CEO duality is the accumulation of the functions of CEO and Chairman of the board.
All the variables were defined as follows;

<table>
<thead>
<tr>
<th>Variable</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dividend Payout</td>
<td>Total Dividends / Total Net Earnings * 100%</td>
</tr>
<tr>
<td>Earning Per Share</td>
<td>Profit after Tax / Number of Common Stock Outstanding * 100%</td>
</tr>
<tr>
<td>Return on Equity</td>
<td>Net Income / Shareholders equity * 100</td>
</tr>
<tr>
<td>Return on Assets</td>
<td>Net Income / Total Assets * 100</td>
</tr>
</tbody>
</table>

Duality of the board takes the value of 0 if the same person holds both positions and if not 1. Independence is assessed by the percentage of independent members of the board. This means the number of meetings conducted annually by the board. CBP (2013) requires board meetings should be held at least once in every quarter of a financial year.

Panel data, cross-sectional time series data or longitudinal data regression procedure is used to investigate dividend policy, corporate governance and firm performance. Two panel data regression models are used in the study as follows based on ROE and ROA.

\[
\text{ROE}_{it} = \beta_0 + \beta_1 \text{DPR}_{it} + \beta_2 \text{EPS}_{it} + \beta_3 \text{SIZE}_{it} + \beta_4 \text{DUALD}_{it} + \beta_5 \text{INDPN}_{it} + \beta_6 \text{MEETG}_{it} + \epsilon_{it}
\]

\[
\text{ROA}_{it} = \beta_0 + \beta_1 \text{DPR}_{it} + \beta_2 \text{EPS}_{it} + \beta_3 \text{SIZE}_{it} + \beta_4 \text{DUALD}_{it} + \beta_5 \text{INDPN}_{it} + \beta_6 \text{MEETG}_{it} + \epsilon_{it}
\]

**Results and Discussion**

**Correlation Analysis**

<table>
<thead>
<tr>
<th>Variable</th>
<th>ROE</th>
<th>ROA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pearson Correlation</td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td>Dividend payout</td>
<td>0.700***</td>
<td>0.004</td>
</tr>
<tr>
<td>EPS</td>
<td>0.873***</td>
<td>0.000</td>
</tr>
<tr>
<td>Board Size</td>
<td>0.333</td>
<td>0.225</td>
</tr>
</tbody>
</table>
According to the Table 1.2 with data analysis of the correlation dividend payout, earning per share, board independence, board meetings and CEO duality have significant positive relationships with ROE, since the Pearson correlation value between the board independence and ROE is positive but, higher than the significant value. As well as dividend payout has a significant positive relationship with ROA. According to Pearson correlation values of earning per share also denotes a significant positive relationship with ROA. There are insignificant positive relationships between board meetings, board independence, CEO duality, board size and ROA, since the significant levels are greater than significant level.

**Diagnostic Tests**

All the variables are tested to check whether they are stationary or not stationary. Harris Tzavalis Unit-Root test found that above variables of dividend policy, corporate governance and firm performance are stationary at the level.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Harris-Tzavalis unit root test</th>
<th>Level of significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROE</td>
<td>0.0219</td>
<td>0.05</td>
</tr>
<tr>
<td>ROA</td>
<td>0.0000</td>
<td>0.01</td>
</tr>
<tr>
<td>Dividend Payout</td>
<td>0.0000</td>
<td>0.01</td>
</tr>
<tr>
<td>EPS</td>
<td>0.0000</td>
<td>0.01</td>
</tr>
<tr>
<td>Board Size</td>
<td>0.0060</td>
<td>0.01</td>
</tr>
<tr>
<td>CEO Duality</td>
<td>0.0461</td>
<td>0.05</td>
</tr>
<tr>
<td>Board Meetings</td>
<td>0.0038</td>
<td>0.01</td>
</tr>
<tr>
<td>Board Independence</td>
<td>0.0021</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Source: (Surveyed Data, 2017)
In the test of VIF value of all individual independent variables and all the values of any of the regressions are below 10. Therefore, it proves that there is no any space to have multi- collinearity here.

**Fisher (F)-Test Results**

The both models do not express a time effect only they own company effects. It becomes two-way effect or time fixed effect when sigma_u and sigma_e can be separately calculated. It captures the things which are vary with the time. However, the study cannot capture it, hence it proves that the models do not have any time fixed effect it has only a company fixed effect.

According to Breusch-Pagen in both panel Panel-A and Panel-B prove that the appropriate suitable model is the random effect model than the pooled OLS model. As per the Hausman- Statistic the better model is fixed effect model.
Table 1.3 Specification Tests

<table>
<thead>
<tr>
<th>Model</th>
<th>Panel A-ROE</th>
<th>Panel B-ROA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td>P-value</td>
</tr>
<tr>
<td>Hausman</td>
<td>183.550</td>
<td>0.0000***</td>
</tr>
<tr>
<td>Breusch-Pagen</td>
<td>66.3400</td>
<td>0.0000***</td>
</tr>
<tr>
<td>F-test</td>
<td>7.8400</td>
<td>0.0000***</td>
</tr>
</tbody>
</table>

Note: ***, ** and * indicate significance at 1%, 5% and 10% respectively.
Source: (Surveyed Data, 2017)
Table 1.3 Results of the One Way: Fixed Firm Effect Model for ROE and ROA

<table>
<thead>
<tr>
<th>Variable</th>
<th>Panel A - ROE</th>
<th></th>
<th></th>
<th>Panel B - ROA</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>Robst Standard Error</td>
<td>T-statistic</td>
<td>P-value</td>
<td>Coefficient</td>
<td>Robst Standard Error</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.1786</td>
<td>0.108</td>
<td>-1.65</td>
<td>0.108</td>
<td>-0.1075</td>
<td>0.0946</td>
</tr>
<tr>
<td>Payout</td>
<td>0.1006</td>
<td>0.0424</td>
<td>2.37</td>
<td>0.024**</td>
<td>0.96</td>
<td>0.0634</td>
</tr>
<tr>
<td>EPS</td>
<td>0.0022</td>
<td>0.0008</td>
<td>2.67</td>
<td>0.012**</td>
<td>0.8667</td>
<td>0.0017</td>
</tr>
<tr>
<td>Board size</td>
<td>0.0253</td>
<td>0.0134</td>
<td>1.89</td>
<td>0.068*</td>
<td>0.7293</td>
<td>0.0252</td>
</tr>
<tr>
<td>CEO Duality</td>
<td>0.1889</td>
<td>0.0375</td>
<td>5.04</td>
<td>0.000***</td>
<td>0.9047</td>
<td>0.1076</td>
</tr>
<tr>
<td>Board Meetings</td>
<td>-0.0094</td>
<td>0.0043</td>
<td>-2.19</td>
<td>0.036**</td>
<td>0.8464</td>
<td>-0.0207</td>
</tr>
<tr>
<td>Independence</td>
<td>-0.0133</td>
<td>0.0236</td>
<td>-0.56</td>
<td>0.578</td>
<td>0.6593</td>
<td>0.0112</td>
</tr>
<tr>
<td>sigma_u</td>
<td>0.1281</td>
<td>0.1989</td>
<td></td>
<td></td>
<td></td>
<td>0.1989</td>
</tr>
<tr>
<td>Rho</td>
<td>0.6939</td>
<td>0.5461</td>
<td></td>
<td></td>
<td></td>
<td>0.5461</td>
</tr>
<tr>
<td>sigma_e</td>
<td>0.0851</td>
<td>0.1813</td>
<td></td>
<td></td>
<td></td>
<td>0.1813</td>
</tr>
<tr>
<td>R²</td>
<td>0.3189</td>
<td>0.049</td>
<td></td>
<td></td>
<td></td>
<td>0.049</td>
</tr>
</tbody>
</table>

Note: ***, ** and * indicate significance at 1%, 5% and 10% respectively.

Source: (Surveyed Data, 2017)
Dividend policy, corporate governance and firm performance

According to the specification tests the fixed firm effect model is the best model for panel A and panel B. A strong positive significant association is expressed with ROE and ROA by dividend payout ratio. This basically denotes that the higher financial performance of a company, the most probably will be willing to pay more dividends to their shareholders. When dividend payout ratio increases it sends a signal to the shareholders and investors that the company performance is good.

Earning per share has significant positive effect on firm performance with ROE and ROA. When EPS increase 1-unit performance also increases. The impact proves that if firm financial performance is high, shareholders’ earning per share also goes high. It also sends a signal to future and potential investors.

Board size has a positive effect with firm performance. When board size increase, many new ideas come into the firms, decision making process can be accurate than previous. In here mean value is 8, thus it is also a good value.

There is a positive association between CEO duality and firm performance. When the CEO and chairman is two different persons it is good for better management, decision making and also anyone can not influence management and director board. Agency theory and Stewardship theory represent opposite views about CEO duality. According to this result it is relay with agency theory.

There is a significant negative impact is caused with the board meetings and the firm performance measurement of ROE. When board meetings are increase the cost also increased in unusual way. Because many arrangements should be done before and after having a board meeting. Sometimes the valuable time which can be put into a profitable business can also go vain as having many meetings. The board meetings do not effect on ROA.
The board independence does not effect on the firm performance. The previous researches by Bell, Greg, Curt Moore, and Igor Filatotchev (2012) and Rosenstein, Stuart, and Jeffrey Wyatt (1997) disclosed that board independence shows a significant impact on ROE. They define that independent directors with a higher ratio has positive impact and also the firm performance goes higher.

The coefficient value of the variables represents the impact of independent variables on ROE and ROA. According to the table 1.4, value of -0.1786 represents the value of ROE at zero level of all independent variables in the model in panel A and value of -0.1075 denotes the value of ROA when all independent variables in the model are in zero level in panel B. These values are constant.

**Conclusion**

According to the analysis of the study it finds that dividend policy and corporate governance are significantly related with firm performance (ROA and ROE) belongs to the listed manufacturing companies in Colombo Stock Exchange (CSE). The fixed firm effect model is the best fitted model according to the results of specification tests. There is no any one-way time fixed effect model or two-way effect model. Using Panel data analysis, the study finds that Dividend payout ratio and Earning per share have significant positive effect on firm performance. As well as Board size, CEO duality have a positive effect with firm performance while a significant negative impact is caused with the board meetings and the firm performance measurement of ROE and it do not effect on ROA. But, the board independence does not effect on the firm performance. This result is useful for managers, employees, shareholders, potential and existing investors and also academics.

**References**


Audit Quality, Earnings Management and Financial Performance: Evidence from Colombo Stock Exchange

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Introduction

Financial Statements are used to reflect the performance of a company through financial information to the external as well as internal users. The users of financial statements or stakeholders of a company expect a better financial condition in a particular company which yields high profits from the operations. Continually investor’s decision making process greatly rely on the accounting information which provided by the management which they have appointed for utilizing the assets belong to investors. Due to this great reliance on the on the financial information provided by management, it usually stimulates management for manipulation of earnings through the financial statements which are prepared by the management of particular company. This opportunistic behavior of management leads for earnings management practices.

According to Heil (2012), several individuals and groups interest in the quality of financial information. Therefore, it is needed to have a mechanism for mitigating earnings management practices and enhancing the actual financial performance of the company. In that case audit quality comes in to play to constraint earning manipulations of management to get a real picture about the prevailing financial condition of the company. Therefore, this study investigates the contribution of external auditor’s quality and effectiveness of audit committee on constraining earnings management practices to enhance the financial performance of public listed companies in Sri Lanka.
Research Problem

During last years, accounting quality has become as most conferring topic which represents the earning quality of a particular firm, refers to how well reported earnings represent real company performance. In last few decades it has been witnessed series of accounting scandals and corporate failures in worldwide due to the manipulation of the earnings by the management. Accounting scandals of Sunbeam, Cendant, WorldCom and ComRoad, Xerox which occurred globally and especially which were not detected by audit were caused to recrudesce the topic of earnings management in present. According to Wild (1996), it is needed a mechanism which can be restricted the opportunistic behavior of managers. In that case audit committee as well as external auditor plays a crucial role as independent parties of the firm by ensuring higher level of earning quality and mitigating earnings management practices.

Therefore, the problem of the study is that, “Does earnings management impact on audit quality and financial performance of public listed companies in Sri Lanka?”

Objective/s

Main objective

– To determine the impact of audit quality on financial performance of listed companies in Colombo Stock Exchange.

Specific Objectives

– To identify the direct impact of external auditor’s quality on financial performance.

– To measure the direct impact of audit committee effectiveness on financial performance.

– To investigate whether earnings management indirectly impact on audit quality and financial performance.
Literature Review

Theoretical Review

Agency Theory

Agency theory (Jensen & Meckling, 1976) has been widely used to investigate and understand the existence of audit committee and external auditor which need to minimize the agency cost among shareholders (principal) and management (agent) since these corporate governance entities reduce the information asymmetry by monitoring company’s financial reports independently.

Resource Dependant Theory

Accordingly, Pfeffer (1972), Resource dependence theory plays the role of board directors as resource providers while agency theory plays the role of monitoring managerial activities. And also based on this theory audit committee expertise should not only focus on accounting related directors but also it should be consisted with the directors who associate with all related tasks which the firm connected.

Empirical Review

Afza & Nazir (2014), found strong, significant relationship between audit committee size, external audit quality and firm performance while audit committee independence and audit committee activities remain insignificant.

According to Okolie (2014), the results revealed that audit tenure depicts significantly negative relationship with discretionary accruals of companies while audit fee remains positive which verifying the argument that higher audit fee impairs the auditor independence and it provide incentives to earning manipulations.

Further the study which discussed that large audit committee assists to improve audit committee’s status and power of within organization (Miko & Kamardin, 2014) and it indicates the possibility of influencing
by a negative impact on earnings management in pre and post code in 2011 while Matoke & Omwenga (2016) express similar opinion to that. Ching et al., (2015) reveals that the audit quality which expect from either big four audit firms or non-big four audit firms do not truly assist in enhancing financial performance when earnings manipulation activities exist.

The results of the study of Kang and Kim (2011) suggests that real activity-based earnings management mediates between corporate governance and firm performance (as measured by Tobin’s Q), thereby strengthening the causal link between corporate governance and firm performance.

**Methodology**

The population of this study contains all firms that are listed in Colombo Stock Exchange in Sri Lanka. In Colombo Stock Exchange there are 295 companies representing 20 business sectors which is listed as at September 2017. This study selected 123 firms of sample from the population based on liquidity method which represent the whole population to study by employing financial data throughout the sample period of 2011-2016. While forming the sample, as the selection criteria it has been concerned the highly liquid firms. It means the stocks of particular firm should be traded throughout the 12 months and also stocks should be traded at least one day per month for being eligible to incorporate to the sample.

The study employs the Three Stage Least Squared (3SLS) model which reflects the relationship between earnings management, audit quality and financial performance. It is to be investigated the indirect effect of earnings management on the relationship between audit quality and financial performance. Further, the significance of mediation impact will be tested through the Sobel Test (1982).
Results and Discussion

Three Stage Least Squares Analysis

In consistent with three stage least squares method (3SLS) it has been run two equations to evaluate the direct impact of external auditor quality and audit committee effective on financial performance and the indirect effect of earnings management on the relationship between external auditor quality, audit committee effective and financial performance. The results of analysis are presented in following Tables.

Table 1-3 SLS Summary Statistics of Return on Assets and Earnings Management – Model 01

<table>
<thead>
<tr>
<th>Variable</th>
<th>Return on Assets</th>
<th>Earnings Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>2.6148</td>
<td>-18.1018</td>
</tr>
<tr>
<td></td>
<td>(0.008)*</td>
<td>(0.000)**</td>
</tr>
<tr>
<td>Audit committee</td>
<td>0.0686</td>
<td>-0.0966</td>
</tr>
<tr>
<td>effectiveness</td>
<td>(0.007)*</td>
<td>(0.017)*</td>
</tr>
<tr>
<td></td>
<td>-0.0393</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.422)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.4689</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.000)**</td>
<td></td>
</tr>
<tr>
<td>Audit Fee</td>
<td>-0.0393</td>
<td>-0.0293</td>
</tr>
<tr>
<td></td>
<td>(0.422)</td>
<td>(0.723)</td>
</tr>
<tr>
<td></td>
<td>0.1314</td>
<td>0.7675</td>
</tr>
<tr>
<td></td>
<td>(0.008)*</td>
<td>(0.000)**</td>
</tr>
<tr>
<td>Earnings Management</td>
<td>0.0386</td>
<td>-0.0293</td>
</tr>
<tr>
<td></td>
<td>(0.469)</td>
<td>(0.723)</td>
</tr>
<tr>
<td></td>
<td>-0.0145</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.564)</td>
<td></td>
</tr>
<tr>
<td>Firm Size</td>
<td>-0.1314</td>
<td>0.7675</td>
</tr>
<tr>
<td></td>
<td>(0.008)*</td>
<td>(0.000)**</td>
</tr>
<tr>
<td>Leverage</td>
<td>0.0386</td>
<td>-0.0293</td>
</tr>
<tr>
<td></td>
<td>(0.469)</td>
<td>(0.723)</td>
</tr>
<tr>
<td></td>
<td>-0.0145</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.564)</td>
<td></td>
</tr>
<tr>
<td>Sales Growth</td>
<td>0.1314</td>
<td>0.7675</td>
</tr>
<tr>
<td></td>
<td>(0.008)*</td>
<td>(0.000)**</td>
</tr>
<tr>
<td></td>
<td>-0.3066</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.069)</td>
<td></td>
</tr>
<tr>
<td>Cash Flow from</td>
<td>0.6298</td>
<td>0.4108</td>
</tr>
<tr>
<td>Operations</td>
<td>(0.000)**</td>
<td></td>
</tr>
<tr>
<td>(R^2)</td>
<td>0.6298</td>
<td>0.4108</td>
</tr>
<tr>
<td>(Chi^2)</td>
<td>448.41</td>
<td>514.60</td>
</tr>
<tr>
<td>(P)</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>Mediation effect</td>
<td>2.3422</td>
<td></td>
</tr>
<tr>
<td>Sobel test statistics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One – tailed probability</td>
<td>0.0096</td>
<td></td>
</tr>
<tr>
<td>Two – tailed probability</td>
<td>0.0195</td>
<td></td>
</tr>
</tbody>
</table>

Note: ** significant at 1%, * significant at 5%
Source: Author calculation based on results of STATA
The results of first equation depicts a probability of 0.0000 at the significant level of 0.01 (1%) which shows R–square value of 0.6298 (62.98%) with 448.41 of Chi–square value. R² value indicates that return on assets can be explained 62.98% of variability of the audit fee, audit committee effectiveness and control variables while second equation also shows 41.08% of R² value which implies that dependant variable of earnings management is explained by independent and control variables approximately from 41% and it has proven to be significant from the probability value of 0.0000 (< 0.05).

As Table 1 shows, it illustrates Sobel test statistics which demonstrates mediation impact of earnings management by concerning both relationships of independent variable, dependant variable and independent variable, mediate variable. According to results Sobel test statistic is proven to be significant with both one–tailed (0.0096) and two tailed (0.0195) probability. Therefore, it can be concluded audit committee effectiveness brings a mediation impact through earnings management on the return on assets of the firm.

Table 2-3 SLS Summary Statistics of Return on Assets and Earnings Management – Model 02

<table>
<thead>
<tr>
<th>Variable</th>
<th>Return on Assets</th>
<th>Earnings Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>2.3780</td>
<td>-16.9240</td>
</tr>
<tr>
<td></td>
<td>(0.015)*</td>
<td>(0.000)**</td>
</tr>
<tr>
<td>Audit committee</td>
<td>0.0480</td>
<td>-0.1367</td>
</tr>
<tr>
<td>effectiveness</td>
<td>(0.045)*</td>
<td>(0.108)</td>
</tr>
<tr>
<td>Audit Fee</td>
<td>-0.0116</td>
<td>-0.4690</td>
</tr>
<tr>
<td></td>
<td>(0.823)</td>
<td>(0.000)**</td>
</tr>
<tr>
<td>Earnings Management</td>
<td>-0.4690</td>
<td>-0.0146</td>
</tr>
<tr>
<td></td>
<td>(0.000)**</td>
<td>(0.562)</td>
</tr>
<tr>
<td>Firm Size</td>
<td>-0.1375</td>
<td>0.7941</td>
</tr>
<tr>
<td></td>
<td>(0.006)*</td>
<td>(0.000)**</td>
</tr>
<tr>
<td>Leverage</td>
<td>0.0284</td>
<td>0.0227</td>
</tr>
<tr>
<td></td>
<td>(0.596)</td>
<td>(0.794)</td>
</tr>
<tr>
<td>Sales Growth</td>
<td>-0.0146</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.562)</td>
<td></td>
</tr>
</tbody>
</table>
R- Squared value of first regression indicates as 62.96% which means audit fee, audit committee effectiveness including other control variable will jointly explain 62.96% variation of the return on assets and the model consists with Chi$^2$ value of 444.14 which is significant at 1% level and the second equation has been reported 40.83% of R$^2$ value at 1% of significant level.

Considering on the Sobel test statistic which illustrates indirect impact of earnings management which obtained through coefficients and standard deviation between audit fee, earnings management and earnings management, return on assets respectively. As it shown in the Table 4.7, 1.5969 of Sobel test statistic can be seen which is proven to be significant two tailed probabilities which implies that earnings management has significant potentiality in mediating audit fee on return on assets.

Table 3- 3 SLS Summary Statistics of Return on Equity and Earnings Management – Model 01

<table>
<thead>
<tr>
<th>Variable</th>
<th>Return on Equity</th>
<th>Earnings Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-1.0200</td>
<td>-18.1124</td>
</tr>
<tr>
<td></td>
<td>(0.012)*</td>
<td>(0.000)**</td>
</tr>
<tr>
<td>Audit committee effectiveness</td>
<td>-0.0396</td>
<td>-0.0967</td>
</tr>
<tr>
<td></td>
<td>(0.000)**</td>
<td>(0.017)*</td>
</tr>
<tr>
<td>Variable</td>
<td>Coefficient 1</td>
<td>Coefficient 2</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>---------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Audit Fee</td>
<td>-0.0108</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.614)</td>
<td></td>
</tr>
<tr>
<td>Earnings Management</td>
<td>-0.0158</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.345)</td>
<td></td>
</tr>
<tr>
<td>Firm Size</td>
<td>0.0536</td>
<td>0.7687</td>
</tr>
<tr>
<td></td>
<td>(0.011)*</td>
<td>(0.000)**</td>
</tr>
<tr>
<td>Leverage</td>
<td>0.2056</td>
<td>-0.0298</td>
</tr>
<tr>
<td></td>
<td>(0.000)**</td>
<td>(0.718)</td>
</tr>
<tr>
<td>Sales Growth</td>
<td>0.0046</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.678)</td>
<td></td>
</tr>
<tr>
<td>Audit Firm Size</td>
<td></td>
<td>-0.3231</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.071)</td>
</tr>
<tr>
<td>Cash Flow from Operations</td>
<td>-0.2922</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.000)**</td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>0.1459</td>
<td>0.4108</td>
</tr>
<tr>
<td>Chi²</td>
<td>123.39</td>
<td>514.65</td>
</tr>
<tr>
<td>P</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>Mediation effect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sobel test statistics</td>
<td>0.8943</td>
<td></td>
</tr>
<tr>
<td>One – tailed probability</td>
<td>0.1856</td>
<td></td>
</tr>
<tr>
<td>Two – tailed probability</td>
<td>0.3712</td>
<td></td>
</tr>
</tbody>
</table>

Note: ** significant at 1%, * significant at 5%
Source: Author calculation based on results of STATA

As shown on the table, 14.59% of return on assets will be explained by audit fee, audit committee effectiveness and other control variables which shown by R² value while 41.08% of earnings management is explained by audit committee effectiveness and the control variables under consideration and both models are significant at 1% level. Sobel test statistic show at both one tailed and two tailed probability tests. It implies that audit committee effectiveness has no potentiality in bringing mediation effect through earnings management on return on assets.
Table 4-3 SLS Summary Statistics of Return on Equity and Earnings Management – Model 02

<table>
<thead>
<tr>
<th>Variable</th>
<th>Return on Equity</th>
<th>Earnings Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-1.0195</td>
<td>-16.9316</td>
</tr>
<tr>
<td></td>
<td>(0.012)*</td>
<td>(0.000)**</td>
</tr>
<tr>
<td>Audit committee effectiveness Index</td>
<td>-0.0396</td>
<td>-0.1359</td>
</tr>
<tr>
<td></td>
<td>(0.000)**</td>
<td>(0.112)</td>
</tr>
<tr>
<td>Audit Fee</td>
<td>-0.0109</td>
<td>-0.0158</td>
</tr>
<tr>
<td></td>
<td>(0.611)</td>
<td>(0.345)</td>
</tr>
<tr>
<td>Earnings Management</td>
<td>0.0536</td>
<td>0.7943</td>
</tr>
<tr>
<td></td>
<td>(0.011)*</td>
<td>(0.000)**</td>
</tr>
<tr>
<td>Firm Size</td>
<td>0.2057</td>
<td>0.0222</td>
</tr>
<tr>
<td></td>
<td>(0.000)**</td>
<td>(0.799)</td>
</tr>
<tr>
<td>Sales Growth</td>
<td>0.0046</td>
<td>-0.2425</td>
</tr>
<tr>
<td></td>
<td>(0.678)</td>
<td>(0.189)</td>
</tr>
<tr>
<td>Audit Firm Size</td>
<td>-0.2930</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.000)**</td>
<td></td>
</tr>
<tr>
<td>Cash Flow from Operations</td>
<td>123.37</td>
<td>509.26</td>
</tr>
<tr>
<td>R²</td>
<td>0.1459</td>
<td>0.4083</td>
</tr>
<tr>
<td>Chi²</td>
<td>0.0000*</td>
<td>0.0000*</td>
</tr>
<tr>
<td>P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sobel test statistics</td>
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<td></td>
</tr>
<tr>
<td>One – tailed probability</td>
<td>0.2048</td>
<td></td>
</tr>
<tr>
<td>Two – tailed probability</td>
<td>0.4095</td>
<td></td>
</tr>
</tbody>
</table>

Note: ** significant at 1%, * significant at 5%
Source: Author calculation based on results of STATA

Finally, the impact of audit committee effeteness and audit fee on return on equity has been checked simultaneously regressing audit fee on return on equity. These models demonstrate 14.59% and 40.83% of \( R^2 \) values respectively which are significant at 1% level.

As results show, since earnings management (mediator) does not significantly relate with return on equity (dependant variable) while the relationship between audit fee (independent variable) and earnings management (mediator) is proven to be insignificant. Therefore, Sobel statistic tends to be insignificant at both one tailed and two tailed probability tests. Hence results ensure that audit fee does not bring a mediation effect via earnings management on return on equity.
Conclusion

It can be drawn several important conclusions according to results of 3SLS analysis. The analysis provides the evidences that the audit committee effectiveness holds significantly positive relationship with ROA while audit committee effectiveness negatively impacts on ROE. It shows the direct impact of audit committee effectiveness on financial performance. This stipulate that the strength of the audit committee supports to enhance ROA where it cannot influence on enhancing ROE due to ownership interest differences of sample companies. Further the audit committee effectiveness strengthens the restrictions on earnings management proving through the significant negative coefficient within audit committee effectiveness and earnings management. It is claimed that audit fee which indicates the external auditor’s quality does not significantly impact on financial performance and earnings management as well.

Consideration on earnings management as mediator it apparently discloses that earnings management negatively impact on ROA indicating that increment of income decreasing earnings manipulations causes to decline performance of firms while earnings management has negative impact on ROE which is proven to insignificant in the sample firms under consideration. Finally, the study concludes indirect impact within audit quality, earnings management and financial performance. Accordingly, it is revealed that the audit committee effectiveness significantly impacts on earnings management and earnings management significantly impact of return on assets hence, earnings management has potentiality of mediating audit committee effectiveness and return on assets.

This study will give practical implications for policy makers, regulatory parties and professional accounting bodies on developing policies, strategies and governance regulations for the purpose of improving the audit quality on mitigating earnings manipulations to enhance the performance of firms.
References


Economics of Environment and Disaster Management
Pollution of Common Areas as an Emerging Tragedy
(with Special Reference to the Negombo Estuary)

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ashani@econ.cmb.ac.lk

Introduction

"The population problem has no technical solution...” (Hardin, 1968)
A burning economic concept of the modern world the “Tragedy of the Commons” dates back to the 1960s, when it was first introduced by ecologist Garrett Hardin. Garrett used a metaphor to describe the selfish human behavior which appears when the right of an individual or a group of people to use a common resource has been taken for granted. Thus, the finite or the limited resources available for a locality or a country or the world must go through immense pressure with the inevitable result of ruin or overexploitation. In a world that is limited, freedom in the commons brings ruin to all. This is the tragedy of the commons.

Further, the concept reappears in problems of pollution; where it is not a question of taking something out of the commons unlimitedly, or in other words exploiting the environment, but putting something into such common area or any other form of destruction caused to natural yet common resources. The tragedy among the rational thinkers who analyze the cost of discharging such wastes to common areas seem to justify such action than any other measure that can be taken to minimize the damage or the pollution ultimately leads the world to lock into a system of fouling its own nest.

This concept is the basis for this study. It examines the tragedy of the Negombo Estuary, a common blessing of nature to humans, the natural habitat of the mangrove ecosystem and unfortunately the collecting center of the sewage and garbage of no boundary. The spot light to be on “The problem of Pollution” that has led to the depletion of the mangrove ecosystem and the natural habitat of the Negombo Estuary,
defined as “the pollution of common areas, as the emerging tragedy of the commons”.

**Research Problem**

The Negombo estuary is used for fishing and fishery related activities. The livelihood of the neighborhood is entangled to the Estuary and its services. Further, the channel segment of the estuary is used for housing development. Mangrove forest area is also used for various activities such as brush pile fisheries. Some areas of the estuary are unfortunately used as waste dumping locations. In fact, recent reports including the Country report on pollution: Sri Lanka BOBLME (2013) and Meier and Munasinghe (2004); have highlighted the severe environmental degradation in and around the estuary and the concerns of local communities. Further, according to the city profile of the Negombo Municipal Council, the present practice of encroachment of the marshy areas for human habitation has aggravated threats affecting its long-term sustainability. The many careless actions of humans eventually lead to propagate unnecessary trouble to deal with. (William 1985) Therefore, identification of such issues and finding practical solution to mitigate the damage is of timely importance than find solutions for disaster management, in the foreseeable future.

**Objective**

The main objective of the study is to identify the potential threats to the lagoon area and to determine the impact of pollution on ecosystems, the economic and livelihood performance and social well-being of the neighborhood. Thus, the research was formulated aiming at unearthing the root causes behind the problem of pollution in the study area, and to assess the consequent Environmental, Economic and Social impacts of pollution of the Negombo Estuary.

**Methodology**

This paper therefore is based on the Case Study conducted around the Negombo Estuary and the Muthurajawela marshland. The primary data collection for the study was done by conducting interviews, discussions
with key informants and Participatory Rapid Assessments. The interviews were carried out with the participation of localities in the Pamunugama (164) Grama Niladari Division. Convenient Sampling Technique was used when selecting the sample and thus comprised of household situated along the river bank of the Hamilton Canal and the lagoon area. A structured questionnaire which comprised of questions to capture the livelihood of the neighbourhood, issues in the area and common problems entangled to pollution of the lagoon was used for the data collection purpose. The paper presents the preliminary findings and depicts information of the pilot survey of an ongoing study in the area. The analysis of the study employs the Problem Tree Analysis (PTA) (Benson, 2000) to determine the causes and effects of the tragedy of the Negombo Estuary.

![Figure 01: Structure of Problem Tree](source: Developed by Author, 2018.)

The discussions carried out with key informants provided insights to the PTA and thereby a clearer understanding of the contemporary developments and challenges that have aroused in the locality. The analysis of the study is two-fold. Firstly, it seeks to understand the existing issues that govern the problem of pollution in the area and next to intensively study the root causes of pollution in the area.

It was commonly highlighted across all households that the excessive human intervention in the area has become a threat to the natural habitat as well as mangrove ecosystem. Hotel construction, tourism targeted coastal developments, etc. have aggravated the above situation. As a
result, certain fishing practices such as beach seining has been adversely affected. Shrimp farming is another coastal development impacted on the livelihoods of fishers. Mangroves are being removed from coastal areas to develop shrimp farms. Further it was observed that filling of low-lying areas is continuing both by private individuals and public-sector institutions and these sites are subsequently converted to housing sites for low-income groups and for other construction activities. There were also instances of unauthorized filling of canal banks by individual owners as well as by squatters who construct temporary houses in low-lying lands.

In the past; we witnessed that the tragedy was due to exploitation of the common resources that ultimately lead to a loss in the biodiversity of the area. This situation is somewhat under control at present with the delegation of property rights and the locality now showing a positive behavior in using the available resources in a sustainable manner. The upcoming tragedy of the commons- also identified as the pollution done to the area; is the filling of the common pool with waste and other non-degradable material. (Peterson 2009) This is a major problem in the Negombo Estuary and is less controllable compared to the over-exploitation problem.

Figure 02: Causes of Pollution
Source: Developed by Author based on Field Survey, 2018.
There are several sub-problems that have emerged in the recent years due to pollution. Firstly, environmental issues are inevitable given the natural ecosystem that serves as a habitat to the species that breed on brackish waters and is now under immense pressure of destruction and depletion. (Rainforest Protestors of Sri Lanka, 2014) Sediment accumulating is another issue. Accumulation of the sediment in an estuary is derived from a variety of local sources, from erosion of river banks and upland watershed delivered by streams and rivers, to sediment from production of organisms and sediment derived from man-made wastes and fillings.

Another major threat is water pollution. Faecal pollution is said to be the most pronounced mean of pollution in the recent past. Sewage from low-income settlements in the close proximity to the mouth of the estuary, industrial development in the catchment area, and tourist sector development particularly in the shoreline and municipal sewage brought by riverine flow from Dandugam Oya and Ja-ela etc are key sources. The faecal pollution undoubtedly adversely affects the edible flora and fauna and hence human beings leading to water related diseases causing health hazards. On the other hand, visual pollution in the basin area is mainly due to the floating matters thrown in the form of solid wastes. As a result, some of these materials are carried away with the tidal flow and deposited particularly in the mangrove islands located in the close to mouth of Negombo estuary. Also, municipal sewage, fertilizer runoff and industrial waste waters carried by riverine flow contain usually high levels of nitrogen and phosphorus that can stimulate eutrophication.

The industrial development of the Negombo estuary basin is concentrated in the lower end of the catchments. There are a few large industries in the upper and mid catchments and a large number of industries along the Kimbulpitiya Oya. Further, the important urban center of Gampaha is located on the Attanagalu Oya in mid-catchment and several small to medium urban centers located on the tributaries.
According to the participatory Rapid Assessments in the River basin area, the communities highlighted several institutional problems. The lack of inter-agency coordination, lack of proper land ownership system, poor implementation of the existing laws and regulation, and the lack of a single agency responsible for entire river basin management were highlighted. Out of all other issues, social issues were emphasized as most important. Insufficient lands and ambiguous land ownership, lack of proper houses, low education and high school dropout rate, excess use of illegal liquor, lack of proper drinking water and constant outbreak of waterborne disease and the lack of basic need etc. were highlighted. Identifying all these problems that threatens the Negombo Estuary in recent times shows significant evidence of being one of the millions of victims of the tragedy of the commons.
Further developments of the PTA helped identify several agents responsible in the management of the Negombo estuary. Although little is still being done to overcome the problem, it is important that these agents are taking necessary action now to mitigate the cost of pollution to the area and protect the biodiversity. Despite several decades of national and international efforts to stop or reduce the threats of coastal environmental degradation and un-sustainable use of biodiversity resources with regard to pollution done specifically in the Negombo Estuary area; the locality and the country as a whole continue to suffer from varying degrees of biodiversity loss, environment degradation and declining ecosystem services. Although plans are made, and suggestions continue to pile up and conferences are scheduled, less is done to see environmental improvements.

**Conclusion**

The analysis of the paper so far provided evidence that the area is rapidly depleting as settlements in the island at the entrance to the lagoon is continuing with industries and housing development take place. The major concern of disposing remains unanswered and is still struggling to find its roots to the problem. As explained by the ecologist Hardin (1968), there are always ecological limits to growth, in the use of resources and pollution of the environment, and as a result, the world is trapped in the battle for survival of the common resources. All in all, the paper exhibited an upcoming tragedy of the commons and the critical situation of the Negombo Estuary. The upcoming tragedy of pollution in the area lies open to us; the present generation and future generations to take action to mitigate the situation as there is doubt if the Negombo Estuary will be able to survive to satisfy all the needs.

**References**


Landscape Variations Due to Open Pit Mining Activities
(with Special Reference to Kundasale Divisional Secretariat Division)

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Introduction

Sri Lanka is endowed with wealth of natural resources including minerals, forest, wildlife, water, wetlands, grasslands, mountains and etc. All of these elements are economically valuable for the country. Among these, minerals play an important role in Sri Lankan economy. The major objective of this study was to identify landscape variations due to open–pit mining activities. Examine the spatial variations of landscape due to mining activities within specific period of time was the sub objective of this study.

Considering about the magnitude of Sri Lanka, there are more mineral resources. Among those minerals, gems, quartz, mica, graphite, apatite, kaolin, ball clay, brick and tile clay, silica sand, calcite, dolomite, calc–gneisses are most significant. As well as from quartz, feldspar, biotite, mica, graphite, silica and calcite Sri Lanka earn more foreign exchange. These minerals are excavation to achieve purpose of domestic usage and for export. Therefore, landscape variations were happening in Sri Lanka due to mineral mining (Hearth, 1995).

Sri Lanka has mine market industry, both domestically and for export. Especially, from graphite, gems, mica and silica country earn more foreign exchange. With the rapid population growth, urbanization, industrial and construction activities, domestically minerals become valuable resource for the country. Therefore, mineral mining is happening in Sri Lanka.

Excavation of minerals influence on create severe impact on environment. Excavation of minerals done through applying open – pit
and underground mining method. Removing minerals near to the earth surface consider as open – pit mining and removing minerals from ground consider as underground mining. Therefore, landscape variations due to open – pit mining activities can identify in Kundasale Divisional Secretariat Division.

**Research Problem**

Sri Lanka is one of the mineral assets in the world. Sri Lanka earns more foreign exchange from exporting minerals. Therefore, mineral mining is conducting for domestically usage and for export. Mining activities create extensive environmental degradation. Most significant one is it influences on changing exiting land. With the open – pit mining activities it changes the topography, landforms, vegetation cover, disturbances on biodiversity and etc. These whole environmental impacts are influence on create massive variations on landscape. This study is based on the landscape variations due to open–pit mining activities in Kundasale Divisional Secretariat Division.

**Objectives**

The major objective of this study was to identify landscape variations due to open – pit mining activities. Sub objective of this study was examining the spatial variations of landscape due to mining activities within specific period of time (15 years +/-).

**Methodology**

The primary and secondary data collection methods used for generating data pertaining to identify the landscape variations due to open – pit mining activities. Secondary data and information were collected through many sources as an extension to the literature review. The secondary sources such as Census data: to obtain information on population, institutional records from Geological Survey and Mines Bureau (GSMB) to find geological information of the study area and collection of data from other multiple sources including journals, magazines, books, and periodicals to obtain historical and other theoretical perspectives etc.; were used in the study area.1: 50, 000
digital topographic sheets of the Kundasale DS division were used. Secondary data analyzed from Arc GIS 10.3.

Arc GIS 10.3 software and Google Earth pro software used for identify the landscape variations between 2003 and 2017. The variations of landscape due to open – pit mining activities were identified by digitizing the mining pits in 2003 and 2017. Perimeter changes of mining pits before and after mining activities were calculated from the measure tool in Arc GIS 10.3.

Primary data was collected from interviews. Information was collected from 15 respondents including Heepitiya, Malpana, Gonawala North, Wepathana GN Divisions by simple random sampling. Information was analyzed by content analysis method using the MS Excel 2016. The main purpose of this method was obtaining information on environmental issues, location of mining sites, diagram of mining area, slope of the land, drainage of mining area, machines use for mining activities and etc.

Results and Discussion

There are 22 aggregate mining sites in Kundasale divisional Secretariat Division distributed among Heepitiya, Malpana, Gonawala North, Gonawala South, Kandekumbura, Wepathana and Ambakotte Grama Niladari Divisions. Gneiss were covered by scrubland before starting mining activities in this area. The land extend of mining sites has been changed with the expansion of mining activities from 2003 to 2017. It influenced on change of the existing landscape (Fig 01 - 02).
Perimeter of mining sites has been changed with the expansion of mining activities. Rapid changes can identify in 13 mining sites by comparing about the changes of perimeter in 2003 and 2017. It has been changed by 79.82% within 14 years. Some mining sites have been merged. The land extend in every mining site has been changed during a selected period (Figure 03).

Figure 03: Perimeter changes of mining pits in 2003 & 2017 Kundasale DSD
Source: Google Earth Pro, 2003 and 2017
Contribution of primary data to identify landscape variations on open-pit mining activities are important. Landscape has been changed as a result of disasters in mining sites, rehabilitation programs and machinery usage on mining activities. Disasters like land descending, landslide and rock falls were happened in mining pits as amounts of 62%, 21% and 15% respectively (Fig 04).

![Figure 04: Disasters happened due to mining activities in Kundasale DSD](source: Field Survey, 2017)

High technological machines and blasting methods are applied to these mining activities in every mining sites. Machines like compressors, jackhammers and rock breakers were applied to mining activities. For blasting gneiss applied chemicals like Gel Dina and Ammonia Nitrate. Therefore, environmental impacts identified in this area due to machinery usages. Air pollution, damage to soil layer and underground water can identify 80%, 60% and 66.6% respectively. (Fig 05). Soil layer severely damaged when applied machines for mining activities. It influenced on the change of structure in soil layers and it damaged to the composition of soil layers. Cracks on the land were able to identify in mining area due to ground vibrations which were arisen due to machines. These are influence on change of the existing landscape.
Rehabilitation programs after mining activities severely influenced on change of the landscape. 84%, 8%, 3% and 5% of land rehabilitation activities for settlements, industrial, fish cultivation and crop cultivation are going to conducted after mining in this area respectively (Fig 06).

Landscape in this area has been changed due to rehabilitation activities. After extraction rock in the mining site people apply various methods to rehabilitate the land. Such as, cultivation crops, for industrial activities, fish cultivation, settlement development and etc. After extraction rock in the mining site people rehabilitate the land into settlement area, industrial land, agricultural land, lake for fish cultivation and etc. It is influencing rapid change of existing landscape. Most of the time land was construction alike steps to minimize the disasters like landslide, rock falls and land descending. Therefore, rehabilitation programs after
mining activities were directly influenced on creating landscape changes.

**Conclusion**
This study sought to examine landscape variations due to open – pit mining activities in Kundasale Divisional Secretariat Division. More minerals can identify in this area. Among minerals aggregate was the most significant natural resource in this area. Open – pit mining method implemented to extraction of gneiss. It influenced on create several variations on landscape. The changes in landscape due to the mining activities are shown according to the above maps and figures.

**Reference**

An Identification of Disease Disperal and Their Causes
(with Special Reference to Welimada Area)

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Introduction
A disease is “the alteration of living cells or tissues that jeopardizes survival in their environment” (Jacques May). Disease dispersal is a common issue in the world and there are various kinds of diseases. Mainly diseases can be categorized into two as non-communicable diseases and infectious diseases. Researching about these diseases and facts related to them is important to present solutions. An agenda for 2030 is launched at the end of 2015, by World Health Organization to achieve sustainable development goals. This agenda frames health and well-being as both outcomes and foundations of social inclusion, poverty reduction and environmental protection (World Health Organization). Diseases are the main threats that limit health development worldwide. According to the estimates in the causes of death 2008 update, there were 57 million deaths in the world in 2008. The broad category of all "non-communicable diseases" killed 36 million people; communicable diseases, maternal and perinatal conditions, and nutritional conditions killed 16 million people worldwide; and external causes of injuries killed 5 million people (World Health Organization). Ischemic heart disease, Stroke, Lower respiratory infections, Chronic obstructive pulmonary disease, Respiratory cancers, Diabetes mellitus, Alzheimer’s disease and other dementias, Diarrheal diseases, Tuberculosis and Cirrhosis are the top 10 deadliest diseases in the world (https://www.healthline.com/health/top-10-deadliest-diseases).

Sri Lanka is a tropical country and a developing country. Geographically it is located in a specific area on earth. Health and diseases directly
influence the development. Diabetes, dengue, sinus and migraine headaches, alcohol, tobacco and drug related illnesses, and asthma are the key diseases in Sri Lanka that are frequently dispersed (Pulse, 2015). While considering the communicable diseases, natural disasters are affected. Conflict situations affected the health within the war period. In the profile of major communicable diseases, water-related diseases are bacillary dysentery (shigellosis), cholera, other diarrheal diseases, hepatitis A and E and typhoid fever. Diseases associated with overcrowding are measles, acute lower respiratory tract infections, meningococcal disease, and tuberculosis. Vector-borne diseases are dengue and Japanese encephalitis (WHO, 2010). Identification current pattern of disease dispersal causes for it and preventing methods is very significant for the development process in the country. Currently, diseases are shifted from infectious to non-communicable diseases in the country. In 2014 the proportion of mortality by non-communicable diseases was 75%. It was, 40% by Cardiovascular diseases, 14% by injuries, 7% by diabetes, 85 by chronic respiratory diseases, 10% by cancers and 11% by communicable and other conditions regarding to each disease.

With the current condition in Sri Lanka, the background of diseases in various areas should be identified. Welimada is an area that is located in upcountry with an agrarian and rural life style. This study is conducted to identify the nature of disease dispersal and causes behind it.

**Research Problem**

Both infectious and non communicable diseases affect the health sector in Sri Lanka. But there is an increasement of the proportion of non communicable diseases. As a rural and agrarian area, Welimada is affected by both kinds of these diseases. The problem of the study is, what are the main diseases and causes for those diseases that can be identified in the study area?
Objective

Main objective of this study is to identify the nature and causes of the diseases dispersed in Welimada area in Sri Lanka. Specific objectives are;

- To identify the nature of the diseases dispersed in the area.
- To identify the causes behind the diseases dispersed in the area.
- To identify means to prevent and control diseases.

Methodology

Data collection and data analysis are done under this study to achieve the objectives. Primary and secondary data sources are used to collect data. Questionnaires, interviews and observation are the main methods that are used to collect primary data. To identify the background of disease dispersal in the area, 50 respondents in the area are selected. Snowball sampling is used for the questionnaire survey because the study is a basic study. 5 interviews are conducted to get detailed information about the area, and the health related problems. Published and unpublished literature sources, internet and books are used to collect secondary data. Data analysis is done under qualitative and quantitative methods. MS Excel is used for the quantitative data analysis.

Results and Discussion

This research is done using the local community to achieve the main objectives. 50 respondents are used by the researcher to complete the questionnaire survey.

Age is a key factor, to collect better information with their experiences. Among 50 respondents, 54% were 19-50 years old and 46% were older than 55 years. According to the interviews, it was clear that non-communicable diseases mostly affect the age group higher than 55 years. But there is a trend for the youngsters to be affected by some non-communicable diseases such as diabetes, cholesterol and piles. Social condition based on their education, therefore the questionnaire focused to ask about their occupation. Among the, 8% had primary education,
60% secondary education, 16% had higher education and another 16% had higher educational qualifications. The questionnaire categorized occupations as government jobs, private jobs, self-employments, businesses, farming and other. Government jobs are done by 8%, private jobs are done by 24%, and 4% did their own job. There were 28% of businessmen among the respondents and farming is done by 36%. According to their education and employments, some groups are threatened. Stress, monotony, lack of freedom, inability to have food on time, patterns of exertion, and some other factors can be seen according to each occupation. Some government job holders and businessmen have stress and stress related diseases. Farmers have arthritis mostly because of the unlimited exertion of the body. The educated group out of them try to prevent diseases by controlling food intake, doing exercises and other ways.

Majority of the respondents earned 21000-40000 rupees per month and it is 62%. 26% of respondents earn more than 41000 rupees per month and 12% earn less than 20000 rupees. When health facilities are selected, the good income holders have the chance to channel specialists and take better medicine. But less income holders have only government clinics and according to their opinion, they do not have quality medicine for their diseases. The questionnaire focuses on identifying the main diseases dispersed among the local people, causes behind it and the formation of having medicine. Charts and table below indicate them.

![Infectious diseases in the area](image1)

![Having medicines](image2)

Figure 01: Infectious diseases in the area
Figure 02: Having medicines

Source: field study-2018
Fever and diarrhea are the main infectious diseases in the area. Climatic condition is mostly affecting the situation. Other than that, social situations also affect. Some poor families do not have clean drinking water, sanitation, costs for healthy and nutritious foods and good medical facilities and care.

Table 1 main non-communicable diseases influenced on local community

<table>
<thead>
<tr>
<th>Disease</th>
<th>Taking medicines</th>
<th>Formation of taking medicines</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>38%</td>
<td>38%</td>
</tr>
<tr>
<td>Heart diseases</td>
<td>6%</td>
<td>6%</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>46%</td>
<td>46%</td>
</tr>
<tr>
<td>High blood pressure</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Low blood pressure</td>
<td>4%</td>
<td>0%</td>
</tr>
<tr>
<td>Arthritis</td>
<td>78%</td>
<td>78%</td>
</tr>
<tr>
<td>Piles</td>
<td>6%</td>
<td>0%</td>
</tr>
<tr>
<td>Other</td>
<td>28%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Source: Field study-2018

According to the respondents and interviewers, there are some common reasons for the mentioned communicable and non-communicable diseases. Changing life styles, monotomy in the working places, stress, changing food items, using alchol, genetic causes and smoking are the main causes for communicable diseases.

Conclusion

Main conclusion is there are a few infectious diseases and non-communicable diseases in the area. Infectious diseases are spreading mostly during the rainy and windy seasons. As mentioned above there are a considerable number of causes for distribution of non-communicable diseases. The common situation in Sri Lanka is
increasing the non-communicable diseases. The study area shows the same condition. Current complex living style and other conditions mostly affect it. The community should be made aware of the diseases, causes and ways of prevention by the responsible institutes and persons.

References


National Center for Biotechnology Information.2009.(The value, importance and oversight of health research) Retrieved from https://www.ncbi.nlm.nih.gov/books/NBK9571/


Multi Hazards Risk in the Imbulpe Divisional Secretariat Division

(Application of Participatory Rural Appraisal Method)

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Introduction

Burton et al. (1978) have defined hazard as characteristics of physical environment that harmful to man and caused by forces extraneous to him. When the one area affected by several hazards in the same time or at the different times, it is considering as multi hazards situation. According to the research articles (Carpignano et al.2009; Garcia Aristizabal and Marzocchi 2012a, 2012b) multi hazards is different hazardous events that are affected on the same exposures at the different times or at the same time. Kappes et al. (2010, 2011) define multi hazards as hazardous events that occurring at the same time or following each other events like a chain in the defined administrative area.

Sri Lanka also can be considered as multi hazards risk country. According to the book, “Towards safer Sri Lanka, a road map for disaster risk management” (2005) that is published by DMC. Country is affected by floods, cyclones, droughts, landslides and coastal erosions. In addition to those major hazards, lightning strikes, Epidemics and the effect of environment pollution also present within the country. In 2017, by flood hazard, 256 deaths and 202 missing individuals were reported. Within the same year from the landslide hazard, 134 deaths and 28 missing individuals were reported. Hence, it is very crucial study and find out solution to mitigate adverse impacts of hazards.

The Participatory Rural Appraisal method is a popular data collection and analysis method among researchers. Paul Venton and Cabot Venton (2005) have done the study on “Community based disaster risk
reduction in the Indian state of Bihar”. In that study, they have used PRA methods such as, hazards mapping and seasonal charts. That study was mainly focused on flood hazard, its impacts on the community and the vulnerability and capacity of the villagers.

This paper applies PRA techniques to understand multi hazards risk in the selected area of the Imbulpe Divisional Secretariat Division.

**Research Problem**

As a country, Sri Lanka has to face various kinds of hazards. Some provinces like Sabaragamuwa Province, Southern Province and Central Province could be considered as highly vulnerable provinces for the natural hazards. In 2017, because of the multi hazards conditions 210 deaths and 76 missing individuals were recorded from the Sabaragamuwa Province (UNISDR, 2017). Rathnapura District could be named as a highly vulnerable district for the multi hazards conditions in the Sabaragamuwa Province. The District is affected by the natural hazards like floods, droughts, forest fires, landslide sand animal attacks. Imbulpe Divisional Secretariat Division is located in the Rathnapura District and it is affected by several severe hazards conditions. Majority of the residents in the area are engaging in primary economic activities. Because of the natural setting of the Imbulpe DSD, it is popular destination among tourists. Then, it is crucial to identify spatial distribution of the multi hazards conditions within the Imbulpe DSD for future social and economic development of the area.

**Objective**

Identification of multi hazard risk in the Imbulpe Divisional Secretariat Division is the main objective of the study.

**Methodology**

*Study Area*

The study area covers seven GN divisions of Imbulpe DSD division in Rathnapura District, Sri Lanka. It is located in among [“80.759”,
“6.688”], [“80.818”, “6.701”], [“80.82”, “6.779”] and [“80.722”, “6.747”] longitudes and latitudes values. The study region belongs to the intermediate climatic zone of the country with a mean annual rainfall of 1,400 mm to 2,000 mm. The area received high rainfall within the North East Monsoon period (September to May). However, rainfall records decrease in South Western Monsoon season (May to September). There are 8,819 population (Sampath pethikada, 2017) live within selected 7 GN divisions. Most residents are engaging with primary economic activities like mining and cultivation. Paddy, tea, sorghum, pepper and vegetable cultivation can identify as major cultivation. In addition to that natural beauty of the area providing opportunities and resources for tourism industry. Thus, within the area identify number of hotels and adventure parks can be identified.

![Study area](image)

**Figure 1: Study area**

Source: Digital data of Survey General Department of Sri Lanka (2007)

**Sample**

The application of the PRA methods done with the active participants. To select participants used “Samurdhi” Societies of the Selected GN divisions. Most of the villagers have membership in that society. Before conducting the PRA methods, provide a lecture for members how it works and what is the purpose of the study. After that gave chance for members of the society to engage with the application of PRA methods according to their willingness. All the necessary papers and colour pens were provided for participants.
Participatory Rural Appraisal Method

The study was focused on multi hazards potential and risk in the area. Thus, hazards map, risk quadrant and historical timeline used to collect and analyzed the data on hazards situations.

Hazards Map

Participants had to draw major land use activities of their GN division within the map. This must be done through the group discussions. After drew major land use activities of the area, participants had to mark hazard situations on the map. They had chance to use any symbol to present hazards on the map. Through this, anybody can get a better idea about spatial distribution of the hazards with in the GN divisions.

Risk Quadrant

The preparation of hazards map gave better knowledge for participants about hazards situations that they have to face. Then they had to arrange hazard situation within the “Risk Quadrant” according to their probability of occurrences and impacts on them. Participants had to arrange hazards under four categories.
- Category of low probability of occurrence and low impact (bottom left box of the quadrant)
- Category of low probability of occurrence and high impact (top left box of the quadrant)
- Category of high probability of occurrence and low impact (bottom right box of the quadrant)
- Category of high probability of occurrence and high impact (top right box of the quadrant).

![Risk Quadrant](image)

**Figure 3: Risk Quadrant**
Source: PRA Field data of GN divisions (2018)

**Historical Timeline**

Participants had to mention severe hazards situations and their impacts within a table. This is known as historical timeline. Historical timeline was prepared by the participants which were faced sever hazard condition in frequently. Through the historical timeline can identify most severe hazards situations faced by the villagers and severity of those hazards.
Results and Discussions

Based on the findings among all Grama Niladari Divisions, except Karagasthalawa GN division all other GN division were affected by more than one hazards. Puwakghawela GN Division can be named as one of the high risk GN divisions for landslide hazard. That GN division has faced severe landslide hazards conditions in the years of 1960, 1965 and 2002. By 2002 landslide five deaths and property damages have reported. Muththettuvegama GN Division can be named as another GN Division which was affected by more than one hazard condition. According to the participants of the GN Division it has faced heavy wind condition in the years of 2016 and 2017. At the same time, by the landslide which was occurred in 2017, one death and property damage have reported in this GN Division.

In the study area, all GN Divisions are affected by animal attacks. All the participants have mentioned it as a severe hazard condition that face by them. Drought and forest fire cane named as hazards conditions face by the residents of Ihalagalagama, Puwakghawela, Muththettuvegama, Kumbalgama, Viharawela and Seelogama GN Divisions. The findings of the study can summarized as following table.
Table 1 Summary of findings

<table>
<thead>
<tr>
<th>GN division Name</th>
<th>Disasters</th>
<th>Severe disasters (Impact and probability of occurrence is high)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ihalagalagama</td>
<td>Landslide, Forest fire, Wind, Animals attack, Drought</td>
<td>Animal attack</td>
</tr>
<tr>
<td>Puwakgahawela</td>
<td>Forest fire, Landslide, Drought, Animals attack, Wind</td>
<td>Animals attack, Wind, Landslide, Drought</td>
</tr>
<tr>
<td>Muththettuvegama</td>
<td>Landslide, Animals attack, Wind, Drought</td>
<td>Animals attack</td>
</tr>
<tr>
<td>Kumbalgama</td>
<td>Wind, Animals attack, Drought, Elephants attack</td>
<td>Animals attack</td>
</tr>
<tr>
<td>Viharawela</td>
<td>Wind, Forest fire, Landslide, Animals attack</td>
<td>Animals attack</td>
</tr>
<tr>
<td>Karagasthalawa</td>
<td>Animal attack</td>
<td>Animal attack</td>
</tr>
<tr>
<td>Seelogama</td>
<td>Landslide, Forest fire, Animals attack, Wind, Flood</td>
<td>Animal attack</td>
</tr>
</tbody>
</table>

**Conclusion**

The study area is affected by multi hazards. According to the participants of PRA method the animals attack is the most severe hazard face by the residents in the study area. All the GN divisions are having high risk of animal attack. Most of the residents are engaging with agricultural activities in the study area. From the animals like peacocks, wild bows, elephants, and leaf monkeys cultivations have big impacts. Sometime it causes high economic lost. Not only animal attacks, the study area is also affected by landslide, heavy wind, drought and forest fire risk. However, the forest fire within the study area not a natural thing it is a human induce hazard. Among the local people of the area, there is a mythical belief which is “by letting fire to the forest during the dry season, can get early rains. This mythical belief and purpose lead people
to fire forest. Following recommendations are proposed to reduce multi hazards risk within the study area.

- Establishment of community base hazard management societies which societies will be helpful to implement hazard mitigation activities within the area.
- Conducting training camps: through those camps can make people more aware of environment and that will erase mythical believes of people.
- Replanting mountaintops with native fruit species, if able to grow natural forest within the mountaintops, it will reduce impact of the animals like leaf monkeys and chipmunks by providing habitats for them.
- Planting tree boundaries against the wind direction will help in reducing wind speed.
- Introducing crop insurance system will be helpful to reduce risk of droughts and animals’ attacks in agricultural field.
- Arraigning strong and efficient mitigation and recovery system for hazards with the cooperation of local societies.

References


Identifying Environmental Changes in Bordering Areas of the Wilpaththu National Park

(A Case Study in Musali DS Division)

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Introduction

The Wilpaththu National park is the oldest and largest National Park in the Sri Lanka. Department of wildlife conservation declared Block one in national park in 1938, Block two in 1967, Blocks three and four in 1969 and Block five in 1973, under the Fauna and Flora Protection Ordinance of Sri Lanka. The boundary of Wilpaththu National park is located in three administrative areas. They are Puttalum, Anuradhapura and Mannar. There are nine adjacent Forest Reserves in Wilpaththu national park namely, Maraichukaddi/Karadikkuli (Kallaru) Forest Reserve, Periyakuriyatti Kulam Forest Reserve, and Vilanththimulam Forest Reserve, Wilpattu North Sanctuary, Thabbova Sanctuary, Veppal Forest Reserve, Mavillu Forest Reserve, Periyamarippu Forest Reserve, Veerakkuli Cholai–Eluwankulam Forest Reserve.

Deforestation in Wilpattu National Park has firstly recorded in 2009 with the construction of two roads. The first road was built connecting Eluwankulama to Mullikulama. The second road ran through Silawathura to Eluwankulama. The construction of these roads destroyed 300 acres of forest lands belonging to Wilpattu National Park.

Deforestation has happened again in Wilpattu area with the resettlement project for displaced person from the war. These resettlement projects have threatened to outside forest cover in the Wilpattu national park. For instance Vilaththikulam and Marichchikaddi can be taken. Wilpattu National Park is running under the wildlife department and Mavillu conservation area including Musali DS division is running under the
forest department. Mavillu conservation area consist about 40000 hectare and forest department has given 1500 acres for resettlements.

**Research Problem**

In recent years various human activities have influenced to biodiversity in bordering areas in Wilpaththu National Park. At present deforestation is critical issue faced by Wilpaththu National Park. With the resettlement projects outside forest cover of the Wilaphththu have cleared rapidly and it negatively affects to bio diversity in this area. Therefore, this study mainly examines environmental changes in bordering areas of Wilpaththu Natioanl Park.

**Objectives**

The main purposes of this study was identifying the environmental changes in the study area. Minor objectives are identifying the social and economic changes in study area.

**Methodology**

In this study, Primary data were collected using structured interviews, focused group interviews and field observations. Secondary data were collected from reliable sources such as books, journals and websites and forest department and divisional secretariat in Musali.

Thirty households were selected randomly for structured interviews from Marichchikaddi, Mullikulama and Sihala vijaya Village. Two focused group interviews were used to collect data from government officers in Musali District secretariat and forest department. Coded transcript was used to analyze the qualitative data and Satellite images of Landsat of 2011and 2018 were utilized to observe deforestation in Wilpaththu.
Results and Discussion

Environmental changes of bordering areas in Wilpaththu National Park During the war period people in this study area moved to different places for instance some people went to India and some of them went to Madu church. After the war people have resettled and lots of environmental changes have happened.

Deforestation

Forest cover, agricultural lands and human settlements are main landuse types in study area and significant changes in land use can be identified after the war. However, deforestation is the major environmental change in study area. The following images (figure:2) clearly show that deforestation in the Marichchikaddi and Mullikulam area during the period of 2011 and 2018.

The main reason for deforestation is human settlements. At present all the families have expanded than earlier. According to the data of Musali Divisional secretariat office earlier there were about 750 families and now these families have expanded to 2000. Therefore, settlements are provided by clearing outside forest cover in Willpattu national park. For instance, Malankadi and Wilaththikulam forest have cleared to give people. Forest department has given about 1500 acres for resettlements. The table: 1 shows that forest area in Musali Ds division and table:2 shows that summary of resettlement area in Musali Division which were controlled by forest department.
Table 1: Forest Areas in Musali Division

<table>
<thead>
<tr>
<th>Forest Area</th>
<th>Area (hectare)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marichchikaddi/Karadikkuli Reserved</td>
<td>6042</td>
</tr>
<tr>
<td>Vilaththikulam Reserved forest</td>
<td>2108</td>
</tr>
<tr>
<td>Mavillu Reserved forest</td>
<td>14575</td>
</tr>
<tr>
<td>Veppal Reserved forest</td>
<td>10494</td>
</tr>
<tr>
<td>Punachchikulam Proposed Reserved forest</td>
<td>200</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>33419</strong></td>
</tr>
</tbody>
</table>

Source: Forest Department, Musali Division

Table 2: Resettlement Area in Musali Division

<table>
<thead>
<tr>
<th>Place</th>
<th>Land area (Acre)</th>
<th>Released date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marichchikaddi</td>
<td>100</td>
<td>2013.01.02</td>
</tr>
<tr>
<td>Karadikkuli</td>
<td>80</td>
<td>2013.01.02</td>
</tr>
<tr>
<td>Palaykuli</td>
<td>100</td>
<td>2013.01.02</td>
</tr>
<tr>
<td>Vilaththikulam</td>
<td>650</td>
<td>2013.05.08</td>
</tr>
<tr>
<td>Both side of the Silawathura-Marichchikaddi road</td>
<td>770</td>
<td>2013.05.08</td>
</tr>
</tbody>
</table>

Source: Forest Department, Musali Division

According to the officer’s view of the Musali Ds division, there are no relationship between Willpattu national park and settlement. And also they criticized news provided by media regarding the deforestation of willpattu. Anyhow currently resettlement project threat to outside forest cover of the Wilpattu and it may threat to national park in future.

**Identifying the Reasons for deforestation**

According to findings 100 percent of peoples in study area have accepted that resettlement as the main reason for deforestation in this area. However according to the interviews and field observations there are other reasons behind deforestation. They are agricultural activities, construction activities.

According to this study water scarcity is the main impact of deforestation. Secondly human animal conflicts are there. Destruction of biological corridors and fragmentation of habitat cause to occur human animal conflict in study area.
Identifying the socio economic changes in study area

There are separate resettlement villages in Musali DS division based on ethnicity. Sinhalese live in Sihala Vijaya village, Muslims live in Marichchikaddi village and Tamil people live in Mullikulam area. Therefore, there are no social problems among these ethnic groups.

However, some residents have houses in other places also. People who went to Puttalam during the war period don’t like to resettle in Musali DS division because they have adapted to Puttalam area and they have better facilities than Marichchikaddi and Mullikulam area. There are 79 families can live in Sihala Vijaya village but at present, there are about 30 families live in this village because of difficulties. With the resettlement project each resident got ½ acre land legally and every house have same structure. But earlier they had more than ½ acre land. Majority of the Muslim people have distributed near the mosque and most of the Muslim people have settled same place where they lived in earlier.

When considering about the infrastructure facilities people have accepted that they had better facilities earlier than now. Therefore, inadequate infrastructure facilities are significant changes in this area. Most of the roads are gravel and concrete as well as no better transportation facilities. Water and electricity are other physical infrastructure facilities that are required but lack of water is major problem. Marrichchikaddii is the driest place in Sri Lanka so water scarcity and drought condition are major problems in here. Nongovernmental organization have launched drinking water project in Sihala vijaya village. Navy camp provides water for people in Mullikulama from Periyakulam tank. There is a water project in palakkuli in marichchikaddi but it is not implementing.

Lack of education opportunities and health facilities are other significant changes in this area. Silawathura hospital is located 12 km far away from Marichchikaddi. Therefore, it is difficult to travel in emergency situation because transportation is also poor in this area. As well as Muslim Village and Tamil village have schools but in Sihala vijaya village there
is no Sinhala school. Therefore, most of the Sinhalese not live in this village because their children have not school and they don’t like to go Tamil medium schools. In addition, there are no sufficient teachers in the schools.

Although every physical thing has changed religious values of the people are still available in this area. In Mullikulam most of the people are catholic and their lifestyle have adapted according to believes in their religion. In Marichchikaddi all the people believe Islam and they have mosque in their village. Therefore, there are no barriers to pray. But in Sinhala village there is no temple.

Livelihood of the community in this area mainly depends on the Agriculture and Fishery. Before war period most of the people had engaged with agriculture sector in vastly. But at present people have only ½ acres and it is not sufficient to cultivate. Paddy, chili, peanut, pumpkin, brinjals and coconut are crops which are cultivated by people in this area. As well as people manage their home garden properly for their consumption. Mostly Sinhala and Tamil village have managed home garden in proper way. Jack, coconut, guava, pomegranate, jambu, banana and ornamental plants are common in home garden. Animal husbandry is common in Tamil village and they raise chicken and cattle.

**Conclusion**

Wilpaththu National park is oldest and largest national park in Sri Lanka. Therefore, it can be considered as a valuable heritage in Sri Lanka. But currently there is a critical issue in bordering areas in Wilpaththu due to deforestation.

Deforestation in Wilpaththu firstly arose in 2009 with the road development. After the civil war large amount of forest cover has cleared for resettlements for displaced people. This condition has created controversy situation among the people in country. Political intervention for deforestation is also highly criticized by people.
However, these resettlement projects have caused to destroy several outside forest covers in the Wilpaththu National Park. Wilpaththu and outside forest cover have rich biodiversity. Therefore, clearing outside forest covers in Wilpaththu negatively affect to the National park in future.

In study area several environmental and socio economic changes can be identified. Deforestation is the main environmental change in study area due to resettlement. Further agricultural activities, construction activities also affected to deforestation. Water scarcity, human animal conflicts are main impact of deforestation. Further habitat destruction, habitat fragmentation and destruction of biological corridors can be mentioned. In addition, inadequate infrastructure facilities are significant issue in this area.

Recomendations

Corridors are one of the strategies to reduce the negative effects of habitat fragmentation and isolation due to human dominant landscapes. Isolation generates several negative effects. Therefore, biological corridors are very important. Theory of Meta Population introduced by Richard Levins in 1970 highly emphasized the importance of corridors. According to this theory isolated sub population within population connect with each habitat using biological corridors. Therefore, isolation is not a problem. Using biological corridors animal can migrate to other places to find food, water, and habitat and with the seasonal variations animals can find new places. In addition, they can find new mates and it enhance the genetic diversity.

The idea of biological corridors closely related with the concept of buffer zones. Around the core areas and corridors, buffer zones must be established to protect the habitat. Buffer zones are crucial because animals do not understand boundary lines and often wander outside the protected areas to feed, mate, or migrate. But if buffer zones are available people do not disturb to the core areas. Therefore, establishment of the buffer zones around the corridors and core areas are
very important land use planning to protection of forest reserve and wild life.

References


Factors Affecting the Customers’ Intention to Use Green Banking Products
(with Special Reference to People’s Bank-Pelmadulla Branch)

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Introduction

The banking sector plays an important role in promoting environmentally sustainable and socially responsible investment. Green banking means “promoting environmental friendly practices and reducing carbon footprint from banking activities” (Schultz, 2010 P:127). In Sri Lanka, the banking sector began to rehearse the green banking concept in 2013. People’s Bank has recently announced the launch of Sri Lanka’s first ecological-friendly savings product for youth under the name of “YES”. The “YES” account has made a large part of the youth to promote savings across Sri Lanka, now it is designed to offer paperless banking services. So, this account is expected to encourage the younger generation to preserve the environment with minimal use of paper, which can lead the route for a more sustainable future in the coming time. Under the concept of “YES with green”, the account holders will no longer receive any correspondence through the paper, but will be encouraged to receive all their banking services electronically in it. People’s Bank is hopeful to popularize the topic to change its banking services and reach the electronic form, marking the bank’s commitment towards operation as an environment-friendly organization. (People's Bank, 2015)

Research Problem

Since 1980, the concept of green banking has been developed and practiced by many banks around the world. There are different factors affecting the customers’ choice on green products. Therefore, the reason
to purchase is different from person to person. Hence it is very important to identify the factors that affecting the customers’ intention to use green products and it is necessary for the bank to implement different strategies to enhance this green product preference. Furthermore, few research works have been done on green banking dimensions and no studies have looked at all these together and no instrument has been developed to measure green banking in Sri Lanka (Shaumya, 2016). There are few empirical studies conducted in Sri Lanka setting with regards to green banking products and clients’ intention. With a specific end goal to satisfy this space, this study will investigate how a green brand dimensions’ influence on customers’ purchase intention to use green banking products in People’s Bank.

Objectives

Main Objective

To examine green brand dimensions impact on customers’ intention to use green products.

Sub Objective

To measure the relationship between green brand dimensions and customers’ purchase intention to use green banking products.

Methodology

The unit of analysis in this study is the customer level. Since this study regards with the effect of green brand dimensions on purchase intention, researcher has used the deductive approach to conduct this study. Green banking products are only available with the YES savings accounts in the People’s Bank. Therefore total “YES saving account holders” of the branch (Research site) were taken as the population. Among the population, 381 of YES savings account holders of the branch were considered as the sample. Convenience sampling was occupied as the reason of the convenience to accessibility as well as the information obtained from individuals who regularly engage with the bank is most appropriate for this study. Primary data were collected with the help of
structured questionnaire. Collected data were analyzed through factor analysis and Structural Equation Model (SEM). In this study, Customers’ purchase intention was considered as the dependent variable and green brand dimensions (Green Product Awareness, Green Trust, Green Image, Green Perceived Value, Green Product benefit, Green Product Security and Privacy) were considered as independent variables.

Results and Discussion

The findings of the demographic information show that the majority of them are female (63%) as well as most of them are in between 21-40 years. Majority of them (99%) are educated and most of them have studied up to the A/L and majority of them are government employees. Moreover, from the total sample, 63% of people are engaged with savings as their main banking transactions, 77% of them have an awareness about green banking products and 73% of them are “YES” saving account holders. Furthermore, most of them (46%) were highly satisfied with these green banking products. However, out of the total sample, 32% of them do not use green products due to the low awareness and knowledge.

When it comes to the overall assessment of the measurement model, the results confirmed that a measurement model has internal consistency reliability and indicator reliability of the model. Furthermore, the results confirmed convergent validity and discriminant validity of the measurement model. The Structural model primarily assesses hypothesized causal relationship between exogenous (independent) and endogenous (dependent) latent variables. This assessment will be done based on the five step guidelines suggested by Hair, Ringle, & Sarstedt, (2011).

In this model, the R² value of the dependent variable has reported as 0.96031 which concluded that 96% variation of the purchase intention has been clearly explained by the independent variables of the study. Furthermore, the model has considered to have predictive relevance.
When concerning the relationship among independent variables and dependent variable, all independent variables represent higher collinearity effects and confirmed there is a multi-collinearity issue in the model.

The results show that there is a positive relationship between green product awareness and the purchase intention. The findings support the findings (Chen & Chang, 2012) and confirmed that awareness about green producs, create positive perception in customers’ mind.

This study proves that the relationship between green product trust and purchase intention is positive. The finding of this study support the findings of (Lee, Park, & Han, 2011). In their researches, they found that green product trust is a determinant of purchase intention of customers and consumer behavior and trust are the major determinants buyer-seller relationship.

However, the findings of this research reveal that that there is a negative relationship between green product image and the purchase intention. The results of this study differ from previous research. (Mourad & Ahmed, 2012) found that there is a significant positive relationship between green product image and purchase intention of customers. This could be due to the lack of clear brand image.

This study proves that green product benefits positively influence on customers’ purchase intention. The findings support the findings of (Bahl, 2012). Green banking reduces paperwork, creates awareness to business people, helps sanction of loans at comparatively less rates and maintains environmental standard of lending. Cost saving is one of the important benefits of green banking.

This study proves that there is positive relationship between green perceived value and purchase intention. The findings support the findings of (Doszhanov & Ahmad, 2015). Therefore, there is a good opportunity for organizations to highlight the value of their products to enhance customers’ intention to use environmental friendly products.
The findings of this research explored that there is a positive relationship between green product security and privacy and purchase intention and this conclusion is same as the conclusion of research by (Bahl, 2012). Customers prefer Automated Teller Machine (ATM), Cash Deposit Machine (CDM) among the E-banking products as the reason of its effectiveness and user friendliness.

**Conclusion**

The study has implications for both bank management and academicians. By adopting an appropriate methodology and ensuring reliability and validity, the study has a sound basis for both theoretical and managerial implications. Empirically, this study explores the existing green banking practices in people’s bank, Sri Lanka. The conceptual framework developed through this study provides an effective tool to measure green banking purchase intention. Researcher has mentioned following policy directions to promote green banking. The bank should change their routine operations though the adoption of paperless/green banking, green credit and debit cards made up of recycled plastic and efficient use of resources. Furthermore, customers are mostly addicted with the newest technology. It has become the major source of awareness that banks can promote their services among people. Therefore, bank’s webpages and social media pages should be daily updated with latest innovations and information related to the green banking offers. It will guide the customers to invest in the bank repeatedly. Moreover, Government should encourage banks and enterprises to invest more and more green investments and products especially credit support to promote green product investments. In Sri Lanka, there is lack of facilities in rural area. Therefore, government should pay their attention and should provide enough facilities in order to enhance knowledge about green among rural people.

**References**


The Impact of Trade Liberalization on Carbon Dioxide Emissions: Evidence from Sri Lanka

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Introduction

Trade and environment relationship is one of the most debated and researched topics in recent environmental economics studies. Proponents of globalisation argue that trade-induced economic growth increases the demand for cleaner environment, hence shifts firms towards environmental friendly techniques of production. However, environmental economists dispute that increased production in global trade is depleting natural resources and rising pollution emissions and consequently deteriorating environmental quality (Baek et al., 2008).

Ever-increasing CO₂ emission is a key factor of human induced climate change and global warming during last decades. Energy consumption throughout the different stages of production and transportation of tradable goods and services is necessarily associated with CO₂ emission. Hence the impact of globalisation on CO₂ emission is a widely discussed topic in the trade and environment literature (Naranpanawa, 2011; Ubaidillah et al., 2013).

In this context, the main research problem highlighted in this study is potential for trade liberalization, energy consumption and economic growth to increase environmental pollution.

Sri Lanka is taken as a case study, in order to analyse this relationship. Sri Lanka liberalized its trade policy in late 1970s and currently known as one of the most open economies in the region (Naranpanawa, 2011). Per capita CO₂ emission in Sri Lanka has been showing an increasing trend since 1990s³. However, according to the Environmental

³ See Figure 1
Performance Index (EPI)$^4$, Sri Lanka ranked 69$^{th}$ place, being the best in air quality management in South Asia. Therefore, this study aims to test the impact of trade openness, energy consumption and economic growth on CO$_2$ emission in Sri Lanka and to provide a clear understanding about this relationship.

![Figure 1: CO$_2$ emissions in Sri Lanka (Metric tons, Per capita)](source: World Development Indicators (The World Bank, 2014))

**Methodology**

This study used annual data for the period of 1977 to 2011. Data sources are annual reports of the Central Bank of Sri Lanka and World Bank development indicators. Journal publications, working papers, textbooks and blog posts are the source of supporting information. The variables in this study are Gross Domestic Product (GDP), Trade Openness (total trade as a % of GDP), Per capita Carbon Dioxide (CO$_2$) emission and per capita energy consumption.

An econometric analysis is conducted to achieve the main objective of the study. Unit root tests followed by a cointegration test and error correction mechanism are selected as the key econometric tools.

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$^4$ A Global Environmental Assessment Index in terms of air quality management in the country.
Main econometric method employed in this study is ARDL model for cointegration. According to the ARDL model following unrestricted regression equation is formulated under the bounds test approach:

\[
\Delta \ln CO_{2t} = \alpha_0 + \sum_{i=0}^{p} \alpha_{1i} \Delta \ln CO_{2t-i} + \sum_{i=0}^{p} \alpha_{2i} \Delta \ln EN_{t-i} \\
+ \sum_{i=0}^{p} \alpha_{3i} \Delta \ln Y_{t-i} + \sum_{i=0}^{p} \alpha_{4i} \Delta \ln TO_{t-i} \\
+ \alpha_5 \ln CO_{2t-1} + \alpha_6 \ln EN_{t-1} + \alpha_7 \ln Y_{t-1} \\
+ \alpha_8 \ln TO_{t-1} + \varepsilon_{1t}
\]

Where CO₂ is per capita CO₂ emissions, Y is per capita income, TO is trade openness; foreign trade as a percentage of GDP, EN is per capita energy consumption, ln(.) is the logarithm operator, \(\Delta\) is the first difference operator and \(\varepsilon_t\) is the error term.

According to Pesaran, Shin, & Smith (2001), the bounds testing procedure is based on the F or Wald-statistics and is the first step of the ARDL cointegration method. The first step in the ARDL bounds approach is to estimate the equation by ordinary least squares (OLS). A joint significant F-test of the lagged level variables in equations is used to test the presence of cointegration.

The null hypothesis of no cointegration among the variables in equation 4 can be defined as;

\[ H_0: \alpha_6 = \alpha_7 = \alpha_8 = \alpha_9 = 0, \]

against the alternative hypothesis of

\[ H_1: \alpha_6 \neq \alpha_7 \neq \alpha_8 \neq \alpha_9 \neq 0, \]

The variables are said to be cointegrated if the null hypothesis of no cointegration is rejected; otherwise the variables are cointegrated and there is a long-run equilibrium relationship among variables.
Results and Discussion

This study employed the Augmented Dickey-Fuller (ADF) test for unit root introduced by Dickey and Fuller (1979). The null hypothesis of non-stationarity (presence of unit root) against the alternative hypothesis of stationarity (no unit root) was tested using ADF test and results are displayed in Table 1 in the annexure.

It is evident in the unit root test that time series are a mixture of I (0) and I (1). Thus it confirms that ARDL bounds test is suitable to be applied for cointegration analysis. It is recommended by Pesaran, Shin, and Smith (2001) and most of the researchers. They have emphasized that ARDL bounds test is the most suitable method for cointegration with purely I(0) or I(1) or fractionally integrated variables.

Table 1 presents the F-statistics taken from bounds test. Each variable is taken as the dependent variable in the ARDL model and joint significance is tested.

Table 1: Results of bounds test for cointegration

<table>
<thead>
<tr>
<th>ARDL Model</th>
<th>Constant with a time trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>$F_{CO2}(CO2</td>
<td>TO,EN,GDP)$</td>
</tr>
<tr>
<td>$F_{EN}(EN</td>
<td>CO2,TO,GDP)$</td>
</tr>
<tr>
<td>$F_{TO}(TO</td>
<td>CO2,EN,GDP)$</td>
</tr>
<tr>
<td>$F_{GDP}(GDP</td>
<td>CO2,EN,TO)$</td>
</tr>
<tr>
<td>95% critical bounds</td>
<td>3.38 - 4.23</td>
</tr>
</tbody>
</table>

Source: Author's computation based on data taken from WDI (The World Bank, 2014)

According to Table 1, when CO2 emission is the dependent variable, F-statistic is 4.534918. This F-statistic is higher than the 95% upper bound critical value and it falls below the 95% lower bound critical value. This implies that the null hypothesis of no cointegration can be rejected in the model.

The estimated long-run coefficients of the ARDL model (see table 2 in the annexure) imply that the long-run elasticity of trade openness to CO2

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5 Hossain (2012), Halicioglu (2008), Banda and Padmasiri (2014)
emission is 0.86 while, the short-run elasticity of trade openness to CO₂ emission found from the error correction model is (negative) 0.32. This reveals that the trade openness is not favourable for environmental quality in Sri Lanka, because the long-run elasticity of CO₂ emission with respect to trade openness (0.86) is higher than the short-run elasticity of 0.32.

Conclusions

According to the results of bounds test and long-run coefficients taken under ARDL model, the long-run elasticity of CO₂ emission with respect to trade openness (0.86) is higher than the short-run elasticity of 0.32. It implies that more open trade or higher trade liberalization in Sri Lanka will increase emission of more Carbon Dioxide. As a result, the environment will be further polluted. Though, Naranpanawa, 2011 concludes that trade liberalization has not significantly contributed to generation of CO₂ emissions in Sri Lanka during 1977 to 2016, currently most of the top traded goods (both exports and imports) are pollution intensive (apparel, machinery, plastic and etc). Therefore, there exhibit a positive relationship between international trade with the increasing trend of CO₂ emission in the country.

According to the estimated long run coefficients using ARDL model, significant positive long-run relationships of income with the CO₂ emission and energy consumption with CO₂ emission leads to a conclusion that economic growth is pollution intensive in Sri Lanka.

According to the results and findings of this study, trade openness has a detrimental effect on environmental quality of Sri Lanka by increasing Carbon Dioxide emission. Sri Lankan policy makers should incorporate environmental concerns into the macroeconomic policies to reduce the Carbon Dioxide emissions in order to achieve sustainable economic growth.

Weak energy conservation policies lead excessive energy consumption in the process of economic development and result in more
environmental pollution. Therefore, the research and investment in clean energy must be an important pollution control tool. Moreover, environmental protection must be considered in the fiscal policy.

**Reference**


Annexure

Table 1: Augmented Dickey-Fuller Unit Root Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level (Intercept and Trend)</th>
<th>First Difference (Intercept and Trend)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Test statistics</td>
<td>Probability</td>
</tr>
<tr>
<td>LNCO2</td>
<td>-5.545616 (5)**</td>
<td>0.0005</td>
</tr>
<tr>
<td>LNEN</td>
<td>-1.666055 (0)</td>
<td>0.7443</td>
</tr>
<tr>
<td>LNT0</td>
<td>-3.709690 (0)**</td>
<td>0.0353</td>
</tr>
<tr>
<td>LNGDP</td>
<td>0.443145 (0)</td>
<td>0.9986</td>
</tr>
</tbody>
</table>

*** indicates significance at 1% level
** indicates significance of 5% level
The numbers in brackets are the lag length. The lag length for ADF test is selected according to Akaike information criterion.

Source: Author’s computation based on data taken from WDI (The World Bank, 2014)

Table 2: The estimated long-run coefficients using ARDL approach

<table>
<thead>
<tr>
<th>Dependent Variable is lnCO2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regressor</td>
</tr>
<tr>
<td>LnEN</td>
</tr>
<tr>
<td>lnTO</td>
</tr>
<tr>
<td>lnGDP</td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td>T</td>
</tr>
</tbody>
</table>

Source: Author’s computation based on data taken from WDI (The World Bank, 2014)
Effect of Rainfall on Business Performances
(with Special Reference to Tea Factories in Down South (Galle District) in Sri Lanka.)


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Introduction

The tea industry plays a significant role in Sri Lankan economy in terms of foreign exchange earnings and providing employment opportunities. For more than a century, the tea industry was the main employment provider, the main source of foreign exchange and the main source of government revenue. This study assesses the relationship between rainfall and Tea factory business performance last few years. Sri Lankan Tea industry faced so many natural disasters. Such as Drought, flood, cyclone, landslide etc. In order to that situation Tea factory owners stranded the lot of problems according to their factory performance. In today one of the biggest concerns for tea factories are to improve their productivity, sales value, profit, labours, investment representing the effective and efficient conversion of resources determining business profitability. Productivity is the one of the most important factors that affects overall performance of any small or medium or large service sector. There are number of factors that directly affect the productivity of tea industry, thus it is important for any organization to study and identify those factors and take appropriate actions for improving the tea factory productivity. Not only productivity but also other performances. The net foreign exchange earnings of tea exceed 80 percent of the total value, in contrast to other export industries like garments, which contribute to less than 20 percent of net export earnings (Ganewatta 2002). In 2008, for the first time in the history of Sri Lanka, export earnings from tea exceeded the one billion US$ benchmark, Sri Lanka is the first producing country to achieve this feat. Sri Lankan tea industry took more than 17 years to double its earnings. The main contributory factor for this achievement was the high tea prices. Despite the fact that
the Sri Lankan tea industry was once pre-eminent in the world, it has been going through intermittent crises for a long time due to problems related to low productivity and the high cost of production (Jayasuriya, 1998). Recent studies on the Sri Lankan tea industry have identified several problems that Sri Lanka is currently facing such as stagnant area under tea, low productivity, lower replanting rate, higher cost of production and shortage in labor supply & claims that the major challenges that the tea industry faces are, raising productivity and remaining competitive. (Jayasuriya, 1998).

**Research Problem**

The Sri Lankan tea industry is facing many problems such as stagnant area under tea cultivation, low productivity, and lower replanting rate, high cost of production and shortage of labor. In particular, Sri Lanka’s share of world production and world export are gradually decreasing. These may be the signs of losing competitiveness in the global tea market. Thus, this study mainly will focus on assesses the relationship between rainfall and Tea factory business performance. The empirical study helps to Climate change is an important environmental issue and impacts greatly tea on growth and production as tea is mainly grown under rain-fed mono-cropping systems and weather conditions determine optimal growth. The effects of rainfall on the tea economy or affected the natural disasters for the tea factories business performances is studying main role of this research & it helps to take predictions to stand successfully for rainfall.

**Objectives**

*Main objective*

To the identify effect of rainfall on tea factory business performance in Galle district in Sri Lanka.
Sub Objectives

- Explore the effect of rainfall on tea factory production, profit, tea price, monthly tea rate & labours in order to ex-ante & ex-post time periods.
- Identify reaction for climate changing & how effected it to the socio economic impact of between private & government tea factories.

Methodology

Buffering method which is used in geography applied as the sampling method. Line buffering method used select tea factories and data collected from 2012 to 2016. Monthly rainfall considered as the independent variable and monthly production, profit, tea rate, labours and tea price considered as dependent variables in panel data analysis. It is highly considered the incensement or decrement of business performances in tea factories near river “Gin Ganga” area for the selecting sample. Line buffering or linear buffering methods are used for this study to delimitate all the tea factories from Gin Ganga to 20km far away from it are taken into consideration for the sample. This study based only secondary data and used all the relevant financial data obtained in annual financial reports of selected tea factories for the period from 2012 to 2017 (monthly data).

The research study is based on the relationship between the rainfall and the profit of the tea factories, production of tea factories, working average of labours, monthly tea rate, and monthly market price. And also, the relationship between Climate changing factor (rainfall) and Business Performances (profit, production, labours, market, and price) of the selected tea factories; researcher used the Panel Data Regression Model for statistical analytical techniques.

Results and Discussion

To cultivate tea ideally the annual rainfall should not fall below a minimum of around 1250mm. And also, tea plant does not like too much
sunlight, it is better suited to the more moderate 13-30C, insufficient of sunlight seriously retard growth whereas intermittent sunshine coupled with good rainfall will only affected a temporary drop in quality of tea production. At least four hours of sunlight is required daily. But tea industry always deals with good, soaking rains with alternating sunshine. Always it can be identified that rainfall is most effective to the tea factory business performances.

According to the correlation result there has negative relationship between rainfall and tea rate. Simply if the tea rate increases it will have a negative impact on the rainfall. But it is not significant. Correlation results between rainfall and production, labour, profit, market tea price, shows positive relationship as 0.012, 0.043, 0.009, 0.014 respectively with a p-value of (0.098, 0.176, 0.789, 0659). It implies that there is a positive relationship between these variables and it is not significant at 1% level. This indicates that there is not any relationship with each other. Correlation results between production and labour, profit shows positive relationship as 0.702, 0.968 respectively with p-value of (0.000). It implies that there is a positive relationship between these two variables and it is highly significant at 1% level. This indicates that there is a relationship with each other. And also, there is no correlation between production and rainfall. But there had a negative relationship between each other. According to that it can be assumed a negative relationship which implies that if rainfall is increased during that period, tea production will be decreased. When rainfall is decreased, tea production will be increased. Finally, it can be concluded that rainfall is the most affected to the tea industry and also it cannot be controlled.

Negative relationship between monthly average rainfall and monthly average tea rate. It implies that as rainfall increases, the monthly tea rate decreases, and negative slope is seen on the scatterplot line.

\[
production = 89429.9 + 1.9775(RPL) - 1249.901(TEA RATE) - 3.6591(RAINFALL) + u_{it}
\]

According to above equation, pooled regression model is significant (Pro > F= 0.000) at 5% significance level. Pooled regression production and rainfall have negative relationship. It implies that even rainfall
increased and then production is decreased. But that coefficient not statistically significant at the 5% significant level. According to robust test, coefficient of Ratio of Profit per Labour and tea rate are statistically significant (p value = 0.000) at 5% significant level. After avoiding heteroscedasticity, coefficient of rainfall p value was changing but it was insignificant. It could be clearly identified the confidence interval lie between -20.06 and 12.75. Finally, researcher could be concluded that pooled regression model was significant at 5% significant level after avoiding heteroscedasticity situation.

\[
\text{Production} = 111602.8 + 1.62905(\text{RPL}) - 1299.226(\text{Tea Rate}) - 2.2943(\text{Rainfall}) + u_{it}
\]

Fixed effect regression model is significant (Pro > F= 0.000) at 5% significance level. The coefficient of determination ($R^2$) in this linear regression model is equal to 77.9%. It means this fixed effect regression model is significant. Comparing pooled regression model and fixed effect regression model, according to the F test researcher can be concluded that fixed regression model was higher significant than pooled regression model. In the fixed model regress rainfall and production had negative relationship and production also regressed positively with tea rate and ratio of profit per labour.

Breusch-Pagan Lagrange multiplier (LM) testing the two way random effect, and reject null hypothesis. Because of that prob > chi = 0.000 and also in here rho=0.7738, 77.38% of the variance is due to differences across panels. "rho" is known as the intraclass correlation. It means researcher could be identify most suitable model is random effect regression model. A negative relationship between rainfall and production, positive relationship between Ratio of Profit per Labour and production, and again negative relationship with monthly average tea rate. So finally concluded that rainfall negative impact on monthly average tea production and also indirectly, it affected to the other factors.
Monthly rainfall considered as the independent variable and monthly production, profit, tea rate, labours and tea price considered as dependent variables in panel data analysis.

Clearly identified that May, September, October, and November are heavy rainfall while December, January, February, & March have relatively low rainfall situation.

Since high variation of tea production could be seen in these months followed by tea rate and tea prices especially in last few years. Concerning on to the labours who are normally working in the tea land were more preferred to work in tea factory during the rainy period.
Conclusion

In this research concerning on to the labours who are normally working in the tea land were more preferred to work in tea factory during the rainy period. But at the normal climate situation tea factory labours try to enter to the plantation field. There is negative relationship between rainfall and tea production whole the tea price and Ratio of Profit per Labour has a positive relationship. As a conclusion, it is person that the owners of tea factories have to face a lot of issues because of heavy rain. So the labours, purchase price and selling price are highly influenced through tea production.

Further, Random effect model under panel data regression techniques selected as the best model for the analysis out of polled and fixed effect regression models based on F test, LM test and Hausman test. The result indicated that rainfall has an insignificant negative relationship with production. Production has a significant positive relationship with labour while monthly tea rate has a significant negative relationship as expected.

References


Framing Macroeconomic Policies
Structure of Sri Lanka’s Transport Sector and its Sustainability:
A Political Economic Perspective

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Introduction

Can per capita private vehicle ownership or usage of private vehicles be considered as indicators of sustainability of transportation development in a country? Evidence found in literature suggests that they are not: Private vehicle ownership, in developing nations with high population densities in particular, would be detrimental towards the three pillars of sustainability (Munasinghe, 2007), namely the economic, social, and environmental constructs. Economic sustainability in transportation would reflect through cost efficiency of transport operations, the degree of foreign dependence for inputs and healthy investments without compromising national sovereignty. Social sustenance would be determined by the equitability of access to transport services, explained in terms of broad-based availability of motorized modes of transport at affordable costs. The environmental sustenance requires minimised negative externalities such as congestion, pollution, carbon emission, number of accidents, etc.

Not all modes of transport are equally sustainability-oriented. The differences do exist between public modes and private modes, as well as between road-based modes and railway mode. It will be the modal mix that determines the overall degree of sustainability orientation of the transport system of a country. A conducive policy framework thus becomes necessary in view of improving the system’s sustainability by way of promoting those modes which are more “sustainability oriented.”
Objective

This research was conducted with an objective of (a) appraising among different modes of motorized transport in Sri Lanka to gauge their sustainability orientation, and (b) examining as to what extent the Government policies on transportation have been conducive towards promoting sustainability drivers.

Methodology

While it is recognised that many different factors impact on the three dimensions of sustainability, the case of fuel inputs was selected for the present analysis. Fossil fuel consumption being a variable that has direct impact on economic aspects (by way of imports, and efficiency of usage, among others) as well as on environmental aspects (mainly through emissions), this choice was purposeful. Once the levels of sustainability orientation were perceived, attempts were made to understand to what extent the policy instruments have effectively been promoting sustainability drivers. Public investment over the years was used as a ‘policy proxy’, which reflects the public push towards future development of these respective modes. Sri Lanka Railways (SLR), State bus transport services (SLTB) and the Road Development Authority (RDA) were used as organisations for the comparative examination. Data required were sourced from literature, as well as from the Annual Reports of the Central Bank of Sri Lanka. Graphical representation and political economic reasoning were used as analytical methods.

Results

Literature revealed that transport modes having high carrying capacity, would be more economical in terms of fuel consumption intensity, and thereby less emission intensive. This could be explained by the economies of scale, which lowers specific input costs (Figure 1).
The fuel efficiency in railway service is the highest among motorized modes, while private and road-based smaller vehicles have high fuel intensities. This shows that public transport, and railways in particular, would be more sustainable in terms of their impact on operating cost economics, on the country’s Balance of Payment, and, thereby, on foreign debt. Lesser fuel consumption intensity would necessarily imply greater environmental friendliness by way of reduced emissions. A particular case of railway fuel economics for Sri Lanka could be found in literature (Gunaruwan & Sannasooriya, 2013), where shifting petroleum bulk transportation from road vehicles to railway mode would bring fuel economics to the tune of 1.17 million litres a year resulting in emission reduction of nearly 4000 Tonnes. At the angle of social sustenance, bus services operated by the Sri Lanka Transport Board (SLTB) were found to be equally or more significant determinant (compared to health or education proxies) in explaining Sri Lanka’s Physical Quality of Life Indices (PQLI) between 1958 to 1988 (Gunaruwan & Jayasekara, 2015). Thus, it is clear beyond doubt that public transport and railway transport are much more sustainability driving, in all three dimensions, than private and road-based motorized transportation. It becomes therefore necessary that the usage of such sustainability-oriented transport modes be promoted and developed, and that any policy intervention to the sector by the Government should be geared towards this.
In the light of this result and the strategic insight, the patterns and trends of public investment were examined as a proxy reflecting State intervention. The results in the graphical form are depicted in the Figure 2.

Results clearly indicated that public investment expenditures on road development have been increasing rapidly (with peaks possibly representing Expressway costs), while the capital formation in favour of Railway and SLTB remains very low, and almost stagnant. This happens amidst of very high road density in Sri Lanka (which stood at 1.6 km of roads per every square kilometer in 2009) compared to that of other countries in the region (CBSL, 2009).

The outcome of the study therefore suggests that the policy orientation of successive Governments de-facto encouraged the use of private modes of transport and road transport, when sustainability objective demands the opposite.

**Conclusions and Policy Implications**

Based on the study findings, Sri Lanka’s transport sector could not be recognized as sustainability-oriented. Instead of correcting the situation, the Government appears to be further promoting private ownership, use of private vehicles by providing expressways and other
road infrastructure at heavy costs to the public coffers. Building expressways at high capital expenditures sourced through borrowings, if full cost recovery from users is not envisaged, would be highly inequitable, and thus not socially sustainable. This is because, the Expressways would exclude low income earners from benefitting from the Expressway usage (as no three-wheeler or motor cycle is permitted on Expressways), while their maintenance and loan servicing costs are funded through indiscriminately earned indirect taxes.

The government therefore has to intervene strategically to rationalize its policies to incentivize users to switch to sustainable modes of transport such as Railway and SLTB. Improved railway and State bus transportation will attract more commuters and more national economics could thus be solicited. By that way only that the transport system in Sri Lanka could be re-oriented towards sustainability.

References


The Long Run Relationship between Stock Prices and the Exchange Rate:


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Introduction

The growing integration and the rapid financialization of economies have paved the way to investigate the implications of exchange rate volatility on the stock markets across the world (Basarir, 2018), (Sikdar, 2013), (Aydemir and Demirhan, 2009), (Aggarwal, 1981). Adding to that the recent trade tensions between USA and China and the interest rate hike in USA have resulted in depreciation of the exchange rate in many currencies. Given these circumstances it is timely important to examine the possible implications of these developments on stock markets in developing countries.

In fact, there have been number of studies to analyze the relationship between the exchange rate volatility and stock prices. For instance, Granger et al. (1998) in his study on “a bivariate causality between stock prices and exchange rates” concluded that there was an indicative long run relationship between the two variables for Japan and Thailand, while there was no such relationship for Singapore. Some other studies have also found that there is a positive impact of exchange rate changes on stock market. (Aggarwal, 1981) On the other hand, Nieh & Lee, (2001) concluded that there is no long-run relationship between stock prices and exchange rates based on their study on G-7 countries for the period of 1993 – 1996. However recent studies done by Basarir, (2018) on Turkish economy points out that there exists a bidirectional causality between exchange rate and stock prices. These findings are in par with Morales’s, (2007) findings on selected transitional economies.
The literature provides few theoretical approaches to the links between stock prices and exchange rates. The Stock Valuation Model (Ibrahim, 2000) and the Portfolio Allocation Models of exchange rate are among the most highlighted theories.

According to the Stock Valuation Model, “the current stock prices represent the discounted present value of the firm's expected future cash flows” (Ibrahim, 2000). Therefore, expectation of either reduction or rise in the future cashflows due to external factors such as development in the economy that influences the firm's cash flows will have a bearing on the firm's stock prices. Ibrahim argues in particular, for an economy that is highly export oriented and dependent on imported inputs, such as Malaysia, fluctuations in the exchange rate are generally viewed to be important.

The portfolio allocation model of exchange rate argues that an increase in the real balance will result in an increase in interest rates. Accordingly, domestic financial assets will become more attractive compared to foreign assets (Qiao, 1996). Consequently, individual investors or firms will adjust their domestic and foreign asset portfolios by demanding more domestic assets and this leads to an exchange rate appreciation and vice versa.

**Research Problem**

The empirical evidence found in literature reflects that there is no consensus among economist on the relationship between the exchange rate volatility and stock prices; thus, leaving space to further investigate the area. Besides, the relationship has not yet been studied intensively in the Sri Lankan context, despite its importance to the country’s policy making. At the outset of the Sri Lankan economy, as argued by Ibrahim (2000) the export-oriented strategy is in the forefront of the country policy making since the introduction of the outward oriented strategies in 1977. Adding to that, major exports products such as apparels are highly depending on imported raw materials. Therefore, it is palpable that a research in this area is topically important. The study was formulated to examine the quest of whether there exists a long run
relationship between exchange rate and stock prices in the case of Sri Lanka.

Objectives

The main objective of this study is to identify the actual relationship between exchange rate and stock market prices in a small open economy. Thereby, achieve the supplementary objective; which is to identify the degree of the impact of exchange rate volatility on stock market and thereby present policy recommendations to mitigate the adverse impacts of future complications that would arise from the dynamic impacts of present international economic developments.

Methodology

The study was conducted using secondary data compiled from Central Bank of Sri Lanka and Colombo Stock Exchange. The monthly data were gathered for a period of seven years starting from 2010 to 2017 with monthly data. Initially, the Augmented Dickey-Fuller Unit Root Test was conducted to check the stationarity qualities of the variables. The study did not deploy bivariate mechanism of co-integration used in conventional studies (see, for instance, Bahmani-Oskooee 1992; Qiao 1996; and Abdalla and Murinde 1997) considering its inaccuracy in determining relationships in macro-level studies. Therefore, the study used the Multivariate framework of co-integration employing the Johansen’s Co-integration test.

The exchange rate, money supply and interest rare were used as the regressors and stock prices as the regressand to identify any existence long run relationship between the variables. M2 (Broad Money Supply) definition of money⁶ was used as the proxy for money supply(\(LNMS_M2\)) and Weighted Average Fixed Deposit rate was used as the proxy for interest rate (\(LNAWFDR\)), American $ and LKR

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⁶ Broad Money Supply (M2) = Narrow Money Supply (M1) + Time and Savings Deposits held by the Public with Commercial Banks
(Narrow Money Supply (M1) = Currency held by the Public+ Demand Deposits held by the Public with Commercial Banks)
exchange rate was used to capture the exchange rate impact (LNREE) and All Share Price Index of Colombo Stock Exchange was used to capture the share prices (LNASPI). All the variables were converted to natural logarithms to avoid any heteroscedasticity problems.

Finally, the Granger causality test was conducted to identify the direction of the causality.

**Results and Discussion**

A set of variables is said to be co-integrated if they are individually non-stationary and integrated of the same order, and yet their linear combination is stationary. Having established that each of the series is non-stationary, as illustrated in Table 1, the co-integration analyses of the variables were performed. ADF test that was used to examine the Stationarity of the variables was constructed as follows;

\[
\Delta Y_t = \theta_1 + \delta Y_{t-1} + \sum_{t-1}^{k} \Phi \Delta Y_{t-1} + \varepsilon_t
\]  

(1)

Where \( \varepsilon_t \) is an IID (Independently and identically distributed innovation term)

Based on the maximum likelihood estimation of the vector Auto-regressive (VAR) model, worked out adopting the Johansen-Juselius (JJ) procedure of cointegration test, two statistics, namely the Trace and Maximal Eigenvalue were calculated to test for the presence of “r” co-integrating vectors.

**Table 1:** Results of Augmented Dickey-Fuller Unit Root Test

<table>
<thead>
<tr>
<th>Variables in their respective Differences with intercept (at 1st difference)</th>
<th>ADF Statistic</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNREE*</td>
<td>-8.53</td>
<td>Reject Null hypothesis of no unit root</td>
</tr>
<tr>
<td>LNAWFDR*</td>
<td>-2.73</td>
<td>Reject Null hypothesis of no unit root</td>
</tr>
<tr>
<td>LNMS_M2*</td>
<td>-4.23</td>
<td>Reject Null hypothesis of no unit root</td>
</tr>
<tr>
<td>LNASPI*</td>
<td>-9.17</td>
<td>Reject Null hypothesis of no unit root</td>
</tr>
</tbody>
</table>

Note: Level of significance: *at 1%.

Source: Authors’ calculations.
Upon establishing the foundational relationship to validate the stock valuation and portfolio allocation models, a multivariate co-integration analysis was conducted based on the function provided by incorporating above specified economic variables.

\[ LNASPI_t = \theta_1 + \theta_2 \text{LNREE}_t + \theta_3 \text{LNAWFD}_t + \theta_4 \text{LNMS}_M 2_t + \varepsilon_t \]  

(2)

Table 2: Results of Johansen’s Multi-variate Co-integration Test

<table>
<thead>
<tr>
<th>Hypothesized Number of Co-integrating Equations</th>
<th>Eigen Value</th>
<th>Trace Statistics</th>
<th>Critical Value at 5% (p-value)</th>
<th>Maximum Eigen Statistics</th>
<th>Critical Value at 5% (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None*</td>
<td>0.32</td>
<td>91.33</td>
<td>54.07 (0.00)</td>
<td>36.65</td>
<td>28.58 (0.00)</td>
</tr>
<tr>
<td>At Most 1*</td>
<td>0.28</td>
<td>54.67</td>
<td>35.19 (0.00)</td>
<td>30.85</td>
<td>22.29 (0.00)</td>
</tr>
<tr>
<td>At Most 2**</td>
<td>0.15</td>
<td>23.81</td>
<td>20.26 (0.01)</td>
<td>15.83</td>
<td>15.89 (0.05)</td>
</tr>
<tr>
<td>At Most 3**</td>
<td>0.08</td>
<td>7.97</td>
<td>9.16 (1.08)</td>
<td>7.97</td>
<td>9.16 (0.08)</td>
</tr>
</tbody>
</table>

Note: * and ** denotes rejection of the hypothesis at 0.05 and 0.10 level of significance, respectively.
Source: Author’s calculations.

Furthermore, the existence of co-integration implies the existence of Granger causality at least in one direction (Mishra, 2011). The presence of co-integration between exchange rates and the stock prices suggested the suitability of using standard Granger causality test for the purpose as the application of the Granger causality framework confirms the existence of a long-run causality between the identified variables. The directions of causation were examined based on the following equation:

\[ \Delta Y_t = \theta_1 + \sum_{t-1}^{k} \theta \Delta Y_{t-1} + \sum_{j=0}^{p} \Phi \Delta X_{t-j} + \varepsilon_t \]  

(3)

Accordingly, sufficient evidence was available to identify that Interest rate granger causes performance of stock prices while, stock prices in-turn granger causes Exchange rate performance during the period of study at 10% level of significance.
Table 3: Results of Johansen’s Multi-variate Co-integration Test

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>F-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNAWFDR does not Granger Cause LNASPI**</td>
<td>2.67810</td>
<td>0.0739</td>
</tr>
<tr>
<td>LNASPI does not Granger Cause LNAWFDR</td>
<td>2.23474</td>
<td>0.1126</td>
</tr>
<tr>
<td>LNMS_M2 does not Granger Cause LNASPI</td>
<td>0.88367</td>
<td>0.4167</td>
</tr>
<tr>
<td>LNASPI does not Granger Cause LNMS_M2*</td>
<td>3.20800</td>
<td>0.0449</td>
</tr>
<tr>
<td>LNREE does not Granger Cause LNASPI**</td>
<td>1.42150</td>
<td>0.0967</td>
</tr>
<tr>
<td>LNASPI does not Granger Cause LNREE**</td>
<td>2.43566</td>
<td>0.0933</td>
</tr>
<tr>
<td>LNMS_M2 does not Granger Cause LNAWFDR</td>
<td>0.14531</td>
<td>0.8649</td>
</tr>
<tr>
<td>LNAWFDR does not Granger Cause LNMS_M2</td>
<td>1.31929</td>
<td>0.2722</td>
</tr>
<tr>
<td>LNREE does not Granger Cause LNAWFDR</td>
<td>0.35627</td>
<td>0.7013</td>
</tr>
<tr>
<td>LNAWFDR does not Granger Cause LNREE</td>
<td>0.25044</td>
<td>0.7790</td>
</tr>
<tr>
<td>LNREE does not Granger Cause LNMS_M2</td>
<td>0.53238</td>
<td>0.5890</td>
</tr>
<tr>
<td>LNMS_M2 does not Granger Cause LNREE</td>
<td>1.26921</td>
<td>0.2860</td>
</tr>
</tbody>
</table>

Note: * and ** denotes rejection of the hypothesis at 0.05 and 0.10 level of significance, respectively.
Source: Author’s calculations

Another significant finding in this context is that during the identified period, stock prices granger causes money supply in the country affecting levels of inflation. The most critical finding of the study confirms the validity of the two models highlighted in the theoretical background as there is sufficient evidence to embrace that Exchange rate granger causes stock prices in Sri Lanka.

These finding provide sound foundations for policy makers to focus on both medium and long-term policies in order to effectively manage the exchange rate to avoid adverse implications on stock prices.

Conclusion

The study deployed Johanson co-integration test to investigate the long run comovements between the exchange rates and the stock prices in Sri Lanka to understand how exchange rate volatility affect stock prices. The research out put indicates the existence of co-integration relationship between the variables used in the study. It also revealed that the exchange rate Granger causes stock prices. These findings are consistence with the stock valuation model as well as the portfolio management model.
These results reveal the critical connection between exchange rate volatality and stock prices in the context of Sri Lanka. The key policy inferences are that, being a small open economy a significant portion of the stock market investments in the country were from foreign investors and their investments decisions were directly influencing the country economy. However, the reality is Sri Lanka could not completely control the foreign capital as internal capital availability was limited and a significant portion was directed to finance fiscal deficit as well. Therefore, the policy makers should consider implementing capital controls as successfully experimented by Malaysia at the time of Asian Financial Crisis to minimize the adverse implications.

References


Industrial Development, SME's and Entrepreneurship
Problems Faced by Small and Medium Scale Enterprises in Rural Areas in Sri Lanka
(with Special Reference to Embilipitiya DS Division)

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Introduction

Small and medium enterprises (SMEs) have been identified as an important strategic sector for promoting growth and development of Sri Lanka. With the industrial revolution, there was a trend in establishing industries both locally and internationally. The profit maximization and cost minimization are major concerns in locating industries. The small and medium enterprises provide considerable contribution for the economy in both developing and developed countries. The Government of Sri Lanka recognizes SMEs as the backbone of the economy, as it accounts for more than 75% of the total number of enterprises, provides 45% of the employment and contributes to 50% of the Gross Domestic Production (GDP). The solutions for the burning issues, i.e. poverty, unemployment and income disparity could be found through the growth in SME sectors while establishing new industries could help in increase in the standard of living. However, it is possible to identify the regional disparity in the context of contribution of SME sector towards the economy.

Since by enhancing SMEs’ opportunities in the rural economy, the lives of many individuals and communities can be improved, they are much preferred to start up small scale business. However, the growth and expansion of SMEs are constrained by problems. The recent studies have found that the 50 percent of SMEs collapsed within the first year while 95 percent collapsed within the first five year due to practical issues. The lack of institutional support and policy inertia, credit allocation have further reduced the potential contribution of SMEs to the national economy. Thus, it is important to identify the issues of small and medium entrepreneurs and their respective policy implications.
The rural SMEs will face vivid difficulties and challenges when they are going to establish the new enterprises. The difficulties in obtaining initial capital investment, finding and entry into the market, competition in the market, scarcity of skilled labour, necessary technology guidance, waste management and availability of information, legal advice and basic infrastructure facilities are the present challenges. The SMEs are contributing a lot to the mainstream of economy of the country today. Therefore, due investigation and studies are to be done without further delay for their well-being. Many researchers have been done very recently by the experts in this regard. The same studies had been done and investigated in the SMEs industry of Malaysian economy (Sallem, Nasir, Nori & Kassim, 2017) and Tamilnadu State economy (Palanivel, 2016). The above mentioned problems too had been identified in the SMEs industry in Sri Lanka (Kankanamge & Dasanayake, 2011).

The main objective of the study was to identify the issues faced by the entrepreneurs in establishing the small and medium enterprises and specific objective was to identify the policy implications for the issues.

**Research Problem**

The SME sector plays a vital role in promoting growth and development in Sri Lanka. Hence, establishing small scale enterprises helps promoting growth process in rural sector. However, the growth and expansion of SMEs are constrained by problems. So, it is important to identify the issues of small and medium entrepreneurs to develop the industrial sector and make policies. Therefore, the research problem is identifying the problems faced by small and medium scale enterprises in rural areas in Sri Lanka.

**Objectives**

*Main objective*  
- To identify the issues faced by the entrepreneurs in establishing the small and medium enterprises.

*Specific objectives*  
- To identify the policy implications for the issues.
Methodology

The study was mainly based on primary data and it was collected through the questionnaire survey. The sample included 60 entrepreneurs. It was selected from the industrial registration list of Embilipitiya Divisional Secretariat division based on random sampling method. The analysis was conducted under the descriptive method by using data tables, graphs and percentages in SPSS and Excel software.

Results and Discussion

It was found that the entrepreneurs in the rural sector faced different constraints in establishing the small and medium enterprises.

The study revealed that 30 percent of entrepreneurs were unable to get proper advice regarding the business management and 27 percent. One of the key issues in Sri Lanka is that there is neither clear government policy nor institutional support for a typical small and medium scale entrepreneur to be guided. Thus, it is important to take immediate policy implications to solve the issues in SME sector in Sri Lanka.

In the selected sample, the majority (higher %) of the small entrepreneurs say that they do not have proper institutions established in the industry concerned to get necessary supports and guidelines.
Therefore, the main problem they pointed out is the poor technical knowledge and management about the SME and the fees, terms and conditions at the time of business registration. The people in the rural areas engaged in the business do not have means to reduce the cost. They have happened to retain wastes in their premises themselves due to no proper systems of waste management.

How to use the capital investment in the business is another problem they face? In the production process, the usage of machines and tools are at the minimum level and they are very old and outdated. The poor road systems and other transportation issues are another issue to reduce their productivity level. Presently, the transport problem is being minimized because the new infrastructure facilities are provided considering the business aspects of the small entrepreneurs. Some proposals are given below how to develop the SME industry to next level minimizing the problems and risks.

The suggestions for promoting the small entrepreneurs are given below:

- Take policy actions to develop the infrastructure facilities in the rural area.
- Provide institutional support to eliminate the constraints in obtaining the capital.
- Design program to provide training to the laborers in small scale enterprises.
- Establish institutions and design programs to provide advisory services in a rural area.
- Introduce labor intensive and lost cost techniques.
- Encourage entrepreneurs to start up more labor intensive industries.
- Design proper techniques to utilize the raw materials properly and start up industries with close proximity natural sources.
Conclusion

According to the study carried out in Embilipitiya district, it was evident that majority of entrepreneurs have suffered different constrains which limit their growth potential. It is also evident that the institutional support towards small scale industries is at a very poor level. Since labor is an abundant factor and most of the industries are labor intensive, the issues in usage of capital have not been identified as a major constraint. In spite of various policy reforms and incentives offered by successive governments and with the assistance of various donor agencies, SME sector needs further assistance to give full contribution to the national economy.

References


Impact of Network Structure on Business Performance
(A Study of Micro Enterprises in Balangoda Area in Sri Lanka)
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Introduction
Micro enterprises (MEs) have been identified as an important strategic sectors in the economic development (Buganza, Colombo and Landoni, 2014). Although MEs contribute well for the economic development, they show a poor performance. Failure rate of MEs in the first five year ranges between 50% and 90% (Yeboah, 2015). Even in Sri Lanka, although a large number of government and private institutions directly involve in the development of MEs providing various supports (provide financial support, information, technological knowhow, marketing assistant and management training etc.), the sector has shown a poor performance. MEs are small and infant, they do not have sufficient resources, knowledge, skill and experiences. They expect external support to achieve growth. MEs use their informal and personal connections in order to get required resources. These informal and personal connections do not have formal and written agreement but these connections are based on network relationships (Premaratne, 2002; Priyanath, 2017). The key benefit of network is that it facilitates to reach information and resources (Burt, 1992). Thus, network relationship has an influence on business performance of MEs.

Research Problem
MEs usually have heavy resource limitations. Internally, they face shortages of capital, information, management and experience (Li and Qian, 2007). Externally, they face constraints that arise from uncertainty and opportunism. Due to both internal and external constraints, MEs expect support from others and develop relationships with others.
expecting to overcome such resources deficiencies. Scholars argued that the MEs expect support from their social network (family members, relations, friend, exchange partners and other firms, acquaintances and supportive network) in order to obtain resources (Premaratne, 2002; Priyanath, 2017). However, there is no prior empirical study in the literature relating to the interaction between network structure and business preference of MEs in Sri Lanka. The current study attempts to bridge this gap studying how network structure affects the business performance particularly MEs in Sri Lanka.

**Objective**

Main objective of the study is to explore the impact of network structure on business performance of MEs in Sri Lanka.

Specific objectives of the study are;
- To find out the effect of network density on business performance of MEs in Sri Lanka.
- To examine the effect of network size on business performance of MEs in Sri Lanka.

**Methodology**

This study comprises five research hypotheses with regards to two independent variables, one meditate, and one dependent variable. These hypotheses were tested on primary data gathered from 142 MEs located Balangoda Divisional Secretariat (DS) area in Sri Lanka. MEs which are classified according to 2 digit levels of ISIC-Revision, 4 (UNDP) were selected to gather data. Department of Census and Statistics in Sri Lanka defines MEs as ‘establishment less 4 persons engaged’ and the same definition was used to select MEs for the survey. There were 226 MEs dispersed in Balangoda DS area and the study employed those SEs as the study population. Then, using this sample frame, 142 of MEs were selected employing the sample size determination formula developed by Krejcie and Morgan (1970). The final survey was carried out using structured questionnaires and data were collected for it conducting face-to-face interviews with each respondent. The network size is simply
defined as the number of persons that SEs is directly connected to. This measurement was adopted by Bhagavatula (2009); Premaratne (2002). The network density is measured as the percentage of close relationships within the total number of possible relationships of the owner. This is adopted by Bhagavatula (2009); Burt (2000); Premaratne (2002). The performance was assessed by respondent’s opinion on their financial and non-financial performance as well as their satisfaction on this business career. Data were first evaluated with descriptive statistics and then using Partial Least Square.

Structural Equation Modelling (PLS-SEM) under two types of models; measurement model and structural model. Under this validity and reliability of higher and lower order constructs were measured. Collinearity diagnostics, the significance of path coefficients, evaluation of R2 value, effect size and predictive relevance were considered in evaluating the structural model.

Results

As expected, the study found that the network structure has a positive impact on business performance of MEs. Figure 01 shows that the network size of the owner of ME has a significant impact on business performance ($\beta = 0.333$ or 33 percent and $t$-value = 4.87) while the network density of the owner of ME has also a positive effect on business performance ($\beta = 0.163$ or 16 percent and $t$ value = 3.72) supporting hypothesis H1 and H2. The empirical results further prove that the network size and the dense of the owner of ME have a direct impact on increasing resources of ME. The results illustrate that network size of the owner of ME has a significant positive effect on the increase of the resources of MEs ($\beta = 0.371$ or 37 percent and $t$-value = 6.23) and also network density of the owner of ME positively affect the increase of resources of ME ($\beta = 0.568$ or 56 percent and $t$-value = 9.87) supporting both hypotheses H3 and H4. Path coefficients indicate that the resources are positively associated with the business performance of MEs ($\beta = 0.243$ or 24.3 percent and $t$-value 2.63). Thus, the result has been answered the hypothesis H5 showing that the resources have a positive influenced on the business performance of MEs.
Conclusion

The results revealed that both the network size and the network density of the owner of MEs have significant positive impact on business performance of MEs implying that the network structure plays a dominant role of the growth of MEs. The network size has a higher impact on business performance than the network density. The study found that access to resources increases with the existence of strong network structure. Both the network size and the network density have a significant positive influence on accessibility of resources. The effect of network size on increase to access resources is more powerful than the network density. The study recommends policymakers to develop approaches to provide necessary supports for MEs to improve their social relationship that helps to improve business performance. Government agencies, private sector and NGOs can maintain information services (through web pages, providing broad brand connections for SEs) to develop more connections among network members both in local and international markets.

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Future and Challenges of the Handloom Industry in Jaffna, Sri Lanka

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Introduction

The handloom sector carries a very rich heritage coming down over centuries of vibrant culture that of the Indus valley civilization. The handloom industries play a vital role in the economy of a country. This industry helps in the creation of ample opportunities of employment especially for the labor class. In Sri Lanka, weaving industry has a long history which goes beyond 543 B.C. Sri Lankan communities of handloom weavers are mainly from Kurunagala, Batticaloa, Ampara and Northern province. The productions of the handloom textiles are sarongs, bed sheets, towels, curtains, table linen, kitchen linen, readymade garments, soft toys, hand woven rugs, etc. Commonly these products are in good quality and texture and the products have a good demand in the open market and international level.

At present handloom sectors are facing multiple problems, challenges and many difficulties to run the handloom productivity. After the war, the handloom industry of Northern part of Sri Lanka faces lot of challenges and there is a need to revitalize the industry which is the livelihood for many families. This research focuses on the selected handloom industries in Jaffna and their problems and challenges for production and sales of handloom product in Jaffna region. All of the handloom industries are located in the rural areas in Jaffna, where both men and women are weavers for whom weaving is a way of life. Nine handloom industries are selected for this research purpose. Though the handloom weavers of Northern region carry a rich legacy of culture and hereditary skills, the challenges faced by them question the future of the handloom industry. There is a need for a revival.
**Research Problems**

Textile industry in Sri Lanka is growing well nowadays. New upcoming technologies and products are to be absorbed by the industry. But comparing power loom with handloom, power loom weaving textile is growing very fast giving much economical income to the country. The study was about the future and challenges of the handloom industry in Jaffna – (Sri Lanka). There are many problems found from the research area. With the lack of human and material resources and financial issues, organizational disorders, competition from the power loom sector, poor sales rate and failure of cooperative management are major challenges of this industry. In order to sort out the problems, there should be an inclusive need to undertaking a comprehensive study of problems are faced by Handloom industries in Jaffna region. That’s why this sector has been chosen for an intensive and detailed study.

**Objectives**

- To find the productivity of handloom in Jaffna region.
- To make a detailed study of the problems and challenges in the handloom industry in Jaffna.
- To analyze the employment opportunities for local youth by the industry.
- To study the change in the handloom industry after war.
- To suggest suitable remedial strategies and policy options for the healthy growth of the handloom sector in Jaffn.

**Methodology**

This study was limited to handloom industries in Jaffna region and nine industries in Jaffnawere selected for the research purpose. Jaffna region was selected as research area not only considering the easy access and other facilities but handloom industry faces many challenges comparing with power loom industry in Jaffna as well. The study is descriptive and case – study based on research. convenience sampling method used. And primary and secondary data were used for this research. Primary data was collected from handloom industry employees, staffs, sellers.
and customers using questionnaire and interview methods. And field observation method is also used for collecting data. Secondary data collected from related books, journals, articles and government reports were also used in the research.

**Result and Discussion**

This research was found several problems and challenges in Jaffna observed and the backdrop of handloom manufacturing sector. The problems can be classified as main problem and subsidized problems. There are lack of human and material resources for production and financial problems. It has been found out from the research that handloom industry receives less support from the government in Jaffna region. And the handloom industry is facing biggest challenge in competition with power loom sector which will also increase in the days to come. In order to retain its market share and also to enter new market segments, the handloom sector needs some well thought out and clearly articulated remedial strategies, supported by conductive policy initiatives.

This research suggested recommendations for development of handloom industries in Jaffna region such as, increasing the productivity, increasing the physical and human resources, providing more benefits to staff and employees by increasing salaries and wages to motivated employees more committed which will result in increased productivity and the government should undertake training programmes and workshops to enhance the productivity of the handloom industry. An increase the consumption of handloom products, by implementing policies to ensure that the government employees use handloom cloths through extended sales centers of handloom products to expand in all areas of the country, providing technological facilities to reduce the cost of production and the ability to meet the price of the key producers are some of the suggestions from this research.
Conclusions

Handloom weaving plays an active role in the growth process of the rural areas, as the small entrepreneurs. This sector has been considered prominent because of the traditional artisan craft skills of the weavers which meet the local needs and demands. Handloom sector has different strengths in the modern economy. It is simple and well suited because they are eco-friendly in nature. To enhance the scope of weaving activity, measures should also be taken to provide raw materials, finance, marketing facilities and other requirements. The government should take necessary actions to increase the productivity of handloom in Jaffna region and government should recognize the role of handloom in achieving sustainable development. This will ensure that as the island’s textile industry speeds up in the 21st century, weaving industry will also like power looms be improved in its processes of production and marketing using new technology.

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Reform Public Policies, Regulations for Economic Governance and Social Welfare
Impact of Purchasing Consumer Durables on Rural Household Economy in Sri Lanka:
Case Study of Ellagala GS Division in Hambantota District

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Introduction

Many developing countries including Sri Lanka, have consumption as a larger share of GDP, compared to that in developed countries. Sri Lanka, though a middle-income country, has a high consumption to GDP ratio and a resultant investment-saving gap. Consumer durables shoulder a significant responsibility for such high consumption ratio as they encroach into otherwise possible savings which are crucial for economic growth and development.

Individuals consider durable goods as giving them high levels of utility over long periods of time, and thus, they value their ownership, in contrast to the case of consumer non-durables. Durable goods also are valued, at times, for the social status they bestow on their owners, often resulting in conspicuous consumption (Veblen, 1899).

Consumer durables are goods which may be used repeatedly or continuously over a period of more than a year, assuming normal or physical usage (Breeli, 2010). In utility theory, consumers are considered rational persons, who purchase goods according to the utility they are likely to gain. This involves identifying their wants, considering alternative purchases through gathering information on price, determining affordability in relation to their income and alternative financing sources and finally creating effective demand as they purchase the commodity.

According to the HIES in 2012/13, the expenditure on consumer durable, as a share of non-food consumption expenditure, figures between 1.6% in Colombo district (the lowest) and 8.9% in Vavuniya (the highest). This leads to the hypothesis that the expenditure burden
on consumer durables could possibly be more punching on communities and social segments with lesser incomes than on relatively high-income groups. The present study was an examination of this aspect of expenditure on consumer durables and its impact on different income segments, by researching into a selected case in Hambantota District, where the non-food related consumption expenditure as a ratio of household income has indicated an increasing pattern, from 59.7% in 2006/07 to 60.2 in 2009/2010 and there-onwards to 62.1 in 2012/13 (HIES, different years).

**Research Problem**

The research therefore was conceived to examine the role played by the consumer durables in raising consumption expenditure of rural households, and the comparative impact of such patterns on the two segments, poor and non-poor, through proxy social groups, namely, Samurdhi recipients (considered as poor) and Non-Samurdhi recipients (Consider as non-poor).

**Objectives**

The objective of this study therefore was to examine the case of Ellagala GS division, in Hambantota district, to understand the patterns of purchase of consumer durables by village households, their inducements behind (including various financing mechanisms) and to perceive relative impacts of such consumption expenditure on their economics.

**Methodology**

The study adopted comparison of means as the main methodology of analysis. Intermediate variables such as Income, savings, borrowings, investments and livelihood (incentives to work more) were used in attempting to understand the drivers behind and impacts.

Primary data were collected through a semi structured questionnaire that sought both quantitative and qualitative information from a selected group of consumers who purchased consumer durables within the six months period from 1st January to 30th June 2016 in the Ellagala GS.
division (in Hambantota District), which has around 250 households (Sampath Pathikada, 2014); 114 of which are Samurdhi recipient households. This study surveyed 70 households: 35 Samurdhi (31%) and 35 non-Samurdhi households (26%) The Sample size, selected using convenient sampling technique, was determined such that statistical testing between the two sub-samples (n-k> 30) would be permitted. Two different household categories, namely Samurdhi recipients (considered poor) and non-Samurdhi recipients (classified as non-poor), were considered to capture the equity perspective. The questionnaire was divided into three sections: (i) household socio-economic and demographic characteristics, (ii) purchase and ownership of durables goods including financing sources and (iii) the impact of purchase of durable goods on household welfare in terms of income, savings and other expenditures. Statistical documents relating to spending on durable goods such as Central Bank Reports and Household Income and Expenditure Survey Reports were also analyzed.

**Results and Discussions**

The Department of Census and Statistics (DCS), Household Income and Expenditure Survey (HIES) data for Sri Lanka has shown an unexpected trend with the percentage of household expenditure made on consumer durables, falling as a percentage of total household non-food expenditure from 6.2% in 2005, to 5.5% in 2006/2007, 4.3% in 2009/2010 and 3.9% in 2012/2013, despite the rise in household income over time. This appears to stem from three factors. Firstly, the rise in prices of other non-food expenditure items, compared to that of consumer durable goods, might have been behind. Secondly, changes in the financing mechanisms like credit cards, Seettu and hire purchase schemes would have spread costs over time unlike in the past. Lastly, there is evidence that much of the purchase of durable goods is the result of migrant remittances (in kind and cash) that possibly get omitted in data collection.

In this study, consumer durables were defined as minor durables (less than Rs. 25,000), middle level durables (between Rs. 25,000 – Rs. 200,000) and major durables (more than Rs. 200,000). Considering the
type of consumer durable purchased, the study findings revealed that the majority of non-Samurdhi recipients had a greater demand for major and middle level durables while, Samurdhi recipients demanded mainly minor durables. The reason for this seems to be that many non-Samurdhi recipient households already owned many minor and middle level durables.

The study also found that the desire for social status pushes households to consume expensive consumer durable goods. This conforms to the concept of conspicuous consumption, advanced in the Theory of Leisure Class by Thorstein Veblen, which argues that modernization results in conspicuous consumption. Some consumption behaviors of individuals are irrational; for example, consuming to achieve prestige and status and to emulate others leading to wasteful consumption (Veblen, 1899).

Moreover, the type of consumer durable goods purchased differed according to household head’s age with younger consumers being more likely to purchase washing machines, refrigerators and other major consumer durables in view of reducing household labour that competes with economically productive activities. Considering reasons behind purchase choice, 43% of households declared procuring consumer durables to make their work easier. It should also be noted that 17% of household used the consumer durable goods to engage in income generation such as hiring and in self-employment activities. Thus, many of the households have consumed these durables as investment goods, which does not have the same dampening effect on savings as those durables purchased for mere consumption purposes.

Once the necessity to purchase consumer durables is felt, rational consumers seek information on product and their maintenance. They focus on price, brand name, quality, optional features and durability, etc. In this study, the majority (43%) obtained information from advertisements on television. In the modern day, advertising is a powerful means of attracting consumers and motivating consumption. The markets for consumer durables are generally oligopolistic in nature; and thereby, product differentiation becomes important and advertising is the main means of highlighting product differentiation. Considering
the situation in the developed countries, empirical studies have shown that advertising and consumer credits are essential components driving the marketing aspects and the distribution of consumer durable goods (Goodwin et al, 2008).

Both sub groups (77%) pay consideration to the quality of the product in terms of SLS, ISO and ASTM standards in their purchasing of consumer durables, while a minority (10%) of the sample consider their social status. This suggests that they are rational consumers, despite gaining their information from advertisements that could possibly be misleading. This is further evidenced through empirical findings; consumer buying behavior being specially affected by market factors such as quality of product, price, place and promotion or advertisements (Bizuneh, 2012; Constantinides, 2006).

Many consumers use different kinds of financing mechanisms, when purchasing consumer durables. In this study, both Samurdhi recipient and non-Samurdhi recipients were found using their disposable income to buy consumer durables. This negatively affects their family economy, particularly through foregone expenditure on other necessities (the opportunity cost), through the impact caused on potential saving, and also through foregone future earnings potentially realizable on investment deprived owing to such fund diversion to buy consumer
durables. They also tend to get into debts in view of acquiring consumer durables. This fact was evidenced through the findings of the study: many consumers, particularly those non-Samurdhi recipient households, were found having sacrificed their savings or resorted to borrowings. Their indebtedness has increased, and they have been made liable to pay heavily on debt servicing (including interest) in the future. This may partly be due to that consumer segment purchasing more expensive consumer durable items. Interestingly, this study revealed that the majority of Samurdhi recipient purchase consumer durables through Seettu, which is a popular informal financing mechanism among rural households, particularly among women. This system was found to be popular for the purchase of minor consumer durable goods.

The study findings suggest that, the high impact of declining savings could be seen among the non-Samurdhi households who purchased major (costing more than Rs. 200,000) durable goods. This means that, although consumers maximize their current utility from consumption, it directly affects their future consumption utility. Moreover, consumption of durables, particularly for exhibitionist purposes and to showcase status, affects future incomes and expenditures depending on the financing mechanism chosen, while purchase of consumer durables such as vehicles and electrical appliances tend to have negative effect on both groups; non-Samurdhi recipients having to bear fuel expenditure while Samurdhi group being made to pay more electricity bills.

**Conclusion**

The study found the means of financing consumer durables to be extremely important in determining the net benefit to households. The majority was found using disposable income to purchase consumer durables and this appeared having a direct bearing on other household expenditures, future savings and future incomes. Interest rates were high, particularly if loans had been obtained from the non-formal sector. The findings revealed that purchases of consumer durables also have affected households who have badly drawn down their savings obtained from the formal sector. The study also revealed that the purchase of durables as investment goods was rare among these household
segments. This has a direct negative implication on productivity and future income generation, particularly when many households are already in debts for purchasing consumer durables.

The results lead to several recommendations which are of policy relevance: First, it might be necessary that appropriate measure be introduced to discourage unnecessary purchase of consumer durables, particularly by non-Samurdhi households for exhibitionist purposes. Such would augment their savings, and also could enable them procure more of the essential consumables. Second, both groups of households should be encouraged to purchase durables that would provide them with income earning opportunities. This “investment-orientation” of procuring durables is important at job creation and poverty reduction angles. Appropriate intervention into financing mechanisms (such as preferential interest rates for purchases earmarking income generating activities) could possibly enable this diversion, at least to some extent. Third, it may be worthwhile looking into how the market competition for consumer durables supply could be expanded, which could enhance utility of the purchasers by way of making available more information, a wider choice through product differentiation and more competitive and quality after sales services.

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Factors Behind Low Female Labour Force Participation in Sri Lanka:
Revelations Through a Case Study of Piliyandala – Kesbewa Divisional Secretary Division

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Introduction

Throughout the history, women have assumed or been assigned various social, economic and cultural roles. Unfortunately, from ancient times, women have had to face many disadvantages and discrimination in many situations. Women faced a number of problems by virtue of their sex. For centuries they have been subjected to exploitation and physical suffering, mental pressure and sexual harassment. There are lots of challenges and problems faced by them, both at home and at work places. It is no surprise that such factors constrain females engaging in employment, which results in low labor force participation by women, causing significant gender inequality in the labor market.

Sri Lanka is no exception, even though women in Sri Lanka are relatively more educated and liberal. Gender disparity in employment has changed only moderately over the last decade. The female share (36%) of employment is still around half that of the male share (75%) (DCS, Household Income and Expenditure Survey, 2016). The need for greater gender equity within the labor market is particularly important in this context. Given the fact that the supply of female labor would depend on equality with regard to earnings, and in terms of working conditions, both factors do not appear conducive towards attracting women into the labor market.

Examining the deterrent factors which discourages female participation in the Sri Lankan labor market is thus important and pertinent. The present study is an attempt towards this end.
**Research Problem**

The main problem addressed through this research therefore was the low rate of labor force participation in Sri Lanka in spite of them being relatively more educated, and the potential causal factors behind.

**Objectives**

The study was conducted to investigate the key factors behind the low rate of female labor force participation in Sri Lanka. It also aimed at perusing through literature to perceive what has been already found, in view of structuring the opinion-survey based research, to fathom the inducements discourage and hamper women engaging in paid employment in the Sri Lankan context.

**Methodology**

In view of addressing the research problem, the study researched into both theoretical material and empirical analysis in order to identifying the different determinants of low female labor force participation.

Literature suggests a number of deterrent factors which discourage female employment. Females are expected to take a greater responsibility for household tasks, childcare and elderly care due to the traditional division of domestic labor (Madurawala, 2009). Unlike men, they are generally expected to shoulder these responsibilities, referred to in literature as “the Triple Burden”, even if they are employed. Those who are employed are compelled to work harder than their male counterparts to prove themselves at their work places to ensure job security. Women’s burden of care prevents them from seeking out male dominated occupations that are less flexible and less amenable to part time or flexible work (Peters et al, 2016).

There is an apparent reluctance from the side of employers also to employ women in their work place. The study of ILO (2016), through key person’s interviews, found that managers were more likely to hire men due to extraneous considerations such as higher probability of women having family responsibilities. Das (2006) reported that, even
when both parents work, mothers are more likely to be the ones to take time off from work to care for sick children and to undertake more housework. Gunathilaka (1999) highlighted the role that prevailing inequalities in opportunities and outcomes in the labor market play in discouraging women from entering the workforce. Though better education and high socio-economic status encourage married women to seek work in the job market, the legal framework governing work in the private sector imposes constraints that prevent women taking up night work or part time work in the rapidly growing service sectors. Such imperatives have two impacts: (a) at recruitment point, it reduces probability of women gaining employment and thereby discourages women’s labor force participation; and (b) during employment, “unfairness” leads to women being discouraged and disgruntled and results in their leaving the labor force. Both these factors reduce female contribution to economic activities.

In this backdrop of literature, the present research opted to adopt opinion survey based case-study approach as methodology to gather primary data. Survey was conducted in Piliyandala – Kesbewa Divisional Secretary Division, a semi-urban area in the Colombo District, was selected for the study. Purposive sampling was adopted to include 40 female respondents educated to different levels, but not joining the labor force due to different reasons, which were intended to be revealed through the survey. A self-administered survey questionnaire (containing both open and close ended questions) was designed based on the findings through the literature survey so that possible deterring factors for female labor force participation in Sri Lanka could be revealed. Questionnaire covered four main areas: (i) personal information, (ii) details of previous employment, (iii) barriers to engaging in employment, and (iv) the desire to do a job in the future. The required secondary data were sourced from the Labor Force Surveys of the Department of Census and Statistics of Sri Lanka, which were used to identify the trends and features of women’s labor force participation in recent years. SPSS software was used to analyze the data gathered from this survey.
Results and Discussion

Results revealed several important trends pertaining to the problem of being unemployed from the females’ perspective. First, 21.4% of non-working women surveyed were found discontent at not being employed, and regret spending the day doing household activities (the opportunity cost of course being lost earnings from an economic perspective and self-actualization from a psychological perspective). Similarly, 62.5% of the sample surveyed stated that they were eagerly waiting to do a job in the future. Of those willing to be employed, nearly one-third expressed hope to engage in self-employment, compared to only a little over one-tenth expressed willingness to work in the government and private sectors.

This survey response appears reflecting women’s over-whelming desire to be self-employed, as they could then work from home while carrying out household activities efficiently and taking care of their children well, an acknowledgement of their responsibilities linked to the “Triple Burden. It is interesting to note that among those women surveyed, 85% (or 34 out of 40 respondents) mentioned that their husbands would not wish them to work at present. This finding conforms to what is reported in literature: family pressure from husbands, parents and in laws is an important constraint to seeking employment faced particularly by poorly educated women. Instead, within the framework of socio-cultural factors, that is gender-based division of work and gender roles based on this division, women are considered primarily home makers who should take care of domestic duties and children and be responsible for the well-being of other family members, including the elderly. This could also be why women self-select against promotions, working overtime, taking greater responsibilities or accepting foreign training. It is evident that these patterns adversely affect female contribution to economic activities as paid employees.

Information gathered from secondary sources also revealed several constraints and discouragements with regard to female participation in the labor market in Sri Lanka. Attitudes of people as well as companies towards certain jobs, for instance, can hinder women from trying to enter
such professions. The job advertisements appearing in the “Sunday Observer” News Paper in Sri Lanka (18th of March, 2018) which mentioned that males were encouraged to apply for jobs like Administration Officer, Graphic Designer and Business Development Officer, could be sighted as examples. It is noteworthy that this happens even though it is now banned by labor laws to carry advertisements explicitly having ‘male only’ specifications for job advertisements. It is clear from the analysis of newspaper advertisements, conducted under this study, that indirect mentioning of male preference, or requesting female preference only for a set of restrictive employment domains such as Data Entry Operators, Office Assistants, Waitresses, Nurses and in Teaching, still continues This job segregation by gender too is inequitable and goes against female and family welfare.

**Conclusion**

The study concludes that women continue to face significant obstacles in entering the labor market and progressing upwards in their careers, despite the country having relatively good gender indices compared to other South Asian countries. The study mainly points that the majority (nearly one third) of women like to engage in self-employment as a means of achieving economic gains while being primarily caretakers and home makers. Further, according to respondents’ reactions, it could be concluded that family pressure from husbands, parents and in laws are the main obstacles of unemployment of women, on top of their own realization of family-based duties and responsibilities. Also, as revealed through the analysis of newspaper advertisements, the opportunities made available for women appear to be rather limited and only few varieties of jobs which could be found as conforming to the parameters faced by women.

The study therefore concludes that both family-level and employer-level changes in attitudes would be necessary to realize greater female labor force participation in Sri Lanka, in spite of the limitation of this study in respect of the difficulty in generalizing an outcome of a survey conducted among a limited set of participants in a particular socio-economic setting. If not, it is likely that significant share of women
would continue to prefer self-employment, which matches with their “Triple Burden” as well as their desired to be economically engaged.

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Perception on Service Quality of Public Services:

(A Study on Ceylinco General Insurance Pvt Ltd)

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Introduction

In the context of rapid globalization and the rebalancing of the world economy towards developing countries, the world recognizes that relationship of public sector and private sector is essential to ensuring the continuing ability of world’s businesses to compete in the international marketplace. Private sector companies are potentially the main beneficiaries when the public sector provides productive services; equally, they can be seriously held back from innovating themselves and from being profitable when public services do not deliver. Institutional units can be classified as being public or private units on the basis of whether they are being owned or controlled by public or private units. The grouping of units owned or controlled by public units is referred to as the public sector. It consists of all government units, all nonprofit institutions (NPIs) controlled and mainly financed by government, and all public corporations. The public sector is defined as the national, regional, and local governments plus entities controlled by government units. Public sector is one of the major sectors in Sri Lanka providing welfare facilities, education facilities, health facilities and social existing facilities (such as issuing various kinds of certifications which need for people’s day-to-day activities) without expecting profit.

Research Problem

Sri Lanka experienced strong growth at the end of its 26-year conflict. This was to be expected as the post-war reconstruction trends to bring a new hope and energy to a country. Trade facilitation reform and private sector growth in Sri Lanka are linked and going forward; Sri Lanka needs growth that is driven by better productivity. Trade is the answer, offering a sustainable, viable solution. Trade can actively promote
technology absorption, skill upgrading and increased competitiveness all crucial to Sri Lanka right now. Currently, Sri Lanka ranks 110th in Trading across Borders (Doing Business Ranking) and 89 out of 160 in Logistics Performance.

The government will benefit from higher revenues and an improved trade balance. By integrating into regional and global value chains, Sri Lanka can leverage its unique location to overcome the economic disadvantage generated by its small size. Thus, the public sector needs strong relationship with the private sector to overcome obstacles. (PPP - Private public Partnerships). The key purpose of the study is to find out the private sector perception towards the public service in Sri Lanka with special reference to the empirical survey on employees of private sector.

By supporting the growth of its private sector, Sri Lanka has a better chance of realizing its ambitions of becoming a high-income country. In the light of those findings, the research problem would be: “What is the Private Sector Perception towards Public Sector in Sri Lanka?”

**Objective**

The main objective of this study is to identify the private Sector Employees (PSE) Perception towards the Public service in Sri Lanka. In the light of what has been discussed in the previous sections, this study will try to answer the questions that have been raised in the above problem definition, and to achieve the following objectives:

- To identify the factors affecting the perception towards the public sector
- To identify the hidden factors that affected perception towards the public sector
Methodology

Private sector Employees of Sri Lanka are the population of study. Overall, there are 3,584,478 private sector employees (PSE) in Sri Lanka. The Sample of PSE was derived from Ceylinco Insurance which is leading insurance company in Sri Lanka. The Colombo Stock Exchange (CSE) has 296 companies representing 20 business sectors and Ceylinco ranked no 5 among them. 150 PSE were selected from applying the simple random sampling. The primary sources are the information, gathered from Departments when we did interviews with higher managers, Personal observation, face-to-face conversation with the Branch officers and the employees. The secondary data are collected in data gathered within the organization itself, data gathered from texts, internet sources, general reports, annual reports and official documents. Statistical package is used as the analytical tools. As an initial step, the features of the sample were identified using descriptive statistics. Chi square tests were conducted to check associations.

Results and Discussion

Among the sample, 81% represent male and rest female. Almost half of the respondents are who conduct their education to complete graduate level followed by a good proportion of O/L completers just over a third. 18 percent is A/L completers. Also, the highest number, 42 percent of the sample mention that they are underwriters followed by 34 percent of Administratives. Most customers, almost over half, visit a government organization once a month to get their services, followed by exactly 21 percent customers, everyday. There is no customer that never visit a government organization.

Factor Analysis was performed with 14 statements related with perception towards the public sector. The Cronbach alpha was 0.8631 and significant supported the use of factor analysis in order to extract independent variables associated with perception towards the public sector. The degree of common variance among the fourteen variables is “mediocre” which reflects that – if a factor analysis is conducted – the factors extracted will account for the fair amount of variance but not a substantial amount.
Varimax rotation was used to identify the underlying factors for perception towards the public sector. Items with Eigen values greater than one were extracted and all factors loading greater than 0.5 were retained. Eighteen items yielded 5 factors explaining 86.3 percent of variance. The analysis yielded 5 factors explaining a total of 86.3% of the variance for the entire set of variables. The fifth factor did not describe 10% value of variance. The variance is just over 1. Therefore, consider as there are 5 factors which can be abstracted from the above variables.

Factor 1 was labeled Efficiency and Effectiveness Problem. Some problems are there according to customer’s perspective. To attract customers to use public service, the best way is remit those misconceptions. The past researches indicate that some customers were facing some problems regarding the system and complaining was not worth. These efficiency problems clubbed together as one factor and they are explained by 34.6 percent of variance. Factor 2 was labeled as Technological barriers. Usually for the perception towards the public-sector account, there must be internet and other technological support. This factor clubbed as one factor and explains 27.3 percent of total variance.

The third factor which describes 8.5 percent of total variance called “Not User Friendly”. The lack of confidence and fear avoid a customer from adjusting to a government services even if it is welfare oriented. Therefore, fear and difficulties combined as one factor for the perception towards the public sector. Personal Attitudes of the public employees’ concerns is the 4\textsuperscript{th} factor. When customer logged to the public sector, it must be easy to customer to get services and he must feel safe there. Thus, the forth factor which is named “security concerns” describe 8.2 percent of the total variance. Time constraint is the most important issue of perception towards the public sector. It is described by 8 percent of total variance.
Conclusions

52% use government services because they do not have any other option. 83% believes outdated rules and regulation are a barrier to the government organization, 76% believes low IT penetration; 68%, inefficiency employees. Those who previously worked in the government sector have better perception towards the public sector than those who did not. Age, job category, education level and job directly affected the perception towards the public sector. Considering the indices, most of the private sector people strongly do not agree with that efficiency and effectiveness of the public sector while they do not agree with the idea about public sector and knowledge about the public sector. The number of times visit to the government organization variable have an effect on the perception towards the public sector.

The factors decide the perception towards the public sector, efficiency and effectiveness problems, technological barriers, not user friendly, personal attitudes and time consume. Factor Analysis was performed with 14 statements related to the perception towards the public sector. The Cronbach alpha was 0.8631 and significant supported the use of factor analysis in order to extract independent variables associated with perception towards the public sector. The degree of common variance among the fourteen variables is “mediocre” which reflects – if a factor analysis is conducted – that the factors extracted will account for the fair amount of variance but not a substantial amount. Factors decide the Perception towards the public sector, efficiency and effectiveness problems, technological barriers, the absence of user friendly, personal attitudes and time consume. Finally, as recommendations: strengthening the customer relationship, improve effectiveness and efficiency, removing Technological Barriers, create a User Friendly environment, change the Personal Attitudes of public servants.
References


Impact of Information and Communication Technology in Secondary Education: An Empirical Study in Rathnapura District

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Introduction

Information and communication technology (ICT) is playing an inseparable part of our day to lives in the 21st century. Even there is no universal definition for ICT; it refers to many areas like all devices, networking, applications and systems that allow people and organizations to go to a digital world. ICT literacy can be defined as “the ability of individuals to use ICT appropriately to access, manage and evaluate information, develop new understandings, and communicate with others in order to participate effectively in society” (Jimoyiannis and Komis, 2007; MCEETYA Performance Measurement and Reporting Taskforce, 2005).

Unlike in developing countries, teachers in developed countries use ICT to prepare lessons and activities for teaching, communicate with students and parents as well as use for the school website or virtual learning environments for teaching. ICT plays a significant role by bringing a revolutionary change in education systems. Notably, it brings significant for rural area schools. Governments distribute academic books and papers across the country though the internet. Students who live in rural areas can download them for a free cost. Consequently, governments provide teacher training and encourage them in both academic and administrative process (Wastiau, et al., 2013; Khan, et al., 2014).

“Academic achievement in adolescence is a key determinant of future educational and occupational success” (Flashman, 2011). Student
performance can be useful when offering scholarships, fellowships and when selecting students for graduate programs. In other hand student performance can be used to identify the weak students. Grades of the final examinations are being used for evaluating the students’ academic performance and mostly, GPA systems used to measure it (Williams, 2018; Masrom and Usat, 2015).

Numbers of worldwide researches have studied the impact of ICT in the education sector (Wastiau at al., 2013; Balanskat, Blamire and Kefala, 2006; Yusuf ,2005). However, only few research articles are recognized in Sri Lankan contest in the education sector (Edirisuriya, 2006). It is required to identify matters in Sri Lankan education sector on usefulness of IT for education and its performance as well as give recommendations for policy makers within education sectors for any enhancements.

**Research Problem**

The Government spends more funds on ICT infrastructure development in education and it is worth to identify the impact on education both sides; teachers and students. The feasibility of using technology especially in rural areas is less than in urban areas. Specifically, this study seeks answers to the following questions;

- Is there any significant relationship between the use of the ICT and improvement in the secondary education in Rathnapura district?
- How can measure the impacts of ICT in secondary education in Rathnapura district?

**Objectives**

- To study the impact of ICT literacy on academic performance
- To identify the effect of ICT literacy of students on their ICT usage.
- To examine the impact of ICT usage on academic performance of secondary education.
- To understand the mediate role of ICT usage on the relationship between ICT literacy and academic performance of secondary education.

**Methodology**

A total of 120 students and 75 teachers, 3 rural area schools and 3 urban area schools participated in the study. Clustered sampling method was employed for sampling schools among nine zonal educational offices and random sampling method was employed for selecting 3 urban area schools and 3 rural area schools. Then systematic random sampling method was employed to select male and female students as well as teachers for the study. The study presents a factor analysis and multiple regression model to identify the relationship between the dependent and independent variables. (Fowler, 2014; Singh, 2018; Kraker & Kollman, 2003).

![Figure 1: Conceptual framework](image)

![Figure 2: Conceptual framework for student survey](image)
The Figure 2 shows that the independent variable is Information communication and technology (ICT) and the dependent variable is academic performance. The mediate variable is the usage of the ICT.

![Diagram](attachment:conceptual_framework.png)

Figure 3: conceptual framework for teacher survey

The Figure 3 shows that the independent variable is Information communication and technology (ICT) and the dependent variable is academic performance. The mediate variable is the usage of the ICT.

**Results and Discussion**

**Reliability**

The reliability test with a Cronbachs’ Alpha > 0.7 values are performing, the questions which are used to measure the ICT Literacy, Usage of ICT for studies and personal and Academic Performance in both student and teacher questionnaire are reliable. (IBM, 2018)

**Multiple Regression for Student Survey**

$R^2$ is 0.412 and there is no strong variation between dependent and independent. (IBM, 2018)
Table 1: Multiple Regression analysis for student survey

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>1.000E-013</td>
<td>.072</td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td>Simple ICT literacy</td>
<td>.231</td>
<td>.114</td>
<td>.231</td>
<td>2.020</td>
</tr>
<tr>
<td>Moderate ICT literacy</td>
<td>.225</td>
<td>.121</td>
<td>.225</td>
<td>1.865</td>
</tr>
<tr>
<td>Advance ICT literacy</td>
<td>.055</td>
<td>.082</td>
<td>.055</td>
<td>.667</td>
</tr>
<tr>
<td>ICT usage in school</td>
<td>.125</td>
<td>.088</td>
<td>.125</td>
<td>1.421</td>
</tr>
<tr>
<td>ICT usage at home</td>
<td>.027</td>
<td>.114</td>
<td>.027</td>
<td>.233</td>
</tr>
<tr>
<td>ICT usage in mobile phones</td>
<td>.168</td>
<td>.110</td>
<td>.168</td>
<td>1.523</td>
</tr>
</tbody>
</table>

Source: survey data, 2017/2018

While remaining other factors are constant factors when the students’ simple literacy increases by 1 the academic performance will increase by 0.231 (H1), moderate literacy increases by 1 the academic performance will increase by 0.225 (H2), advance literacy increases by 1 the academic performance will increase by 0.055 (H3), ICT usage in school increase by 1 the academic performance will increase by 0.125 (H4), ICT usage at home increase by 1 the academic performance will increase by 0.027 (H5), ICT usage in mobile phones increase by 1 the academic performance will increase by 0.168 (H6).

Multiple Regression for Teacher Survey

R square is 0.619 and there is no strong variation between dependent and independent. (IBM, 2018)

Table 2: Multiple Regression analysis for teacher survey

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>-.070</td>
<td>.258</td>
<td>-.271</td>
<td>.787</td>
</tr>
<tr>
<td>ICT usage for Administration</td>
<td>.018</td>
<td>.065</td>
<td>.036</td>
<td>.283</td>
</tr>
<tr>
<td>Simple ICT literacy</td>
<td>.038</td>
<td>.153</td>
<td>.038</td>
<td>.247</td>
</tr>
<tr>
<td>Moderate ICT literacy</td>
<td>.400</td>
<td>.184</td>
<td>.400</td>
<td>2.178</td>
</tr>
</tbody>
</table>
While remaining other factors are constant factors when the teachers’ simple literacy increases by 1 the academic performance will increase by 0.038(H1), moderate literacy increases by 1 the academic performance will increase by 0.400(H2), advance literacy increases by 1 the academic performance will increase by 0.153(H3), ICT usage in school for teaching increase by 1 the academic performance will increase by 0.109(H4), ICT Use for preparing teaching materials increase by 1 the academic performance will increase by 0.164(H5), ICT use for preparing teaching materials increase by 1 the academic performance will increase by 0.133(H6), ICT Use for administration increase by 1 the academic performance will increase by 0.018(H7).

**Conclusion**

To review from the evidence, authors conclude that the results of the research shows that the ICT literacy and academic performance contains positive relationship and simple and moderate ICT literacy play significant role than others pertaining to the students and conversely, same as the teacher performance and hence it can be concluded that the ICT literacy present on the schools should be in the moderate level. Usage of ICT for learning/teaching has also been positively affected in increasing the academic performance of both students’ and teachers’ in secondary education level in Rathnapura district, Sri Lanka. The results can be used as baseline data for future implementations of ICT in education sector in Sri Lanka and it will be very helpful for future researchers and decision makers.

**Reference**

Teacher Development, 11(2), 149-173. doi:10.1080/13664530701414779


Analysis of Enduring Factors Influenced in Trends of Road Accident Occurrence in Sri Lanka During Last Two Decades

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Introduction

Road Accidents has become a dreadful phenomenon in the world which creates embarrassing circumstances by losing thousands of lives and damaging properties of a human being. According to the estimations of the World Health Organization (WHO), 1.25 million people die every year by road traffic crashes and 20 to 50 million injuries occur worldwide with many injuries incurring disabilities of the victims. As per the available statistics, more than 90 percent of road accidents take place in low and middle-income countries which have lower socio-economic backgrounds. Road injuries have become the tenth leading course of deaths globally and predicted to become seventh leading cause by 2030, except having remedial actions to overcome this disastrous tendency WHO.

Road Accidents in Sri Lanka has become a serious issue in the present context of road transportation and conceivably creates gigantic economic losses in the country with an enormous effect on future sustainable development. The economic cost of road accidents has been valued at over Rs 10,000 million annually which is around 1 percent of the GDP of Sri Lanka (Kumarage 2003). The traffic police records (2017) in Sri Lanka revealed that on average six people die in road accidents daily whereas thousand road accidents occur weekly creating many people seriously injured and damages of possessions. As per the road accident database which maintained by the Traffic Police Headquarters, 7 percent of total accidents are fatal while 20 percent are grievously injured in 2017.
Many researchers have investigated the trends of road accident over the years and revealed the risk factors affected in the fluctuations of these deadlier occurrences. Atubi (2012) shows that road accidents significantly increase with increased length of roads (km), presence of road safety corps and increased population in Lagos State, Nigeria. The findings of his study confirmed that better quality of highways results in more accidents because of drivers most likely over speed on quality roads, leading to more frequent and fatal accidents (Onakomaiya 1988; Filani and Gbadamosi, 2007). Adhikari (2016) conducted a research to find the road traffic accidents trends on Kathmandu-Bhaktapur road after addition of lanes and concluded that there is an increase in accidents immediately after completion of the widening of the road due to unfamiliarity among drivers with the increased design speed and unchanged behavior of pedestrians. Somasundaraswaran (2006) conducted a research using road accident statistics during 1989-2005 and revealed that alarming rate of vehicle ownership together with inadequate road network development to support the demand for transportation are the most significant reasons for the increased road crashes in Sri Lanka. Kumarage et. al (2009) revealed that accidents have steadily increased with time on Sri Lankan roads and rapidly increasing vehicle fleet. Accordingly, the most doable reason for the road accident trend is rapid motorization together with road developments around the world making a higher risk to all road users. The past researches concluded that the statistics on non-grievous accidents are unreliable due to low reporting rate to the police with insurance claims whereas grievous accidents are almost reported and reliable to be considered for road accident analysis in Sri Lanka.

**Research Problem**

Road accidents have become a serious hazard which directly influences public health and the economy in Sri Lanka creating disabilities and losses of human lives throughout the year. This problem drastically increased over the last few decades with high fatalities, grievous injuries and property damages (Figure 1).
It is a vivid fact that grievous accidents including both fatal accidents and grievous injuries have been trebled from 1977 to 2017 even though the number of non-grievous accidents does not show a significant change during these four decades as per the statistics of the Traffic Police database the prominent factor for road accidents in Sri Lanka is aggressive and negligent driving while speeding whereas alcohol influence and error judgment making had become the secondary reasons. These factors only reflect the closest reasons for road accident occurrence, but not long term road accident trend. In order to make long-term policy decisions on road accidents preventions, analyzing the influential factors and root causes of road accident trends is indispensable.

There is a scant literature on Road Traffic Accident trends and its’ long-term relationship with the influential factors in Sri Lanka. In addition, the past researches concluded that the statistics on non-grievous accidents are unreliable due to low reporting rate to the police with insurance claims whereas grievous accidents are almost reported and reliable to be considered for road accident analysis in Sri Lanka. Thus, the focus of this study is to investigate and analyze the enduring factors that influenced in grievous road traffic accident trends in Sri Lanka.
Objective

The main objective of this study is to investigate the effective and enduring factors that influenced in Sri Lankan grievous road traffic accidents. Accordingly, the study firstly identify the main factors influenced in road accident trends using the knowledge grasped through the literature survey and brain storming. Secondly, the study analyses these enduring factors and ascertain the significance in order to determine the future trends of grievous road accidents in Sri Lanka. Thirdly, the study provides guidance to take necessary precautions by the relevant authorities making higher concern on road safety measures so as to minimize the tragic consequences of road crashes in Sri Lanka.

Methodology

The study considers the fluctuations and trends in road accidents within 20 years period from 1997 to 2017. The selected key influential factors on road accident trends based on the literature survey and the in-depth analysis on economic variables and road accident fluctuations during this period. The dependent variable of the preliminary model is Grievous Accidents (including accidents of pedestrians) (GA) and eight independent variables; population, operated vehicles, road investments, employments, GDP (constant), railway investments, per capita GDP and the road length were considered. According to the preliminary tests results, the study analyses three main variables; Grievous Accidents (GA), Operated Vehicles (OV), and Road length (RL) for model formulation. This study uses the secondary data which collected from Traffic Police Head Quarters, National Budget Department and Central Bank of Sri Lanka. Due to non-stationarity of original and all the variables are co-integrated in the first difference (I(1) variables), Vector Error Correction Modeling (VECM) with Co-integration test is used to find the long term relationship and short term dynamics among the variables. Original data of variables; GA, OV and RL were transformed in to log form as LGA, LOV and LRL to linearize the data since Vector Auto Regression models (VAR Models) do not capture non-linear elements.
Several unit root tests have been introduced in econometric literature and the most common tests are the Dickey-Fuller test (DF test) and Augmented Dickey-Fuller test (ADF test). Augmented Dickey-Fuller test is an extension of the Dickey–Fuller (DF) test to remove all the structural effects (autocorrelation) in the time series and Augmented Dickey Fuller Unit-root testing was used to determine whether the data series are stationary or non-stationary. To examine long run relationship between three variables, a Johansen Co-integration Test was employed while running Vector Error Correction Model (VECM) to find short run dynamics among the variables.

**Hypothesis 01:** Whether there is a positive relationship between number of operated vehicles and number of road accidents

\[ H_0; \varphi_1 = 0 \]
\[ H_1; \varphi_1 > 0 \]

\( \varphi_1 \) = Operated vehicles coefficient of Road Accidents model (Should be positive).

**Hypothesis 02:** Whether there is a positive relationship between road length and number of road accidents

\[ H_0; \varphi_2 = 0 \]
\[ H_1; \varphi_2 < 0 \]
\( \varphi_2 = \) Road Length coefficient of Road Accidents model (should be positive)

**Proposed Model:**

\[
LGA_t = \varphi_0 + \varphi_1 LOV_t + \varphi_2 LRL_t + \mu_{t-1}
\]

Equation 01

Where:

- \( LGA = \) Log of Grievous accidents including pedestrians’ accidents
- \( LOV = \) Log of number of operated vehicles
- \( LRL = \) Log of road length
- \( \varphi_0 = \) Autonomous grievous accidents
- \( \varphi_2 = \) Operated vehicles coefficient of accidents model
- \( \varphi_3 = \) Road length coefficient of road accidents model
- \( \mu_{t-1} = \) deviation of road accidents from the long run equilibrium in the previous year.

According to ADF test results, all the three variables are identified as non-stationary (see table 01). They become stationary at the first difference, and all three variables are identified as “I (1) Variables”. When all variables are I (1), Co-integration and Vector Error Correction modeling would be proper methods to find the long run relationship and short run dynamics among the variables.

**Results and Discussion**

**ADF test results**

<table>
<thead>
<tr>
<th>Variable</th>
<th>LGA</th>
<th>LOV</th>
<th>LRL</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADF Test statistics (in levels)</td>
<td>-1.448292</td>
<td>-1.207025</td>
<td>-1.008049</td>
</tr>
<tr>
<td>Critical values 5%</td>
<td>-3.052169</td>
<td>-3.020686</td>
<td>-3.020686</td>
</tr>
<tr>
<td>ADF Test statistics for 1st differenced data</td>
<td>-4.086634*</td>
<td>-5.004412*</td>
<td>-7.992488*</td>
</tr>
<tr>
<td>Critical values 1%</td>
<td>-3.886751</td>
<td>-3.831511</td>
<td>-3.831511</td>
</tr>
</tbody>
</table>

Note: sign * for Rejecting at 1% significant level.
Co-integration test results

VAR Lag Order Selection Criteria proved that lag one is proper to run the regression. Co-integration test brings two tests as trace test and maximum Eigen Value test. Max Eigen test, null hypothesis of r=1 is accepted at the 5% significance level (Table 02). Maximum Egan value test indicates one co-integrating equation among the variables used in the study.

Table 2: Co-integration test results

<table>
<thead>
<tr>
<th>Hypothesized No. of CE(s)</th>
<th>Maximum Egan statistics</th>
<th>5%critical value</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>None *</td>
<td>23.90593</td>
<td>21.13162</td>
<td>0.0198</td>
</tr>
<tr>
<td>At most 1</td>
<td>10.23343</td>
<td>14.26460</td>
<td>0.1971</td>
</tr>
<tr>
<td>At most 2 *</td>
<td>5.781025</td>
<td>3.841466</td>
<td>0.0162</td>
</tr>
</tbody>
</table>

* denotes rejection of the hypothesis at the 0.05 level

Estimated Long Run Model for road accidents:

As per the results of Vector Error Correction test results (Annexure 01), the estimated Long Run Model for road accidents is:

\[
\text{LGA}_t = -8.88 + 0.4LOV_t + 1.13LRL_t + \mu_{t-1} \\
[\text{[-4.47929]} \quad \text{[-2.01980]}]
\]

\[\text{Equation 02}\]

In the long run, number of operated vehicles (OV) shows a positively relationship with grievous road accidents. The estimated coefficient is significant and consistent. Higher number of operated vehicles leads to higher road accidents. This positive coefficient (0.4) of road accidents model explains that the impact of 1 percent increase in Operated Vehicles would increase grievous road accidents by 0.4%. The Road Length coefficient of road accidents model is also significant and consistent. This positive coefficient (1.13) of Road Length explains that the impact of 1% increase in road length would increase grievous road accidents by 1.13%. Road length elasticity of road accidents is very influential in the model.
Estimated Error Correction Model:

\[ D(LGA) = -0.66(LGA_{-1}) - 0.4LOV_{-1} - 1.13LRL_{-1} - 8.88 \]  

Equation 03

0.66% of the disequilibrium \((\mu_{t-1})\) in road accidents is corrected towards equilibrium within one-year period which is a good rate of adjustment. R squared of model is not satisfactory & explanation power of the model is 42%.

Conclusion

The model results conclude that when operated vehicles and road length increases fatal and severe accidents increases continuously. This reveals that investment on new road construction in order to cater the existing traffic demand is not a viable solution to smoothen the existing road accident trend. As such, improvement of road designs providing facilities for vulnerable road users and proper maintenance programmes are indispensable. Policy makers should introduce new awareness programmes and campaigns to enhance road safety while imposing and enforcing rules and regulations in order to minimize existing road accident trend.

References


Impacts of Public Borrowings on Private Investments in Sri Lanka

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Introduction

Over the last two decades, the whole world has experienced rapid changes and socioeconomic transformations. Sri Lanka’s economy has transitioned from a predominantly rural, agricultural economy towards a more urbanized economy driven by services. Due to this expansion Sri Lanka would build up policy framework to face the changing demands of public services. If revenue collected through taxes & other sources is not adequate to cover government expenditure, it might create to be running deficit budgeting. To finance the deficit, government should use at least one of four ways. There is money printing, running down foreign exchange reserves, borrowing abroad and borrowing from the domestic economy.

Private investment is an important channel for the effectiveness of fiscal policy and improving economic growth. When a country not in recession reducing the size of the budget deficit would reduce the government borrowings, decrease interest rates, increase private investments. Macroeconomic stability of a country is highly dependent on government budget strategies. According to the classical school of thoughts of economics, public debt slows down the Investments of a country, and public debt should be kept as minimum as possible. However, the Keynesian economists are extremely flexible about public borrowing.

Research Problem

After the three decades’ civil conflict, Sri Lanka is obtaining many investments from local and foreign communities. Therefore, Sri Lanka is gaining an opportunity in the investment side. But many fiscal related issues are directly affecting to Sri Lankan private investment. Moreover,
the relationship between Government borrowing and private investment is a continuing matter in economic growth and development. Therefore, this has necessitated the need for an empirical analysis of the above phenomenon in Sri Lanka.

**Objective**

The main objective of this study is to empirically analyze the impacts of domestic and external government borrowings on private investments in Sri Lanka. Meanwhile, study the strategic priority factors of public borrowings that accountable for Investment in Sri Lanka through the period from 1980 to 2015.

**Methodology**

The study mainly based on secondary data. Data for domestic and foreign borrowings gathered from the Central Bank of Sri Lanka Statistical report, 2015 and Annual Reports for various years. Data for private investments, GDP, real interest rates, domestic credit to the private sector and inflation rates collected from the World Bank databank. Unit root test (test of stationary) and Johansen co-integration test were used to estimate the long-run impact of public borrowing on private investment. The study used the Augmented Dickey-Fuller (ADF) test and Phillips and Perron (1988) test (PP) for verifying unit roots of the error term. Co-integration test was conducted in case of non-stationary of the series to ensure long-run relationships. Applied Granger causality test for investigate causality between Public borrowings and Private Investments in a time series. The theoretical framework ought to enable to understand the relationship between private investment, public borrowing, GDP per capita and interest rate and financial development in Sri Lanka.

**Results and Discussion**

The unit root test: since the assumptions for the classical regression model require that both variables be stationary and that errors have a zero mean and finite variance. The unit root test is evaluated using the Augmented Dickey-Fuller (ADF) test.
\[ \Delta y_t = \beta_1 + \beta_2 t + \delta y_{t-1} + \varepsilon_t \]  
(\varepsilon_t \text{ is a pure white noise error})

This study employs:

\[ \text{GFCF} = a_0 + a_1 \text{DD} + a_2 \text{FD} + a_3 \text{GDS} + a_4 \text{LR} + a_5 \text{GDPC} + \varepsilon_t \]  
Model 1

\[ \text{GFCF} = a_0 + a_1 \text{DD} + a_2 \text{FD} + a_3 \text{GDS} + a_4 \text{LR} + a_5 \text{GDPC} + a_6 \text{ED} + \varepsilon_t \]  
Model 2

GFCF is Gross Fixed Capital Formation which presents the share of the gross domestic capital formation to GDP by subtracting net FDI inflows, while DD means domestic debt which shows the total government debt in a country that is owed to lenders within the country and GDPC is Gross Domestic Per Capita Growth Rate. Meanwhile, LR is the Lending Rate, domestic credit to the private sector as a percentage of GDP (Financial development) is express by FD and ED stands External Debt. Gross Domestic savings as a percentage of GDP denotes by GDS.

F-statistic (of 6.01) is higher than the upper bound at 95% (of 3.28) or 90% (of 2.94). Hence the conclusion that, there is co-integration between the set of I(0) and I(1)) variables. Therefore, it is clear that the assumption that there can be at least long run or short run relation with among domestic debt, financial development, gross development savings, Gross Domestic Product Per Capita and Gross Fixed Capital Formation.

ARDL result shows that there is an insignificant positive long-run relationship between Domestic debt and gross fixed capital formation product. It suggests that an increase in domestic debt negatively influences to gross fixed capital formation in Sri Lanka. Precisely, 10% change in domestic debt creates a 0.26% increase in gross fixed capital formation as a percentage of GDP. This is in demonstrating to the findings by Abbas and Christensen (2007) who reported moderate domestic debt levels to drive economic growth.

\[ \text{GFCF} = 7.948 + 0.026803 \text{ DD} -0.051 \text{ ED} +0.04606 \text{ FD} +0.320519 \text{ GDS}+0.016215 \text{ LR}+0.784824 \text{ GDPC} + \varepsilon_t \]
Financial Development (FD) proxies as Domestic credit to private sector Gross Domestic Savings (GDS) and Gross Domestic Product per Capita (GDPC) have positive and significant long run relationship with gross fixed Domestic capital formation in Sri Lanka.

This suggests that an improvement in Gross Domestic Savings leads to an increase in Gross fixed capital formation in Sri Lanka. Specifically, 10% change in GDS drives to a 3.25% increase in GFCF. The results further indicate that GDP Per Capita growth positively and significant impact on Gross fixed capital formation and precisely 10% rise of GDP per capita heads to a 7.8% growth in Gross fixed capital formation. This implies that an increase in financial development proxies (an increase in domestic credit to the private sector) in Sri Lanka will lead to enhancing capital formation to increase Investments. Meanwhile, Gross domestic savings produce a significant positive influence on Gross fixed capital formation in Sri Lanka.

Further, Lending rate a positive but insignificant long-run relationship creates with Gross fixed capital formation. If the rate of domestic borrowing to finance investment is increased, this would be boost savings for future lending. The private sector and individuals would use earned interest for re-investment.

**Conclusion**

This study implies important findings for policy formulation. The rise of government borrowing would drive to the reduction of resources which available for the private sector Investors. Meanwhile, the private sector would pay taxed more to pay interest payments on both domestic and foreign debts. Further, this would be affected to discourage private investments more in the Sri Lankan economy. The effect of adverse impact on investment could show evidence of a crowding-out effect. The study found that sound positive interaction between GDP per capita and investment and more financial development and Investment. Due to the private sector funding supports investments became more than government borrowing. Therefore, it is needed to construct credibility.
in the economy by respecting political stability and massive confidence of investors to increase investments.

Reference


World Economic Outlook Database, October 2016
The Impact of External Debt on Economic Growth in Lower Middle-Income Countries in South Asia

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Introduction

With growth topping 6.9 percent in 2018, South Asia is firming up its position as the world’s fastest growing region (South Asia focus spring 2018). According to the World Bank classification in 2017, Sri Lanka, India, Bangladesh, Bhutan and Pakistan are considered as lower middle-income countries based on the per capita income (from $1,026 to $4,035).

According to the economic theory, it is noted that a reasonable level of debt should help both developing and developed countries to enhance their economic growth. However, the theory of liquidity constraint hypothesis and debt overhang theory have pointed out higher debt levels crowd out economic growth because of increased government internal borrowing (Krugman 1988, Saches 1989, and Cohen, 1992). The increase in borrowing raises the interest rate, which makes the cost of borrowing for both investment and consumption become more expensive and this in turn result in crowding out effect. Moreover, poor debt management in developing countries would adversely affect the economic growth and financial sustainability of these countries. Hence, it is important to use the borrowed funds to finance productive investments that will generate future income. (Kharusi and Ada, 2018).

South Asia, one of the fastest growing regions in the world has shown a contraction in the total external debt outstanding in 2016 (International Debt Statistic, 2018). Figure 1 shows the comparison of South Asia’s net external debt inflow with the other regions in the world.
The total external debt stock of South Asia contracted by almost 2 percent as net debt flows into the region turned negative ($-7.7 Billion) for the first time in the decade. The ratio of external debt to Gross National Income (GNI) of the region dropped by one percentage point from 23 percent in 2015 to 22 percent at the end of 2016, which is below the average of 26 percent for all developing countries (International Debt Statistic, 2018). Historically too, this ratio for South Asia has remained lower than the average of low-and-middle income countries (International Debt Statistic, 2018).
As shown in Figure 2, in 2016, the external debt to GNI ratios of Bhutan and Sri Lanka is 113 percent and 59 percent respectively which is way above the average for other developing countries (World Bank, 2016). More importantly, the external debt to GNI ratios for these two economies has deteriorated markedly over the last few years and this trend has not seen in the other South Asian countries.

**Research Problem**

The literature review reveals that external debt has a positive impact on economic growth in certain economies whereas it brings negative impact to certain countries (Adegbite & Ayadi, 2008; Pattillo et al., 2004; Paudel & Perera, 2009). Hence, it is clear that there is no definite relationship between external debt and economic growth.

![Figure 2: External Debt to GNI Ratios for South Asian Economies](image)

Figure 3: GDP growth rate (%)  
Source: World Bank statistics 2018

It shows that there is a research gap exists regarding external debt and economic growth in lower middle income countries in South Asia. Therefore, the study attempts to investigate whether there is a link between economic growth and external debt.

Figure 3 above illustrates the GDP growth rates for South Asian lower middle-income countries for the period of 2000-2016. From the trend shown in figures 2 and 3 one cannot clearly identify whether external debts affect positively or negatively on economic growth. For instance, countries with higher percentage of external debt to GNI like Bhutan
record high economic growth, whereas Sri Lanka records lower economic growth. Hence, it is important to undertake a detail analysis to determine the relationship between external debt on economic growth in the South Asian context.

**Objective**

The prime objective of the study is to identify the relationship between external debt and economic growth in lower middle income countries in South Asia. Following are secondary objectives of the study:

- To estimate the impact of other economic indicators on the economic growth of lower middle income countries in South Asia.
- To identify the reasons affected on South Asia’s deviation from the norms of International Debt Statistics 2018.

**Methodology**

Most of the former studies (Pattillo et al., 2004; Wijeweera & Dollery, 2005; Ayadi & Ayadi, 2008) employed quantitative method to determine the relationship between external and the economic growth. Therefore, the study uses panel data regression method to investigate this relationship. In estimating the model, the secondary data has been extracted from the World Bank database for the lower middle-income counties in South Asia for the period of 1990 to 2016.

**Econometric model**

The analysis has conducted through a panel data set using a linear regression model. The present study is based on the model used by Elbadawi, Ndulu and Ndungu (1999) which is widely employed in similar studies undertaken to ascertain the relationship between external debt and economic growth. The variables used in the model are commonly used variables in studies undertaken to determine the aforementioned relationship (Paudel, Perera, & Paude, 2009, Sichula, 2012).
\[ YG_{it} = \beta_0 + \beta_1 \text{DEBGDP}_{it1} + \beta_2 \text{LABF}_{it2} + \beta_3 \text{GCFGDP}_{it3} + \beta_4 \text{TRDGDP}_{it4} + U_{it} \]

Where, \( YG = \) GDP growth rate, \( \text{DEBGDP} = \) External Debt as a \% of GNI, \( \text{LABF} = \) Labour force, \( \text{GCFGDP} = \) Gross capital formulation as a \% of GDP, \( \text{TRDGDP} = \) Trade as a \% of GDP (Trade openness), \( U_{it} = \) idiosyncratic error term.

**Results and Discussion**

The study employs fixed effect model which is selected after running the huasman test (Prob>chi2 = 0.0000). The model results are presented in Table 1. The overall model is significant at 95% confidence level (prob > f = 0.0010). The results indicate that external debt and labour force are significant, whereas gross capital formation and trade openness are insignificant, as the p-value of these variables are greater than 0.05 (at 95% confidence level).

<table>
<thead>
<tr>
<th>Variables</th>
<th>coefficient</th>
<th>Std.Error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(constant)</td>
<td>3.394</td>
<td>.838</td>
<td>0.000</td>
</tr>
<tr>
<td>External debt</td>
<td>-0.121</td>
<td>.038</td>
<td>0.002*</td>
</tr>
<tr>
<td>Gross domestic capital</td>
<td>0.059</td>
<td>.042</td>
<td>0.163</td>
</tr>
<tr>
<td>formation</td>
<td>0.003</td>
<td>.039</td>
<td>0.946</td>
</tr>
<tr>
<td>Trade openness</td>
<td>2.080</td>
<td>7.580</td>
<td>0.007*</td>
</tr>
<tr>
<td>Labor force</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Dependent variable: Annual GDP growth rate, *significant at 0.05 level

It is interesting to note that, there is a negative relationship between external debt and economic growth in lower middle-income countries in South Asia. Moreover, labour force is positively related with the economic growth. The error terms are correlated with the regressors (corr (u_i, xb) = -0.9356) which is 73.57\% of the variance is due to differences across panels (\( \rho = 0.7357472 \)).
According to the estimated results India constitute more than 70 percent of the external debt in South Asia. Among South Asian countries, India and Afghanistan are the only countries that record a negative net debt flow in 2016.

Conclusions and Policy Recommendations

The findings of the study reveal that external debt and labour force are the factors that affect significantly on GDP growth rate in lower middle-income countries in South Asia. It shows that gross capital formation and trade openness are not significant factors in determining GDP Growth in South Asian context. However, this is contrary to the conventional view on the growth effects of trade openness and gross capital formation. According to the study undertaken by Rodrik, Subramanian, & Trebbi, 2018 indicate that the trade is almost always insignificant, and often enters the income equation with the “wrong” (i.e., negative) sign. From the South Asian context, it is noticed that countries started liberalising their economies in late 1990s, other than Sri Lanka. Hence, trade openness may not directly affect to the economic growth in South Asia. Study relating to capital formation concluded (Borensztein, Gregorio, & Lee, 1998) that foreign direct investments (FDI) contribute significantly to the economic growth only when a sufficient absorptive capability of the advanced technologies is available in the host economy.

There is a significant positive relationship between labour force and GDP growth rate in South Asia as these counties are abundant with labour. The findings indicate that GDP growth rates and external debt in lower middle-income countries in South Asia are negatively related. Increase in external debts in this region will result in fall in the GDP growth rate. Moreover, it shows that there are unobservable random variables (cultural factors, national policies, federal regulations, international agreements) that have impact on the specified independent variables in the model.

Identifying the reasons affected on South Asia’s deviation from the norms of International Debt Statistics 2018 is one of the sub objectives
of this study. Afghanistan and India are the only two countries in the region that registered negative net debt flows in 2016. Hence, the overall trend of South Asia reflects this trend given India is the largest economy of the region and alone constitutes more than 70 percent of the external debt stock of South Asia. In 2016 India showed a massive increase of 70 percent in its principal repayments on long term external debt (Report A S, 2017).

The prime objective of the study is to investigate the impact of external debt on economic growth in lower middle-income countries in South Asia. It is seen that external debt has negatively affect economic growth. Higher external debt results in higher debt service payment which ultimately results in depreciation of the domestic currency, BOP crisis, inflation etc. which led to hamper economic growth. Hence the policy makers should pay attention on how to use them in productive manner. The lending institutes like Asian Development Bank needs to consider the overall impact on the region through external debt related decisions. Also policy makers should take into consideration that debt overhang is still a paradox that may exist, but debt relief plays a major role in GDP growth.

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Reshaping Human Capital for Enhancing Productivity
A Comparative Study on Labour Supply of Employees between Social Media Addicts and Non-Addicts in Sri Lanka

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Introduction

The patterns of labour supply among workers have been changing over time with the higher usage of information technology. Although neo classical labour leisure model presents the clear division of labour and leisure among workers, that model has been challenged by the usage of social leisure through social media at work. Not only the labour supply but also the other types of leisure including individual and family leisure are further affected by social media since that helps workers to involve in personal activities while at work. This reduces the gap between boundaries of work and home (Kreiner, 2006). Some researchers argue that social media would help to enhance networking among workers which enhanced the work place efficiency and reducing work related stress and would lead to increase the productivity of workers (Aguenza and Som,2012; Fahmy, 2009) while the others argue that reducing work time through social media would make negative impact on the productivity of workers (Peacock,2008; Gaudian,2009; Soron and Taraf,2015). According to Chauhan (2017), 38 percent of employers say that the productivity of workers reduces due to social media. Usage of social media has been increasing all over the world and Sri Lankan situation is also aligned with the global context. According to Internet world stats (2018), 5.5 million people are using Facebook profiles in Sri Lanka. Computer literacy among workers has also been continuously increasing in Sri Lanka and the percentage of people with computer literacy is 27.6 percent among 5 -69 aged people according to Labour Force Survey, 2016. Therefore, future labour markets will face new challenges in measuring the performances of workers due to the impossibility of identifying actual hours of work with Internet and social media addiction.
Objectives

The main objective of this research is to identify the impact of social media addiction on labour supply of workers in Sri Lanka allowing a comparison of labour supply differences between social media addicts and non-addicts.

Methodology

Primary data is the main source of data for the analysis. A structural questionnaire is used to collect data. Since social media usage is high among youth, the sample is drawn from the Facebook accounts of final year undergraduates in Economics of Sabaragamuwa University of Sri Lanka. Each student was advised to get a list of employed people from their Facebook accounts and to select 10 respondents using systematic random sampling method. 390 employees were selected as the sample to provide a questionnaire through a telephone survey conducted in 2018.

This study allows a comparison between labour supply hours in the two contexts of addiction and non-addiction into social media, by a worker. The working definition for social media addiction is the usage social media for two or more hours per day. Since the workers are reluctant to give accurate information on social media usage at work, hours of using social media per day has been used as a proxy and the above working definition was applied for that variable. The study uses endogenous switching regression model to make comparisons between labour supply of employees under two conditions of social media addiction and non-addiction as given below. The switching regression model has been used for the study because this allows to fit binary and the continuous parts of the regression simultaneously with consistent standard errors (Lokshin and Sajaia, 2004; Setboonsarng, et al., 2008).

If $\gamma Z_i + u_i > 0$ individual worker $i$ addicts social media is described by $SM_i = 1$

If $\gamma Z_i + u_i \leq 0$ individual worker $i$ does not addict social media which is described by $SM_i = 0$
Regime 1: \( \ln y_{1i} = \gamma Z_i + \varepsilon_{1i} \) if \( SM_i = 1 \)

Regime 2: \( \ln y_{0i} = \gamma Z_i + \varepsilon_{0i} \) if \( SM_i = 0 \)

Where \( Z_i \) is a vector of individual characteristics that affects the worker’s addiction into social media; \( \ln y_{1i} \) and \( \ln y_{2i} \) are dependent variables of labour supply measuring average hours of works per a week day\(^7\) of social media addicts and non-addicts. \( u_i, \varepsilon_{1i} \) and \( \varepsilon_{0i} \) are random error terms that follow a tri-variate normal distribution. After estimating the above parameters, the following calculations are made as post estimations of switching regression.

\[
xb_{1i} = E(\ln y_{1i} | x_{1i}) = x_{1i}\alpha_{1i} \\
xb_{0i} = E(\ln y_{0i} | x_{0i}) = x_{0i}\alpha_{0i} \\
yc_{1-1i} = E(\ln y_{1i} | SM_i = 1, x_{1i}) = x_{1i}\alpha_{1i} + \sigma_1 \rho_1 f(\gamma Z_i) / F(\gamma Z_i)S \\
yc_{1-0i} = E(\ln y_{1i} | SM_i = 0, x_{1i}) = x_{1i}\alpha_{1i} - \sigma_1 \rho_1 f(\gamma Z_i) / \{1 - F(\gamma Z_i)\} \\
yc_{0-1i} = E(\ln y_{0i} | SM_i = 1, x_{0i}) = x_{0i}\alpha_{0i} + \sigma_0 \rho_0 f(\gamma Z_i) / F(\gamma Z_i)S \\
yc_{0-0i} = E(\ln y_{0i} | SM_i = 0, x_{0i}) = x_{0i}\alpha_{0i} - \sigma_0 \rho_0 f(\gamma Z_i) / \{1 - F(\gamma Z_i)\} \\
\]

Where \( x_{1i} \) denotes all explanatory variables for social media addicts, \( x_{2i} \) denotes all explanatory variables for social media non-addicts. \( x_{1i} \) represents the unconditional expectation of hours of work for social media addict; \( x_{0i} \) represents the unconditional expectation of hours of work for social media non-addict, \( yc_{1-1i} \) represents the conditional expectations of hours of work for social media addict with social media addiction; \( yc_{1-0i} \) represents the conditional expectations of hours of work of social media addict without social media addiction; \( yc_{0-1i} \) represents the conditional expectations hours of work for social media

\(^7\)Study uses five week days to measure work hours per day to keep consistency in average work hour calculations between workers in both government and private sectors.
non-addict with the addiction of social media; \( y_{0,i} \) represents the conditional expectations of hours of work for social media non-addict with the non-addiction of social media; \( \sigma_i \) and \( \sigma_0 \) denotes standard errors of \( \varepsilon_{1i} \) and \( \varepsilon_{0i} \). \( \rho_1 \) denotes the correlation coefficient between \( \varepsilon_{1i} \) and \( u_i \), while \( \rho_0 = \) correlation coefficient between \( \varepsilon_{0i} \) and \( \mu_i \). \( f(.) \) denotes a normal density function and \( F(.) \) cumulative normal distribution.

**Results and Discussion**

The results of endogenous switching regression have found that the selection function of social media addiction is mainly affected by work sector and the nature of social networks\(^8\) which is used by the respondents. A government worker has a significant negative relationship with the addiction into social media than that of a private worker. Years of education is insignificant with social media addiction. Using WhatsApp, Instagram, YouTube and virtual social world/games increase the addiction into social media. Travel distance to work is also an important factor associated with social media addiction. High distance to work place would lead to increase the travel time which facilitate social media usage. The need of communication for the family and social requirements would further lead to increase social media addiction of them.

The switching regression model given in Table 1 compares determinants of working hours between social media addicts and non-addicts. The working hours of social media addicts are mainly determined by age, gender, occupation sector (Being an executive employee) and monthly net salary in thousands. Increasing age would reduce hours of work due to biological deprivation and it is further affected by the seniority benefits and promotions. However, that is not significant for the group of social media non-addicts. Male employees have higher working hours than females among social media addicts (in line with Hassel et al., 2017)

---

\(^8\)Using Facebook was not included in to model since the sample is drawn from Facebook users.
while that is insignificant for non-addicts. Being an executive employee has significant negative relationship with working hours of both social media addicts and non-addicts in comparison to non-executives. According to Kaufman (1989), professionals have lower working hours than the others since they are salaried workers and their remuneration is not determined by the hours of work. Monthly net salary is another significant factor positively associated with hours of work in general for all employees for both groups of social media addicts and non-addicts. The overall model is significant according to LR statistics.

Table 1: Endogenous Switching Regression Model

| Variables                                      | Coef.  | Std. Err. | z       | P>|z|
|-----------------------------------------------|--------|-----------|---------|-----|
| Workinghours_1 (social media addicts)         |        |           |         |     |
| Age                                           | -0.036 | 0.021     | -1.720  | 0.085|
| Being male                                    | 1.371  | 0.325     | 4.220   | 0.000|
| Being an executive employee                   | -0.752 | 0.320     | -2.350  | 0.019|
| Being a government worker                     | 0.173  | 0.320     | 0.540   | 0.590|
| Years of education                            | -0.051 | 0.070     | -0.730  | 0.463|
| Monthly net salary in thousands               | 0.013  | 0.006     | 2.070   | 0.039|
| Constant                                      | 9.925  | 1.088     | 9.120   | 0.000|

| Workinghours_0 (social media non-addicts)     |        |           |         |     |
| Age                                           | -0.011 | 0.022     | -0.030  | 0.975|
| Being male                                    | 0.474  | 0.358     | 1.320   | 0.186|
| Being an executive employee                   | -0.824 | 0.404     | -2.040  | 0.042|
| Being a government worker                     | 0.232  | 0.382     | 0.610   | 0.543|
| Years of education                            | -0.037 | 0.073     | -0.510  | 0.609|
| Monthly net salary in thousands               | 0.018  | 0.009     | 2.050   | 0.040|
| Constant                                      | 6.440  | 1.220     | 5.280   | 0.000|

| Selection Function                             |        |           |         |     |
| Social Media Addiction (2 or more hours at social media) |        |           |         |     |
| Age                                           | -0.003 | 0.009     | -0.370  | 0.713|
| Being male                                    | 0.135  | 0.148     | 0.910   | 0.362|
| Being an executive employee                   | -0.045 | 0.159     | -0.280  | 0.778|
| Being a government worker                     | -0.307 | 0.152     | -2.010  | 0.044|
| Years of education                            | -0.050 | 0.031     | -1.630  | 0.104|
| Monthly net salary in thousands               | 0.000  | 0.003     | 0.020   | 0.982|
| Being permanent worker                        | 0.133  | 0.137     | 0.970   | 0.330|
Using WhatsApp 0.417 0.131 3.170 0.002
Using Instagram 0.428 0.153 2.800 0.005
Using YouTube 0.540 0.134 4.030 0.000
Using virtual social world/games 0.399 0.164 2.440 0.015
Distance 0.004 0.001 2.830 0.005
Constant 0.109 0.519 0.210 0.834

LR test of indep. eqns.: $\text{chi2}(1) = 36.99$ Prob $> \text{chi2} = 0.0000$ n = 385
Wald $\text{chi2}(4)$ = 39.32 Prob $> \text{chi2} = 0.00$
Log Likelihood = -1016.30

Table 2: Post Estimation of Endogenous Switching Regression Model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
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<th>Max</th>
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<td>psel</td>
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<td>0.112</td>
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<td>0.215</td>
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</tr>
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</table>

According to Table 2, unconditional expectation of hours of work for social media addict is 9.09 while unconditional expectation of hours of work for social media non-addict is 6.53 hours per day. Unconditional expectation of hours of work is higher for social media addict than the non-addict. Since the social media usage is possible at work their actual workhours could include social leisure activities as well. Considering conditional expectations, hours of work of social media addict with social media addiction is lower than the conditional expectation of hours of work of social media addicts without social media addiction. It indicates that social media addiction would affect negatively on the efficiency of work of the respective group. Conditional expectations hours of work for social media non-addict with the addiction of social media is lower than the conditional expectations hours of work for social media non-addict with the non-addiction of social media. That means if non-addict employees get addicted to social media, it would rapidly reduce their workhours. Finally, both conditional expectations show
that the addiction to social media would cause to reduce the efficiency at labour supply in line with the findings of Peacock (2008), Gaudian (2009) and Soron and Tarafđ (2015).

**Conclusion**

The study concludes that the conditional expectations of work hours would increase for the non-addicts of social media in comparison to social media addicts, showing that social media addiction would lead to reduce the number of working hours of employees. Therefore, human resource managers should pay their attention on social media usage of employees especially at work since that would reduce the maximum capacity utilization of workers.

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Introduction

The human capital of a country is a significant resource to its economy. The active participation of human capital in the country’s economy determines how well a country can achieve its economic goals. However, certain socially created barriers can have adverse effects on achieving the true potential of a country’s human capital.

The human capital of a country comprises of both men and women whose roles are predefined both socially and culturally. As such norms are considerably deep rooted in different societies, breaking away from these predefined gender roles as a social whole or community is near impossible. Due to this reason some individuals are either compelled or conditioned, to suppress their own desires.

This predefining of one’s role in the society based on his/her gender is termed ‘gender stereotyping.’ “Gender stereotyping is the practice of ascribing to an individual woman or man specific attributes, characteristics or roles on the sole basis of her or his membership of the social group of women or men” (Cook and Cusack, 2010: 20).

Pertaining to this gender based stereotyping, the society expects certain specific roles to be fulfilled by individuals. This state is reflected in the employment field as well. Gender stereotyping marks the availability or unavailability of employment opportunities for the two genders. Consequently, gender stereotyping has a positive relationship with
employment asymmetries; i.e. inequality in employment opportunities (Kiaušienė and Štreimikienė, 2011).

Due to the pre-conceived notions on gender roles certain employment sectors favour and are favoured by one gender (Catalyst, 2017). This discourages individuals in choosing certain careers which are dominated by the opposite gender in the society. Consequently, gender equality in employment decreases and causes inconsistencies in the labour market, which is proof of the country’s human capital not being appropriately utilized.

This study thus engages in a case study of the low female employment in the vehicle services sector of DIMO to discuss how gender stereotyping has affected the lack of females in the vehicle services sector of that company.

**Research Problem**

Gender inequality can be observed in every employment sector and it acts as a barrier when utilizing a country’s human capital in the labour market. The present lack of a gender-balanced workforce in DIMO showcases the discrepancy in the larger industry as the lack of female employees in the company’s vehicle services sector is enough evidence of this argument. As the company has not yet been able to discover a solid reason for this issue this study focuses on the following research problem; “Why is there a low female employment within the vehicle services sector of diesel and motor engineering PLC?”

**Objectives**

The general objective of the research is to study the low female employment within the vehicle services sector of DIMO and the specific objective was to study the impact of gender stereotyping on low female employment within the same.
Methodology

Based on the literature on gender stereotyping and employment, the number of employees in a certain sector can be determined based on three factors: employment choice, competence and employment opportunities. Gender stereotyping has an impact on all of these. The dependent and the independent variables therefore were identified as follows;

![Diagram showing the relationship between gender stereotyping and employment choice, competence, opportunities and number of female employees in the vehicle services sector.]

The study mainly focused on four departments of DIMO forming a population of 144. To maintain a confidence level of 95% and a margin of error of 5% the sample size required for this research was determined as 100 through Simple Random Sampling.

Simple observations, semi-structured interviews and participant observation were used to collect qualitative data while a questionnaire designed by operationalizing the conceptual framework was used to collect quantitative data. Secondary data was collected through research papers, journal articles, e-books, website articles, surveys and the company website.

The data gathered from the questionnaire was analysed using SPPS version 20.0 and were used as the foundation for the descriptive analysis of the study. In addition, the data gathered through simple observation, semi-structured interviews and participatory observation was used as supportive information for the analysis.
Results and Discussion

The analysis of the demographic data showed that there is a gender imbalance in the DIMO work force. Within the selected random sample size of 100 participants the gender division was shown as 77 males and 33 females. More interestingly, there was only 1 female in the vehicle services sector out of 57 employees in the selected sample. Thus there is a definite lack of female employees in the vehicle services sector of DIMO.

The overall analysis of the data exhibited that while most of the respondents believe that women are able to work in the vehicle services sector, they also believe that it will be hard for women to carry out the tasks in this sector due to high labour intensiveness that this sector demands.

The p-value (0.000) for the relationship between the strength required for work at the vehicle services sector and the impact of high labour intensiveness (which is lesser than 0.05) suggest that there is a relationship between the two tested statements. Thus, there was a conviction that the tasks at vehicle services sector are hard for women due to high labour intensiveness.

Further the data showcased the existence of stereotypical beliefs; “Females are more likely to work in office environment than workshop environment” and “Females doesn’t want to work in this sector because it is being labelled as a Masculine sector.”

Analysing responses based on gender unveiled that majority of females as well as males support these stereotypical beliefs. Thus, there was a general belief that services sector should be confined to males and that females would find the work too labour intensive. Due to these reason females tend to not choose vehicle services sector as their employment of choice.

This argument can be further clarified as the P value for the relationship between the responses received for the two statements that vehicle
services sector is only suitable for men and women are more suitable for office environment was 0.000 which is lesser than 0.05. This suggests that there is a relationship between the responses received for these two statements. Thus the reason people believe that women do not belong in the vehicle sector is the belief that women should work in an office environment not in a workshop environment.

The spearmen correlation analysis further proved this argument with a value of 0.667 which suggest a strong positive relationship between the above two statements. An interview conducted with a male employee in the vehicle service sector provided insight into this matter; “I don’t think that women can survive in this sector. The amount of work that we do in a day is very labour intensive. Women are more suitable for administrative work in the office, not to the workshops” (Source: Interview, Jayantha Fernando, Service Advisor Mercedes Passenger Vehicles, 11 September 2017).

A considerable number of respondents believe that vehicle services sector is a “Masculine” sector. It is due to such stereotypical views that employment choices for women are limited and those barriers are more psycho-social rather than based on real fact.

**Conclusion**

The data analysis showed that the vehicle services sector of DIMO was subjected to gender stereotyping and was labelled as “Masculine” only. As the vehicle services sector is very labour intensive and because of the belief that females have less tendency to work in labour intensive environments, this sector has limited to males (Bem, 1981). Thus the traits of the dominating gender of that employment sector are reflected from the nature of that employment sector.

Further it was observed that because of the “Masculine Only” label females were limiting themselves from entering to the vehicle services sector and this is a main reason for the lack female employees in it (DelBoca and Ashmore, 1980). The argument of individual’s competence is subjected to gender stereotyping and it limits the true
potential of individuals by creating a “Stereotype Threat”. This “Stereotype Threat” refrains them from selecting employment sectors that they actually have the ability to perform well in (Brannon, 2004; Deaux and Lewis, 1984).

To change this misbelief of the vehicle services sector and increase the number of female employees in DIMO, people’s perception about the vehicle services sector has to be changed (Corbett, Hill and Rose, 2010). In conclusion gender Stereotyping has a positive impact on utilizing human capital in an economy. The case study of low female employment of DIMO speaks for the entire industry on how gender stereotyping has positively contributed to limiting individual’s potentials and employment opportunities in the social context. Breaking this stereotypical barrier is essential to fully utilize the human capital of a country and it can be done by altering the perceptions of people about the stereotypically labelled employment sectors.

References


The Efficiency of Public Expenditure on Sri Lankan Universities

A Data Envelopment Analysis

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indeewari@econ.cmb.ac.lk

Introduction

Public education is the biggest initiative undertaken by many governments around the world (Baker & LeTendre, 2005), mainly due to education’s connection to innovation and growth. Investment in public education results in huge social and economic benefits. Particularly in recent years issues related to financing education in Sri Lanka have been widely debated. The Federation of University Teachers’ Association (FUTA) demands that the public investments in education should be increased to six per cent of Gross Domestic Product (GDP). It is argued that the inadequacy of educational financing leads to the deterioration in the quality of education. The counter argument is that, demanding six per cent of GDP for education is not practically possible; given that the total government expenditure as a proportion to GDP was only 19.4 per cent in 2017 (Central Bank of Sri Lanka, 2018). However, efficiency of resource utilisation is hardly discussed in social forums. Nevertheless, it has become a key concern of policy makers. It is important to rationalise government expenditure in view of the huge government deficit in Sri Lanka.

Data Envelopment Analysis (DEA) was initially being used to investigate the relative efficiency of not-for-profit organizations, only to quickly spread to profit-making organizations. DEA has been applied to evaluate the relative efficiencies among universities and relative efficiencies among university departments or courses. This research attempts to critically review the efficiency of public expenditure on universities in Sri Lanka, using the DEA approach.
Research Problem
Is public expenditure on universities in Sri Lanka efficient?

Objective
Evaluating the efficiency of public expenditure on universities in Sri Lanka and proposing measures to enhance the efficiency.

Methodology
The efficiency of public expenditure on universities is analysed using secondary data from several sources. This research employs the DEA approach to evaluate the efficiency. DEA approach “is based on a linear combination of input and outputs in order to specify the efficiency frontier. Convexity of the set of input-output combinations is assumed since this method constructs an envelope around the observed combinations” (Mandl, Dierx, & Ilzkovitz, 2008, p. 9). This study uses the Banker, Charnes & Cooper model (BCC model), which assumes variable returns to scale (VRS). The use of a VRS model is justified using the argument of Coelli, Rao, O'Donnell, & Battese (2005):

The use of the constant returns to scale (CRS) specification when not all firms are operating at the optimal scale, results in measures of technical efficiency (TE) that are confounded by scale efficiencies (SE). The use of the VRS specification permits the calculation of TE devoid of these SE effects. (p. 172)

The model used is an output-oriented model; a model that maximizes the efficiency rate of a unit. As pointed out by Boussofiane, Dyson, & Thanassoulis (1991), in order to discriminate effectively between efficient and inefficient DMUs, there is a need for a sample size larger than the product of number of inputs and outputs. Another rule of thumb for selecting an appropriate sample size, as portrayed by Sinuany-Stern, Mehrez, & Barboy (1994), is to ensure that it is at least three times larger than the sum of the number of inputs and outputs. However, DEA can be used with small sample sizes (Evanoff & Israilevich, 1991) and many such examples can be found in the literature (e.g. Haag & Jaska, 1995;
Sherman & Gold, 1985; Parkan, 1987; and Oral & Yolalan, 1990). Thus, the input-output mix used in this study is identified based on previous studies that evaluate the efficiencies of universities.

Data on 14 state universities9 are used. Input variables used are total recurrent expenditure10 and total capital expenditure (in rupees thousand)2. Output variables are total number of first degrees awarded2, total number of higher degrees awarded2, graduate employment rate11 and webometrics world rank12. Webometrics world rank is linked to the volume and quality of the contents the university publishes on the web. It indicates the power of its official website to produce scientific information for public access. Webometrics world ranks were modified to fit the model. The university with the highest world rank in the dataset (i.e. University of Peradeniya - 2,044) was numbered 14 and the university with the lowest world rank (i.e. University of the Visual & Performing Arts - 14,256) was numbered 1. The logic behind this operation is that, the university with the highest number (University of Peradeniya) is thus considered to be the best in this output indicator (the higher the output, the better). Thus, this study captures the multi-dimensional output of tertiary education. The internal output is captured through the number of degrees awarded. The graduate employment rate, which measures the success of graduates on the labour market, captures the external output.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recurrent expenditure (Rs. thousand)</td>
<td>2,112,213</td>
<td>1,299,145</td>
<td>526,395</td>
<td>4,863,030</td>
</tr>
<tr>
<td>Capital expenditure (Rs. thousand)</td>
<td>957,822.6</td>
<td>573,101.6</td>
<td>175,719</td>
<td>2,134,393</td>
</tr>
<tr>
<td>Total graduates</td>
<td>1,309,714</td>
<td>774,4403</td>
<td>342</td>
<td>2,650</td>
</tr>
<tr>
<td>Total postgraduates</td>
<td>289,7143</td>
<td>474,7386</td>
<td>0</td>
<td>1671</td>
</tr>
<tr>
<td>Employment rate (%)</td>
<td>57.73571</td>
<td>15.89391</td>
<td>33.9</td>
<td>94.3</td>
</tr>
<tr>
<td>Webometrics rank</td>
<td>7.5</td>
<td>4.1833</td>
<td>1</td>
<td>14</td>
</tr>
</tbody>
</table>

9 Out of the 15 state universities in Sri Lanka, Open University of Sri Lanka (OUSL) is excluded in the analysis. This is because OUSL’s financing system cannot be directly compared with the others’. One of the main differences is that, part of OUSL’s recurrent expenditure is raised through fees.
10 Source: University Grants Commission, 2017
11 Source: Ramanayake, Jayammane, Ramyadevipriya, & Perera, 2013
12 Source: Webometrics (2018, Jan)
Results and Discussion

A university being given the efficiency score of 1, in Table 2, indicates that the university is efficient in producing outputs from its inputs.

*Table 2. VRS output-oriented two-stage DEA model for the 14 universities*

<table>
<thead>
<tr>
<th>University</th>
<th>Rank</th>
<th>Efficiency Score</th>
<th>Peers</th>
<th>Slack</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><em>L</em> Exp &amp; <em>L</em> Exp_1, <em>O</em> Grad, <em>O</em> Postgrad, <em>O</em> Emp, <em>O</em> Rank</td>
</tr>
<tr>
<td>CMB</td>
<td>1</td>
<td>1</td>
<td>CMB</td>
<td>-</td>
</tr>
<tr>
<td>PDN&lt;sup&gt;5&lt;/sup&gt;</td>
<td>1</td>
<td>1</td>
<td>PDN</td>
<td>-</td>
</tr>
<tr>
<td>SJP&lt;sup&gt;6&lt;/sup&gt;</td>
<td>1</td>
<td>1</td>
<td>SJP</td>
<td>-</td>
</tr>
<tr>
<td>KLN&lt;sup&gt;7&lt;/sup&gt;</td>
<td>1</td>
<td>1</td>
<td>KLN</td>
<td>-</td>
</tr>
<tr>
<td>MRT&lt;sup&gt;8&lt;/sup&gt;</td>
<td>1</td>
<td>1</td>
<td>MRT</td>
<td>-</td>
</tr>
<tr>
<td>JFN</td>
<td>13</td>
<td>0.9144</td>
<td>SJP, KLN, MRT, RUSL, UWU</td>
<td>- 306,212, 243,933</td>
</tr>
<tr>
<td>RHN</td>
<td>11</td>
<td>0.9739</td>
<td>SJP, KLN, MRT, RUSL</td>
<td>- 492,111, 518,902</td>
</tr>
<tr>
<td>EUSL</td>
<td>12</td>
<td>0.9490</td>
<td>RUSL</td>
<td>18.120.8, 491.593, 630.857, 201.571, 1.97143</td>
</tr>
<tr>
<td>SEUSL&lt;sup&gt;9&lt;/sup&gt;</td>
<td>1</td>
<td>1</td>
<td>SEUSL</td>
<td>-</td>
</tr>
<tr>
<td>RUSL&lt;sup&gt;10&lt;/sup&gt;</td>
<td>1</td>
<td>1</td>
<td>RUSL</td>
<td>-</td>
</tr>
<tr>
<td>SUSL&lt;sup&gt;11&lt;/sup&gt;</td>
<td>1</td>
<td>1</td>
<td>SUSL</td>
<td>-</td>
</tr>
<tr>
<td>WUSL&lt;sup&gt;12&lt;/sup&gt;</td>
<td>1</td>
<td>1</td>
<td>WUSL</td>
<td>-</td>
</tr>
<tr>
<td>UWU&lt;sup&gt;13&lt;/sup&gt;</td>
<td>1</td>
<td>1</td>
<td>UWU</td>
<td>-</td>
</tr>
<tr>
<td>VAPA</td>
<td>14</td>
<td>0.8442</td>
<td>SEUSL, RUSL, UWU</td>
<td>- 2898.54, 2.40327, 1.60075</td>
</tr>
</tbody>
</table>

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<sup>5</sup> University of Peradeniya  
<sup>6</sup> University of Sri Jayewardenepura  
<sup>7</sup> University of Kelaniya  
<sup>8</sup> University of Moratuwa  
<sup>9</sup> South Eastern University of Sri Lanka  
<sup>10</sup> Rajarata University of Sri Lanka  
<sup>11</sup> Sabaragamuwa University of Sri Lanka  
<sup>12</sup> Wayamba University of Sri Lanka  
<sup>13</sup> Uva Wellassa University of Sri Lanka
Another useful application of DEA is it can provide information on how much universities should improve in their performance. In an output orientation, inputs are assumed to be fixed and the possibility of expansion of outputs is explored. University of Jaffna (JFN), University of Ruhuna (RHN), Eastern University of Sri Lanka (EUSL) and University of Visual & Performing Arts (VAPA) are indicated as inefficient universities in Table 2. For example, VAPA can improve its output by 18.46% (calculated by $1/E_0 = 1/0.8442 = 1.1846$).

The university has medical and engineering faculties as well. Universities that do not have an engineering and/or medical faculty spend considerably less and have less staff per graduate than universities with an engineering and/or a medical faculty. Especially, medical and engineering faculties employ an increased number of non-academic staff when compared to other faculties, e.g. nurses or technical staff. JFN too is indicated as inefficient: it also has a medical faculty. Though EUSL’s capital expenditure (Rs. 990,285 thousand) is above the average level (Rs. 957,822.6 thousand), it has the lowest number of graduates.

The main objective of this research is to apply DEA in examining the relative efficiency of public universities in Sri Lanka. The findings indicate that the universities are already operating at acceptable levels, on average. There is potential to improve by increasing outputs such as number of graduates and specifically postgraduates. Further development in this revenue-raising activity of postgraduate enrolment is important. There were also slacks in input utilization, which can be addressed by university administration without much difficulty.

**Conclusion**

While tertiary education systems in the world are being evaluated on quantifiable inputs and outputs, the tertiary education sector in Sri Lanka still retains certain key characteristics that set it apart from other types of organisations. Some of these key characteristics are “the lack of profit motive, goal diversity … [and] diffuse decision making” (Lindsay, 1982, p. 176). This nature of tertiary education continues to complicate selecting inputs/outputs and undertaking inter-university comparisons. Nevertheless, application of DEA provides an avenue to explore the
efficiency of converting multiple inputs into multiple outputs in tertiary education.

The authorities need to revise the method used for allocating funds to public universities (and other tertiary education institutions); it needs to be based on efficiency, to make it more results-oriented. Efficiency-based financing reinforces the accountability of public tertiary education institutions. Furthermore, the government needs to establish a reliable and user-friendly tertiary education management information system that collects data from all public higher education institutions.

In view of the huge government deficit, identifying areas that may specifically enhance future growth is important. On the other hand, given that government income is mostly generated through taxes and taxes create distortions in the allocation of resources and thus constrain economic growth, it is essential that government expenditures are used effectively to improve long-term growth. Improved effectiveness of government expenditure increases value for money by achieving better outcomes at the same level of spending. Thus, Sri Lanka needs to focus on making the most of its limited public resources allocated to tertiary education.

References


Whether the Lower Level of Educational Performance Leads to Poverty:

An Analysis for the Developing Countries of South East Asia

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Introduction

Along with the development and progress of civilization, poverty is a burning issue across the world. Historical evidences suggested the poverty-based growth of human civilization in space and time. The history page bear testimony to the fact that the standard of living was very low compared to the modern times. Approximately in and around 1500 A.D., the standard of living began to improve in Renaissance Italy. For the few centuries, the centre of prosperity shifted to the north-western part of Europe. The light of industrialisation patronized the upliftment in income level which eliminated this situation in some extent. In the 20th century the latent image of poverty became prominent across the world (www.ourworldindata.org). Countries like USA, China had faced the same situation though have evolved as capital growth engine in world context in present time. Poverty portrayed the real image of a country’s socio-economic condition. Poverty may call as a situation of an individual or societal inability to meet the basic need of livelihood. World Bank provides the information of global extreme poverty and also sets the international poverty line that is $1.90 per day. Basically, poverty is defined as per income level across the world which is not easily measureable across the countries because the price level, purchasing power, per-capita incomes are not same. Adjusted purchasing power parity can solve this problem.

Poverty due to uneven distribution of natural resources, unfavourable climate, natural calamities, unemployment, industrial and agricultural backwardness as well as illiteracy and so on. Different stakeholders of the society act locally, regionally or globally funded directly or
indirectly for alleviate poverty. Nowadays Poverty alleviation is a global challenge emphasized on Millennium development goals (MDG). Availability and accessibility of quality education make an influence on poverty and vice-versa in sub Saharan Africa (Agbor, 2012). Lack of monetary fund of an individual minimizes the opportunity to access the education facility and thus aggravate poverty level in a vicious cycle manner (Banerjee, and Duflo. 2011). From different studies it has been proved that, light of education enhances the economic condition as well as livelihood status (Tilak, 2002; International labour office, 1977). As per the human development approach suggested by UNDP (2010), the better quality of life and standard of living may be the result of expansion of income and wealth which reduce poverty. So, education can improve the quality of life and also alleviated poverty at all (Noor, 1980; Cochrane, 1988; McNicoll et. al., 1997).

This paper tries to draw a clear image of the relationship between education status and level of poverty of South-east Asian countries. Data suggested that, Gross enrolment in Primary and secondary education level has a greater impact on gross monthly minimum wages and GDP-per capita in the countries like India, Pakistan, Nepal, Bhutan, Sri Lanka and Bangladesh. From the study it is clear that, education can enhance the human capital, human capital enhances the economic growth and economic growth can be alleviated the poverty.

**Research Problem**

Education is a very important social factor which leads to improve human capital as well as it is means of measuring the human resource development. Most of the countries within south-east Asia, try to shape up their nation for a better life. Education can improve the lifestyle as well as economic condition of a region which can alleviate poverty. The study tries to portrait the impact of education on economic condition as well as alleviation of poverty in South East Asia. Adult literacy is quite low in this study area except Sri Lanka which has low percentage of international extreme poverty. Thus, clearly portray that education has a control on poverty. This study is conducted by uses of secondary data which is collected from World Bank.
Objectives:

Third world countries have been faced poverty situation more seriously. India, Pakistan, Bangladesh, Bhutan, Nepal and Sri Lanka considered as study area. Here, comparatively discuss the situation of adult literacy, GDP per capita (PPP US$) and head count of below poverty line. The main objectives of this study are following:

- To analysis the educational scenario of these countries.
- To examine the economic condition of these countries.
- To analysis the poverty situation of these countries.
- To examine the relationship between education and poverty situation.

Methodology

Secondary data have been collected from World Bank, International Labour Organisation and UNESCO institute for statistics database for conduct this study.

Statistical and Cartographic techniques have been adapted as methodology. Simple regression analysis has been adapted to analysis the relationship between education and poverty. To conduct this study three multiple layers have been constructed with several variables for portrayed the relation as per system approach. Three multiple layers are:

Input: Gross enrolment ratio in Primary education in percentage, Gross enrolment ratio in Secondary education in percentage and Adult literacy rate in percentage.

Process: Employment to population ratio in percentage, Output per worker (GDP constant), Statutory nominal gross monthly minimum wages and GDP (PPP US $).

Output: Poverty percentage as per international level.
Results and Discussion

Educational Scenario

Nepal is very much ahead in terms of Gross enrolment ratio in percentage. In 2015 the rate is 115.43 percent while India is 108.49 percent, Bangladesh is 120.01 percent, Bhutan is 97.86 per cent, Pakistan is 92.41 percent and Sri Lanka is 101.68 percent. In case of Gross enrolment ratio in secondary enrolment, Sri Lanka holds a remarkable place among others selected countries. In 2015 the rate is 97.70 per cent while Bhutan is 82.92 percent, India is 73.98 per cent, Nepal is 67.14 percent, Pakistan is 44.38 percent and Bangladesh is 63.42 percent. In case of overall adult literacy, Sri Lanka is in top with 92.60 per cent while Bangladesh is 61.50 percent, Bhutan is 63.90 percent, India is 72.20 percent, Nepal is 64.70 percent and Pakistan is 56.98 percent in 2015.

Economic Scenario

GDP per capita PPP and Gross monthly minimum wages are considered as economic indicators. Sri Lanka has been occurred a remarkable place in terms of GDP per capita PPP with $11798.39 in 2015 while Bhutan is $ 8245.60, India is $6130.06, Pakistan is $5000.28 and Nepal is $2464.39. In case of Gross monthly minimum wages, Sri Lanka also holds a significant position at $ 10655 in 2015 while Pakistan is $10000, Nepal is $8000, Bangladesh is $ 5300, Bhutan is $3000 and India is $2990.

Poverty Scenario

In 2016, international extreme poverty rate is 13.80 percent in Bangladesh while in India 12.40 percent people lives below the poverty level in 2015, in Sri Lanka the figure is 1.8 per cent (2013), in Pakistan it is 6.07 percent (2013), in Bhutan 2.17 percent people live below the extreme international poverty line (2012) and in Nepal 14.99 percent people lives below the poverty line.
Relation between Education and Poverty:

Education can enhance the human capital, human capital enhances the economic growth and economic growth can be alleviated the poverty. In the case of Sri Lanka, 1.8 per cent of people lives below the extreme poverty line while literacy is 92.60 per cent and GDP per capita PPP with $11798.39. In Bangladesh 13.80 per cent of people live below the poverty line while adult literacy rate is 61.50 per cent and GDP per capita is $ 5300 but in case of Bhutan only 2.2 per cent of people below the poverty line while adult literacy rate is 63.90 per cent and GDP per capita is $3000. As per the case to case, it is clear that poverty is related to education as well as economic condition. As per the regression model-1, economic condition is positively related with adult literacy which indicate better educational opportunity accelerate the economic condition of a country. Model-2 is showing the relationship between poverty and education status and model-3 also explain economic variable is a significant determination of poverty. The models are:

Model-1: Economic Condition (GDP) = (-8498.511) + 0.791 Adult literacy
Model-2: Poverty percentage = 21.37 - 0.401 Adult literacy
Model-3: Poverty percentage = 17.631 -0.854 GDP

Conclusion

Poor people are not getting as such educational opportunity due to mal distribution of resources and infrastructural bottlenecks. So there is an interrelationship between them. From the regression result it is followed that education is a very significant variable to determine poverty.
References


Challenges and Prospects Faced by Youth in Sri Lanka
(with Special Reference Tangalle District, Hambantota, Sri Lanka)

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Introduction

Youth is a significant asset in a development process in any country. The UN explains youth as a key component of the society and vital human resource for development, social change, economic growth and technological innovation. In this regard, youth groups must have full access to education, adequate healthcare, employment, financial services, and participation in public life and activities (UN, 2011, p.8). United Nations Educational Scientific and Cultural Organisation (2018) looks at a youth as an individual between 15-24 years. However, in Sri Lanka, youth considered as an individual, if he or she is under the age of 15-29 years (National Youth Policy, 2014: Ibargüen, 2004). However, Sri Lanka has witnessed youth decline in recent times according to the 2012 Census, from 26.8 in 2001 to 23.2 in 2012 (UNDP, 2014, p.10). This is contrary to the youth bulge that some countries are experiencing in the World today. In this regard, Sri Lanka faces the problem of declining influence of youth and shrinking labour force (ibid, p.12). In addition, Youth in Sri Lanka faces challenges such as youth unemployment and poverty resulting in rapid urbanization, anxiety and violence (MYASD, 2014, p.30; UNDP, 2014, p.12, Hector Kobbakaduwu Research Institute, 2013: 16).

However, youth is a major societal component and vital in the development of the economy. Therefore, this requires proper youth empowerment process in the state and strong policies, plans and programmes. Sometimes politicians use youth empowerment in their agenda, but the actual empowerment is not visible. This study was carried out in Tangalle Urban Council, Hambantota District and the
main objective was to explore youth empowerment in Sri Lanka, in light of their prospects and challenges.

**Research Problem**

Youth considers as the heart of the any nation as they are the work force of the country. Sri Lankan Public Policies, state development agendas have always given a significant attention to the youth empowerment (Ministry of Youth Affairs and skills development, 2017). One of the most remarkable event happened for the youth empowerment was the World Youth Conference in 2014 and Sri Lankan National Youth Declaration introduced in 2014(National Youth Declaration, 2014). “Aspiring Youth” (Tharunyata Hetak) was one of major programmes to empower youth under former Mahinda Rajapaksa’s government. The programmes had special focus on Hambantota district as it was the electoral division of former president in 2005-2015. The researcher selected Tangalle district in Hambantota, to see what the available opportunities, challenges, prospects of the youth in Tangalle, Hambantota. In addition to that, the awareness of the opportunities and parents’ expectations also concerned in this research.

**Research Objectives**

- To identify the available opportunities for the youth in Tangalle
- To understand how the political attention has been given opportunities to Tangalle district youth.
- To understand the prospects of youth
- To observe how does the education has affected to change the prospects of youth
- To see what the expectations of the parents from the young people

**Research questions**

- What opportunities are available for youth in Tangalle Urban Council?
- What role does family, education and society play in shaping the prospects of youth in Tangalle Urban Council?
What challenges do youth of Tangalle Urban Council face in the pursuit of their current and future goals?

Methodology

The researchers adopted the qualitative research strategy in order to “dig deep” in understanding the current situation of youth, available opportunities, prospects and challenges that they face from their own perspectives (Blanche et al., 2006). The study adopted a case study design because it gives opportunity to “see through the eyes” of the youth and access their local knowledge on their current situation, available opportunities, prospects and challenges that they face from their own perspectives with reference to Tangalle (Bryman, 2012, p.68). The study sample was selected based on convenience sampling technique because there was no specific list of respondents from which we could select the study sample. But the sample includes different educational level, Age, Gender groups. The sample selected the main three institutions available in Tangalle Urban Council that have been providing youth training and development programs. These included the National Youth Services Council, Vocational Training Centre and the Ocean University in Tangalle. Semi-structured interviews, Focused Group Discussions were used to collect data. According to Bryman (2012, p.471). “Interview is the most widely used method in qualitative research and provides the interviewee a great deal of leeway in replying due to the flexibility of interview method”. The use of the semi-structured interview in this study was guided by an interview guide that covered fairly the topics that the researchers wanted to study. Focus Group Discussion was used at the Vocational Training Centre for students and instructors. Participant observation also used along with the data collection. Data analysis has done by using the thematic analysis. Researchers have collected all the data from the field and coded them first. the data has descriptively explained under the major themes in order to answer the research questions.
Results and Discussion

*Higher interest to join the public sector as employees.*

All respondents in the youth and parent category were asked to choose between the private and government sector for work preference. All parents interviewed reported that they wanted their children to work in the government sector because it is pensionable and gives a good reputation. Equally, 30% of youth preferred to work in the private sector and the 42% the government jobs. Rest of the participants did not have priority either private or government. Youth who selected the government sector had the similar argument as their parents that government jobs have good reputation in the society and are pensionable unlike in the private sector. Youths who studied at Ocean university, 95% wish and plan to work in abroad and foreign companies. Interviewers asked what the reasons for are going abroad. They mentioned high salaries, establish in developed countries, seeking better lives, Sri Lanka does not have wide job market for them etc.

Youth Training Activities

The question on youth training programs were asked from all respondents’ categories. Youth were asked to identify some of the youth activities in which they had participated. On the other hand, the instructors were asked to identify some of the youth activities that they conduct to develop youth capabilities in their preparation current and future activities. Purposely, this question was asked to establish youth empowerment programs that youth are undertaken through. Also, to know whether they participated in such programs and how their lives have changed after undergoing such trainings. Participating activities in the youth centre has identified as adding value to their CV, expand social network and build their personality. The university students did not aware where they can improve their skills and they did not aware the youth centre. One of the major reason for that is the students are from different parts of the country. Study shows that the young jewellers have identified that there are opportunities around them, such as mega projects in Hambantota. They do not necessarily understand that if they benefited from the different programmes of the politicians. But the ocean university students have identified politicians influence help them
to establish Ocean university as a state university. Youth jewellers, who are unemployed and who are working at private sector has told that they necessarily receive special attention of opportunity from politicians, they claim that people who have close relationship to politicians always get the jobs and benefits.

The Role of the Family in Youth Prospects
Through semi structured interview and focus group discussion, both youth and parents highlighted the importance of the family in youth development. Those were: Family support and motivation, Skills and training development, Securing white collar jobs and Marriage.

Skills and Training Development
Apart from the support and motivation, the youth attested that their families are helping them to acquire special skills and training besides formal education. These include English Language skills, ICT skills, driving skills, interpersonal relations, swimming and leadership skills. Parents revealed that these skills and trainings were important in their children to jobs. Other than parents support and financial assistance to the children, some parents who are doing traditional jobs such as fishing. They wish their children to do nice, well reputed jobs. Vocational training description of the future using semi-structured interview instrument and focus group discussion, youth were asked to give a description of the kind of life they intend to live in the next five years. This was intended to establish what they thought about their future. Out of the sample of 80 youth, 25 youth did not have an idea of the type of life they intend to live in the next five years. All the youth interviewed through focus group discussion revealed that their interest in pursuing degree courses in the next five years. A question as they to why they thought so was asked. They reported that they had all applied for degree programs at different universities and were waiting for admission results. The rest identified the following; working as teachers, lecturer, undertaking master's and Ph.D. programmes abroad and establishing businesses. Parents interviewed reported that they are not only investing in their children, but also preparing them for “good work” such as Doctor, Lawyer, Engineering, among others.
Conclusion

Youth are a vital asset to the country. In this regard, they must have full access to education, healthcare, employment, financial services and participation in the human and economic development efforts of the country. However, the study revealed that, the youth in Tangalle Urban Council are facing challenges such as acquisition of job, financial constraints, English Language and ICT problem and over politicization in the National economy. Youth did not see they got special attention or significant opportunities with the political agendas and programmes which has designed based on Hambantota youth. As part of efforts in resolving these challenges the respondents recommended a youth loan system to receive micro credit to youth in the business domain, training the youth in English Communication Skills, instituting youth programs towards attitudinal change, transparency and fairness in the economy to have equal platform the youth and educating the youth on the various developmental projects and available jobs.

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Moonlighting Professionals: Causes for Seeking Second Jobs by the Expertise Human Capital in Sri Lanka

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Introduction

Both exogenous and the endogenous growth models have identified the role of labour and productivity of labour to have a greater contribution towards the economic growth of a country. Not only reducing the level of unemployment but also full capacity utilization of available human capital plays an important role in this context. The proportion of expertise professionals in different employment sectors is relatively low in Sri Lanka in comparison to workers representing skilled and elementary occupations. Full capacity utilization of professionals would be an important policy discussion to enhance the aggregate expertise labour supply of the country by facilitating them additional work hours to increase the level of productivity at macro aspect. If the primary employer doesn’t fully utilize the readily available hours that individuals would like to offer due to unavailability of capacity at primary job, then it will ultimately lead to under-utilization of professional workers. Therefore, by allowing professionals to engage in a secondary job, the economic growth can be increased. In that sense, professional moonlighting is pro-growth.

In microeconomic perspective, there are four supply side motives for holding secondary employment including hours’ constraint motive, financial motive, heterogeneity motive and flexibility motive. ‘Hours constraint’ motive explains the tendency to moonlight due to the restrictions made by the primary organization to have preferred work schedules (Shishko & Roster, 1976; Krishnan, 1990; Nadrei, 2003) while tendency to perform different interests have become the second key motive of moonlighting (Sussman, 1998; Nadrei, 2003; Heineck, 2009). The specific financial needs and economic fluctuations further
motivates to moonlight (Culler & Bazzoli, 1985; Krishnan, 1990; Shishko & Rostker, 1976; Abdukadir, 1992; Heineck, 2009) while the flexibility in both primary and the secondary jobs have become the other motive of moonlighting. (Alden, 1977). Professional moonlighting is also affected by the same motives while the priorities are different by the occupation. According to Weerathunga and Samaraweera (2018), moonlighting among teaching professionals was mainly affected by the hour’s constraint motive. Financial and the hours constraint motives are identified as the key motives of moonlighting in general, according to Samaraweera (2015). Identifying the main causes of moonlighting among professionals, will guide the labour market policy directions to achieve the full capacity utilization of the labour.

Research Problem and Objectives

Moonlighting is not a behavior which is enforced on a worker but it’s a result of personal choice. Decision to moonlight can be arise due to various reasons such as financial and non-financial. These reasons differ from one to one based on their demographic factors, social factors, geographic factors and economic factors. As per past studies decision to moonlighting depends on a wide variety of determinants. As they demonstrate, even the same determinant tends to move in opposite directions, in different economic setups in different countries. As well the determinants of moonlighting and their behavior also differs among occupation groups. This paper is targeted to explore the determinants of professional moonlighting in Sri Lankan context and as well, how they behave, along with decision to moonlight.

Identifying the determinants of professionals seeking moonlighting opportunities is the main objective of the study. Demographic, socio economic and locational factors dealing with the different motives of moonlighting are considered further to elaborate the main objective.

Methodology

The researcher has adopted a quantitative approach to identify the determinants of moonlighting among professionals. The study has used micro level secondary data of Labour Force Survey 2016 enumerated by
the Department of Census and Statistics Sri Lanka. The secondary data has considered the working age population defined as “All persons of age 15 years and above.”

The occupation category ‘Professionals’ have been selected as the sample for this study. Out of 85,082 observations only 2.52 percent (2,140 observations) falls into the category of Professionals. Within the 2,140 professionals there are 241 Moonlighters (11.3 percent) and 1,899 Non-Moonlighters. Probit estimation has been used to model the choice of moonlighting to maximize the utility of individuals, based on the review of methodological literature (Krishnan, 1990; Foley, 1997; Samaraweera and Ranasinghe, 2015; Samaraweera, 2016). Demographic Characteristics including age, age², gender and marital status (Shishko & Rostker, 1976; Krishnan, 1990; Abdukadir, 1992; Foley, 1997; Samaraweera, 2016); Social Factors including years of education and race (Krishnan, 1990; Foley, 1997; Sussman, 1998; Nadrei, 2003); Geographic Factors including region/province and residential sector (urban/rural) (Shishko & Rostker, 1976; Foley, 1997; Sussman, 1998) and Economic Factors including primary job wage, primary job hours, occupation and skills (Alden, 1971; Shishko & Rostker, 1976; Krishnan, 1990; Nadrei, 2003) were used as explanatory variables of the conceptual framework in the study.

**Results and Discussion**

The study has found that the age, gender, marital status, province, wage in primary job, hours in primary job, occupation and literacy in English have statistically significant effect on the choice of moonlighting among professionals while years of education, race, residential sector and literacy in Sinhala and Tamil are insignificant with the choice of moonlighting decision. Age increases the likelihood of moonlighting by professionals at a decreasing rate and this is in line with the past studies of Foley (1997), Nadrei (2003), Samaraweera and Ranasinghe (2015) and Samaraweera (2016). Financial needs of the individuals have been growing with age when they are facing different stages of their life cycle. The need of improving human capital through moonlighting would be gradually decreased with age and the biological deprivation of
physical and physiological health would cause to increase moonlighting among professionals at decreasing rate. Male professionals have more tendency to moonlight than that of female professionals and this is in line with the findings of Sussman (1998) and Nadrei (2003). Less involvement in moonlighting by female professionals is affected by the triple burden borne by them due to market, non-market and social activities. Usual night shifts of secondary employments also affect on the lower involvement of moonlighting among professional women. Family obligations with the child and elderly dependents would also affect the females’ decision to moonlight in a negative manner. The study concludes that the married professionals have more tendency to moonlight than the others as similar to the findings of Nadrei (2003) and Samaraweera and Ranasinghe (2015). Growing expenses of the family after marriage encourages professionals to moonlight. Teaching and health professionals report high tendency to moonlight than the other professionals in Sri Lanka (in line with Samaraweera, 2015) and the highest number of occupation specific moonlighting literature were also recorded for these two professions. Moonlighting opportunities are available for the both occupations in all areas of the country. Flexibility in working schedules also affects on this tendency. Financial problems with poor salary encourage teaching professionals for moonlighting. Higher level of English literacy also enhances the opportunities of moonlighting and the relationship of this variable with moonlighting is positive as expected. When professionals are rich in skills they tend to moonlight for broadening work experiences and for further improvements of skills. Being a resident in Western Province (in lined with Samaraweera and Rathnayaka, 2010) and both the primary job wage (Shishko and Rostker, 1976; Krishnan, 1990; Foley, 1997) and primary job hours (Shishko and Rostker, 1976; Krishnan, 1990; Nadrei, 2003; Samaraweera, 2016) have significant negative influences on professional moonlighting. Moonlighting opportunities are available in the other provinces than the Western province for all workers and for the professionals. The cause behind negative impact of primary job hours on the choice of moonlighting is the hour’s constraint motive as explained by the theory. Primary job wages also record the inverse relationship with moonlighting decision making of professionals showing the influence of financial motive on moonlighting behavior.
The model recorded a Pseudo $R^2$ (McFaddens’ $R^2$) of 16.84 percent. This explains the variation of choice of Moonlighting, described by all the independent variables in the model. The overall model is significant based on the LR statistics at 5 percent significant level.

**Conclusion**

Financial motive and the hour’s constraint motive are the key supply side motives of moonlighting among professionals in Sri Lanka as found by the study. Age, marital status and occupation and the wage of primary job are mainly dealing with the first motive and the hours of work in primary job is dealing with the second motive. Literacy and the provinces are mainly dealing with the opportunities of moonlighting in the labour market. The role of human resource managers to manage the compensation and full capacity utilization of professionals were highlighted by the study as the key policy involvement of the business firms.

**Recommendations**

The study has identified the lower rate of moonlighting among female professionals than the male professionals and this could be mainly due to family responsibilities being bestowed on females. Since the marriage has also increased the tendency for moonlighting, family care components should be given a priority in policy making of human resources managers of the firms to manage the moonlighting behavior among professionals. Providing flexible working schedules and virtual office environments would cross the boundaries for professional women to engage in secondary occupations and this would help to get the full capacity utilization of their human capital. Ministry of Labour should encourage employers to provide protective umbrellas for working mothers holding professional employments with the provision of day-care facilities at an affordable cost and at acceptable level of quality. Since the English language proficiency would enhance the moonlighting opportunities for professionals in a modern knowledge economy, encouraging policies for improving English language proficiency would help for the full capacity utilization of professionals. This would further help to extend their service to international community through the
development of information technology. Financial motive has been identified as a key motive of professional moonlighting since the model records the negative relationship of primary wage with moonlighting. Therefore, human resources managers of the firms should aware on this situation and should sufficiently compensate their professionals to get their maximum effort for the primary organization. Hours constraints motive has also been identified as another motive associated with professional moonlighting in Sri Lanka and full capacity utilization of professionals should also be focused in the human resource management aspects with proper incentives for career advancements in future.

Acknowledgement: Authors wish to thank Department of Census and Statistics for the provision of micro level data of Sri Lanka Labour Force Survey (2016) for this study.

Reference


Role of Vocational Education and Training on Youth Employability

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Introduction
The youth are the strength and future of every country, with a long-term vision for welfare and development. Youth plays an important role in putting Sri Lanka into a smart growth path which is a collective task. Nowadays they face the problem to find the jobs. The gap between high educational competence, market demands and skills shortages as well as the mismatch between career wishes and available job opportunities is central to the problem of youth employability. VET is the best solution for those problems. VETA coordinates large number of training centers in each and every district to improve the skills of the youth. Every year large number of students got these trainings under the different fields but problem of that is they cannot find jobs within short time period.

Literature Review
Vocational Education
VET prepares trainees for jobs that are based on manual or practicable activities, traditionally non-academic, and totally related to a distinctive trade, occupation, or vocation. Parasuraman & Hari prasad (2015) in their study said the composition of soft skills and core skills can shape the skills of individuals to reach for employment. The aim of Vocational Education is preparing the students for work in a commercial or technical field; the course content is mainly practical and enables graduates to enter the labor force. VTA training on skill competencies involves a planned and organized activity specifically meant to convert knowledge, skills and attitudes to vocational training institutions graduates in order to be able solve job related problems (Mutarubukwa, 2007).
Youth

Youth can be defined as individuals between age of 15 and 24 years. United Nations believed that, youth are the most important components of society and must have access to education, ample healthcare, employment, financial facilities and participation in public life and activities. Youth’s development and their capacity to occupy in the development activities of the country will be determined whether Sri Lanka achieving its development goals or not. Offering a job for every young person is an important step in completing the shift to adulthood. Employment is often the main means for attaining a better life for the young people living in poverty and other difficult situations.

Employability

Employability is a most important word that can be used in different contexts and with different meanings. Employability is having a set of skills, knowledge, understanding and personal attributes that make a person more likely to choose and secure occupations in which they can be satisfied and successful (Dacre Pool & Sewell 2007). The capacity to move self-sufficiently within the labor market to realize potential through sustainable employment for the individual it depends on the knowledge, skills and attributes they possess, the way they use those assets and present them to employer (Institute of Employment Studies).

Materials and Methods

A questionnaire was used to collect primary data and secondary data was collected through document analysis. A Sample of 120 respondents who were drawn through stratified sampling technique. Factors related to VET covered through this questionnaire as basic demographic and social factors, year of enrolment, training institution, training course, training duration, nature of training, relevance of the training.

Chi Square test utilized to find out whether one or more attributes are associated or not with employability variable. Apart from that Descriptive statistics was used to analysis the data.
Logistic regression is the most important model for categorical response data. For this study dependent variable having two levels as employed "1" and Unemployed "0" after the training? In addition to that selection procedure was Forward LR, it adds terms sequentially until further additions do not improve the fit. Akaike Information Criterion (AIC) was used to select the best fir model.

AIC = -2(Maximum log likelihood – number of parameters in model)
To test the goodness of test was used Standardized Pearson’s Residuals.

Results and Discussion

Figure 1 shows the distribution of employed field. According to this graph 65 % of graduates were employed in the private sector but 2.5% of graduates got the chance to enter to the government sector.16% and 12% of vocational trainees are self-employed and worked under the semi government sector respectively.

Figure 1: distribution of employed field
Figure 2: Distribution of waiting time of the trainers

This histogram (figure 2) shows the waiting time of the vocational trainees until they join the first job. The average waiting time for the first job was approximately 179 days after the completion of the training. Apart from that, after completing these courses, students waited maximum 352 days to find the job but someone can find the jobs within 31 days.

Table 1: Employed person’s age and income

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Variance</th>
<th>Min</th>
<th>Max</th>
</tr>
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<tbody>
<tr>
<td>Age</td>
<td>22</td>
<td>28</td>
<td>16</td>
<td>48</td>
</tr>
<tr>
<td>Income</td>
<td>31073</td>
<td>28320626</td>
<td>20000</td>
<td>45000</td>
</tr>
</tbody>
</table>

Table 1 represents the employed person’s age and income. According to this table minimum age of the employees was 16 and maximum was 48. However average age to get training was around 22 years. Considering about employees after the different types of training, they were entered to the jobs with Rs. 20000 minimum income. Further the maximum amount of monthly salary was not beyond Rs. 40000.

**Results of Chi Square test**

**Conclusion for chi – square test**

Analyzing a logistic regression model with several explanatory variables is more complex. Therefore, before entering to fit a logistic
regression model, chi-sure technique is used to identify the association with employability variable from explanatory variables. According to the result shown in table 2 it can be illustrated that only 5 of explanatory variables are associated with the response variable and the remaining variables are not show a considerable relationship with dependent variable. Those are ‘relevance of the training ’ and ‘marital status.’

Table 2: chi square test results

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Df</th>
<th>P</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>8.5</td>
<td>1</td>
<td>0.003</td>
<td>dependent</td>
</tr>
<tr>
<td>Institute</td>
<td>24.2</td>
<td>4</td>
<td>0.000</td>
<td>dependent</td>
</tr>
<tr>
<td>Course</td>
<td>93.5</td>
<td>7</td>
<td>0.00</td>
<td>dependent</td>
</tr>
<tr>
<td>Relevance</td>
<td>0.87</td>
<td>1</td>
<td>0.351</td>
<td>independent</td>
</tr>
<tr>
<td>Nature</td>
<td>56.8</td>
<td>1</td>
<td>0.000</td>
<td>dependent</td>
</tr>
<tr>
<td>Year</td>
<td>16.5</td>
<td>2</td>
<td>0.000</td>
<td>dependent</td>
</tr>
<tr>
<td>Duration</td>
<td>17.9</td>
<td>1</td>
<td>0.000</td>
<td>dependent</td>
</tr>
<tr>
<td>M/S</td>
<td>0.24</td>
<td>1</td>
<td>0.62</td>
<td>independent</td>
</tr>
</tbody>
</table>

**Binary logistic**

Stepwise procedure is used to identify the suitable model to explain the data. The first step is focus on to analyzing the result of null model. P value of the intercept term is considerable at 5% level significant.

Table 3: Model with Nature

<table>
<thead>
<tr>
<th>Param</th>
<th>Estim</th>
<th>S.E.</th>
<th>Wald</th>
<th>D</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature</td>
<td>1.948</td>
<td>.464</td>
<td>17.63</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>Consta</td>
<td>-3.002</td>
<td>.625</td>
<td>23.04</td>
<td>1</td>
<td>.000</td>
</tr>
</tbody>
</table>

$\beta_0$ Shows the intercept term and $\beta_1$ indicates the change in probability of the employability to resulting of most significant variable. The reduction of deviance compared to the models of null and including the
‘Nature’ to null model is 17.633 this is significant at 5% level of significant \( (G^2_{cal} = 17.633 > \chi^2_{1,0.05} = 3.84) \).

When nature variable is already in the model and next checked the significance of additional variable. Adding the variables one by one with the nature variable separately, the results are investigated by using likelihood ratio test. The results of final model are

Table 4: Final model

<table>
<thead>
<tr>
<th>Param</th>
<th>Estim</th>
<th>S.E</th>
<th>Wal</th>
<th>df</th>
<th>p-Val</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature</td>
<td>1.948</td>
<td>0.4</td>
<td>16.8</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>Durati</td>
<td>0.625</td>
<td>0.2</td>
<td>5.65</td>
<td>1</td>
<td>.017</td>
</tr>
<tr>
<td>Consta</td>
<td>-4.326</td>
<td>0.9</td>
<td>23.0</td>
<td>1</td>
<td>.000</td>
</tr>
</tbody>
</table>

Model can be considered with additional variables when ‘Nature’, is already in the model. Following the selected model, variables remaining further were added one by one and results of the building models were not significant further. But the only considered variable was duration of training when nature is already in the model. All the main effects are considered, and then the attention is paid to interaction effects, now. According to the forward selection procedure, the process should be continued until the model is significant. none of the two-way interaction model was significant.

Then the fitted model is,

\[
\text{Logit}(\pi_{ij}) = \beta_0 + \beta_i^{Duration} + \beta_j^{Nature}
\]

After selecting the preliminary model, goodness of fit of the model has to be tested. With categorical predictor, it is useful to form residuals to compare observed and fitted counts. To test the goodness of test was used Standardized Pearson’s Residuals. Absolute value larger than roughly two or three, provide evidence of lack of fit. (if \(|e_i| > 2\) lack of fit).
According to the above plot it can be illustrated that residuals are approximately lie in the exception are except nearly 3 observations. That observation holds nearly 2.5% out of the region when consider of the whole observation. Undoubtedly can to come a conclusion that the fitted logistic regression model for the data is matched well.

Conclusions and Recommendations

VET is important for economic growth. The provision of vocational training must be directly related to those points at which some development is already apparent. According to the descriptive summery employed students age were lie between 16 to 48 and their average income level was approximately 31000. Study also found that gender, training institution, course, nature of the training and year of completion were directly affected to the employability of youth. Trained in VTA have paid their special attention to their trained skills when searching a job whether it is related or not in addition to that the government grantee about their related jobs and its standards especially with the salary. This study concludes that, trainees who completed full training duration have been found jobs related to their vocational skills.

References


Impact of Physical Literacy Test (Sudoku Game, Braingymexercise & Psychomotor) Model for Sri Lankan Children in Grade 4 to 6

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Introduction

Physical literacy is described as the motivation, confidence, physical competence, knowledge and understanding to value and engage in a physically active lifestyle. As such, it is expected that those who have greater physical literacy would be more likely to obtain the health benefits offered by the habitual physical activity. Theoretical model and assessment battery for the assessment of childhood physical literacy are proposed in many other countries and successfully implemented. But in Sri Lanka, we don't have a systematically designed model. The purpose of this study is to design a physical literacy model to improve physical literacy level of Sri Lankan children with valid data.

The education and carry out of fundamental movement skills is the basic building block for the development of physical literacy. A large amount like learning the alphabet and phonics are the fundamental skills needed to ultimately read Shakespeare, or, identifying numbers and learning to add and subtract are the fundamental skills needed to eventually balance a chequebook, the development of fundamental movement skills, and fundamental sport skills, is critical if children are to feel confident when they engage in physical activity for fun and for health, or for competition and the pursuit of excellence.

Physical literacy is the increase of fundamental movement skills and fundamental sport skills that allow a child to move self-confidently and with control, in a wide range of physical activity, rhythmic (dance) and sport situations. Physical literacy also includes the ability to “read” what
is going on around them in an activity setting and respond appropriately to those events. For full physical literacy, children must learn fundamental movement skills and fundamental sport skills in each of the four basic environments.

Fundamental motor skills are one of the most essential assessment in the physical literacy setting that provide a wide base of movement abilities from which more advanced skills can be developed. People who do not develop fundamental motor skills in early childhood will not have a foundation upon which build physical literacy movement forms. Fundamental motor skills should be developed in the early childhood. It is considered as an essential item of physical literacy development. Schools should provide a great support to develop the competency of Fundamental Motor Skills rather than developing more complex, specialised skills in the early childhood. It is an integral part to insert/introduce the Health and Physical Education Curriculum Planning in early childhood. Many researches have indicated that the improvement in self-esteem and confidence in movement that accompanies the acquisition of Fundamental Motor Skills has provided a sound foundation to develop academic efficiency also. Because both body and mind need to perform a physical activity. Physical and cognitive developments are closely linked.

Fundamental Motor skills are the basic level of every skill. It is also known as Brain gym activity of any specialized activities for children, adolescents or adults. It can be divided into three categories called locomotors skill, object control skills and body management skills.

- **Locomotors-** “Giving force to a body through space” (Running, Hopping, Galloping, Skipping, Dodging, Leaping, Jumping & Landing)
- **Body Management -** “Maintaining balance in static and dynamic situations”
  - (One-Foot Balance, Beam Walk, Rolling)
- **Manipulative or Object Control Skills-** “Giving force to and receiving force from objects” (Catching, Throwing, Striking, Dribbling)
The requirement of studying the fundamental motor skill level of primary school students in Karawita Central College have (?) by knowing the experience of colleagues, friends and some athletes who were struggling to do some physical activities correctly in the school age. As the opinion of coaches and teachers, they have explained the lack of foundation of motor skills would be the reason of that. For further knowledge the researcher interviewed the physical education teachers and they said that most of the people in the society face some difficulties of doing sports activities due to lack of fundamental motor skills in early childhood. With having the idea of that the researcher collected more information regarding this by interviewing people and referring literature and books.

**Research Problem**

These types of researches could not be found published in Sri Lankan journals. So, this will be helpful to use as a literature for the future researches. Thus, testing physical literacy of primary school students will be important for the Sri Lankan youth. This research adds a great impact on Sri Lankan context. Therefore, definitely this research makes very important space in Sri Lankan and world literature context too.

**Objective**

The major objective was to design a physical literacy model for Sri Lankan children grade 4-6 (8-12 years). Apart from the major objective there were two specific objectives to achieve. They are to develop neuronal variability of children in Sri Lanka and to develop physical literacy level of the children by using this model.

**Methodology**

The permission of the school principals was taken from the letter which has given by the Director of Karawita Educational Zone. Once having the permission of the principal, the sectional head of the primary section
was met. The value of assessing fundamental motor skills was explained. Handouts which are written to explain the value of fundamental motor skills were given to the sectional head. Sectional head was acknowledged the teachers from each grade and appointed 33 students from each grade. Four girls and boys were included in that. A date was fixed to conduct the test by discussing with sectional head and teachers. A teacher and principle were appointed by the sectional head to support to the test. The permission letter to get photographs and video tape was given to the sectional head.

The test was conducted in one day for school. Two hours were allocated for a grade. It was conducted for mainly in three steps.

- Warm Up
- Testing
- Warm Down

Warm up was given by the researcher. The use of a warm-up will help to gain the students’ interest in a lesson, motivate them to perform, prepare them physically for the tasks ahead raise a light sweat on the forehead. Preparing the body with a warm-up reduce the chance of having injuries and increase the level of performance.

**Results and Discussion**

The overall objective is to design a physical literacy model for Sri Lankan children. Researcher spent during the research period is more experience and valuable. Also, researcher learned many things via doing this research. As a member of the research, researcher got opportunity to introduce FMS cycle to Karawita central college grade 4, 5, 6 students and all so researcher learned how to do/conduct a research project and also researcher learned how to analyze those things. Finally, presented the results and those are how to analyze.
According to Excel char’s pre-test and post-test data were normally improved. The significant level was accepted to 95%. To identify any significant differences between the selected group at the Pre-test and Post-tests for the dependent variables. According to 95% Confidence interval for mean difference: (1.202, 1.759), we concluded the null hypothesis at the 5% level of significance and conclude that the treatment method is effective in changing the Physical literacy level when evaluate using a Sudoku game test.

According to 95% Confidence interval for mean difference: (1.0737, 1.4165), we concluded that the treatment method is effective in changing the Physical literacy level when evaluate using Brain gym exercise test. According to 95% Confidence interval for mean difference: (1.145, 1.620), we concluded that the treatment method is effective in changing the Physical literacy level when evaluate using Questionnaires paper test. All data analysis was done using MS Excel and Minitab 17 version. To see the significant differences of the pretest and post test data. According to the data from pretest and posttest cognitive, psychomotor, affective tests

**Conclusion**

The current study has successfully assessed the design a physical literacy level in Sri Lankan children’s grades 4 to 6 (age group 08 to 12). The research sample showed that, pretest for the physical literacy level lower than the normal level. When it is considering about the questionnaire, Sudoku game, Brain gym exercise it shows that the student’s literacy level and physical activity have a great impact on the physical literacy level. It implies that students May only engages with academic specially grade 5 students. Because of Grade five scholarship exams and low physical activity level day to day requirement rather than using their own physical activity. As a result of introducing eight weeks FMS cycle programme students gave their maximum cooperation without any external influence. After from that they used to keep a note about their pretest marks, Remember physical activity, daily activity and their medication.
During the above eight weeks’ period, the one and only treatment students they were given was an FMS cycle programme. When the post test was being done it showed that the present Physical literacy level was higher than that in the pretest. Reason for that can be implied as the regular participation in the FMS cycle programme. For the above success or the achievement warm up session, which was done prior to the FMS cycle programme cause to prevent some kind of muscular injuries, develop physical literacy level. As well as proper cool down lead past to have a proper sleep at night. At the beginning and the end of the programme for each patient PLL (Physical literacy level) was calculated to determine whether there is a possibility to attain physical literacy level develop or not. At the early stage a considerably large number of students had their low level of physical literacy and low level of physical activity. But after the programme, it was converted to the higher level.

References


Reshaping Technology, Society and Language Skills Towards a Knowledge Economy
Mapping Study on Information Communication Technology towards Knowledge

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Introduction

Technological development in ICT has gained a vast scale in Sri Lanka today because globalization plays a role as an accelerator that has speeded up the process on both consumers and businesses. The KE is driven by the demand for higher value-added products and services innovated by well-educated consumers and businesses in Sri Lanka. Technological development in ICT has become a supply side enabler in Sri Lanka. According to the features of a knowledge economy, most of the software companies as well as the industries are using high and low information technologies for their operational activities.

ICT represents a new technological paradigm that are inherited to the family of General-Purpose Technologies that has the potential for spreading adoption and adaptation in a wide range or even all sectors of the economy in ways that effectively change operations and products as well as the relationships between different sectors. ICT are formed of a wide range of product and service technologies including computer hardware, software and services and a host of telecommunication functions that are including wire or wire line and wireless, satellite products and services [1]. The KE is the way of how new general-purpose technologies have combined with intellectual and knowledge assets such as the ‘intangible assets’ of research, design, development, creativity, education, science, brand equity and human capital to transform to Sri Lankan economy. As well as KE is a global process that is used to operate all sectors of the economy such as manufacturing and services, domestic and internationally traded, public and private, high technology and low technology, large corporation and small enterprise [2].
Previous reviews and investigations have been conducted for ICT in KE in different perspectives such as principals, methods, pros and cons, opportunities and supporting features. However, what are the influences of ICT in KE and what kind of tools help to proceed with ICT in KE are not well understood. To identify and address this gap, mapping study has been performed to determine that there is research evidence on a relevant topic.

**Methodology**

Research method of this mapping study is defined according to the guidelines described by Kitchenham and Charters [3]. In the 1st selection stage, we looked for the current status of the research studies regarding in ICT applied to KE in organizations. It means, this study has been conducted on all the research studies related to the field of ICT and KE regardless of the country to get the clear and wide view of ICT and KE because of having a research gap in research studies related to the ICT in KE in organizations in Sri Lanka. In Table 1, the results of the 1st selection stage are showing. In the 2nd selection stage, a selection process has been performed to retrieve the studies. Here following selection criteria were addressed: (i) Definition of search string and terms (ii) Sources for searching (iii) Definition for inclusion and exclusion criteria and (iv) Way of storing data. For that tertiary study, used search strings are shown in Table 2 and Table 3. As well as the inclusion and exclusion criteria are showing in Table 4. In the 3rd selection stage, publications until December 2017 were considered.

<table>
<thead>
<tr>
<th>Areas</th>
<th>Search terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICT KE</td>
<td>“ICT”, “Information Communication Technology”</td>
</tr>
<tr>
<td>KE Review</td>
<td>“Knowledge Economy”</td>
</tr>
<tr>
<td></td>
<td>“systematic literature review”, “systematic review”, “systematic mapping”</td>
</tr>
<tr>
<td></td>
<td>“mapping study”, “systematic literature mapping”</td>
</tr>
<tr>
<td>Search string</td>
<td>(“‘Information Communication Technology’ OR ‘Information and Communication Technology’) AND (“‘Knowledge Economy’”) AND (“‘systematic literature review’ OR ‘systematic review’ OR ‘systematic mapping’ OR ‘mapping study’ OR ‘systematic literature mapping’”)</td>
</tr>
</tbody>
</table>
Table 2: Search Terms of the Study on ICT

<table>
<thead>
<tr>
<th>Areas</th>
<th>Search terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICT</td>
<td>“ICT”, “Information Communication Technology”</td>
</tr>
<tr>
<td>Review</td>
<td>“systematic literature review”, “systematic review”, “systematic mapping”, “mapping study”, “systematic literature mapping”</td>
</tr>
<tr>
<td>Search string</td>
<td>(“Information Communication Technology”) AND (“systematic literature review” OR “systematic review” OR “systematic mapping” OR “mapping study” OR “systematic literature mapping”)</td>
</tr>
</tbody>
</table>

Table 3: Search Terms of the Study on KE

<table>
<thead>
<tr>
<th>Areas</th>
<th>Search terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>KE</td>
<td>“Knowledge Economy”</td>
</tr>
<tr>
<td>Review</td>
<td>“systematic literature review”, “systematic review”, “systematic mapping”, “mapping study”, “systematic literature mapping”</td>
</tr>
<tr>
<td>Search string</td>
<td>(“Knowledge Economy”) AND (“systematic literature review” OR “systematic review” OR “systematic mapping” OR “mapping study” OR “systematic literature mapping”)</td>
</tr>
</tbody>
</table>

Table 4: Inclusion and Exclusion Criteria

<table>
<thead>
<tr>
<th>No.</th>
<th>Inclusion criterion (IC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC1</td>
<td>The study EKR use and project success in software companies</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>Exclusion criteria (EC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC1</td>
<td>The study does not contain an abstract</td>
</tr>
<tr>
<td>EC2</td>
<td>The study is published just as an abstract</td>
</tr>
<tr>
<td>EC3</td>
<td>The language used in writing the study is not English</td>
</tr>
<tr>
<td>EC4</td>
<td>The study is an older version of a study already selected previously</td>
</tr>
<tr>
<td>EC5</td>
<td>The study is not a primary study. The study is either an editorial or a summary</td>
</tr>
</tbody>
</table>

**Results and Discussion**

In the search process, as the searching result, a total of 80 publications were returned. Out of the total search result, 22 from Econbiz, 18 from Nber, 16 from Science Direct and 24 from EconPapers were found. To extract the most relevant studies, the selection process was performed on the selected publications. In the first stage, we eliminated
duplications (publications that appear in more than one source), achieving 40 publications (reduction of approximately 50%). In the second stage, we applied the selection criteria (inclusion and exclusion criteria) over the title, abstract and keywords, resulting in 15 papers (reduction of 62.5%). 5 papers were eliminated by EC5 (The study is not a primary study) and 20 for not satisfying IC1 (The study discusses a ICT towards a KE). In the third stage, the selection criteria were applied considering the full text, resulting in a set of 8 studies (reduction of approximately 46.67%). 7 papers were eliminated for not satisfying IC1 (The study discusses ICT towards a KE). Over these 8 studies considered relevant, the 4th stage, snowballing was performed which resulted in 5 papers.

After applying the selection criteria over title, abstract and keywords, 3 papers remained (reduction of 40% over the 5 papers selected by snowballing).

![Figure 1 Distribution of the selected studies over the years](image)

For the remaining, the selection criteria were applied considering the full text and only one paper remained (reduction of approximately 67% over the 3 previously selected papers). Finally, we have selected 9 papers and in the 5th stage, we have looked for publications authored by the researchers and research groups involved in these studies. As a result of this searching, 2 papers identified and after analyzing the full text 1 paper was identified as more appropriate to the subject were selected as a direct search. Total of 10 papers were retrieved as the result of this searching process, including, 8 from the sources, 1 from snowballing
and 1 from direct searching researchers and research groups. Fig. 1 is represented to elaborate the distribution of selected papers over the year of publication. Only the papers published since 2006 to December 2017 were considered in order to get an updated view of the study area. According to Fig. 1 researchers have focused on ICT in KE in recent years, since, there have been published 6 papers out of 10 selected papers in 2010-2017 period.

Table 5: Results of the Selection Stages

<table>
<thead>
<tr>
<th>Stage</th>
<th>Applied criteria</th>
<th>Analyzed content</th>
<th>Initial number of studies</th>
<th>Final number of studies</th>
<th>Reduction (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>Duplicate removal</td>
<td>Title, abstract and keywords</td>
<td>80</td>
<td>40</td>
<td>50.0</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>IC1 and EC3</td>
<td>Title, abstract and keywords</td>
<td>40</td>
<td>15</td>
<td>62.5</td>
</tr>
<tr>
<td>3&lt;sup&gt;rd&lt;/sup&gt;</td>
<td>IC1, EC1, EC2, EC4 and EC5</td>
<td>Full text</td>
<td>15</td>
<td>8</td>
<td>46.67</td>
</tr>
<tr>
<td>4&lt;sup&gt;th&lt;/sup&gt;(a)</td>
<td>Snowballing</td>
<td>Title, abstract and keywords</td>
<td>5 (added by snowballing)</td>
<td>3 (added by snowballing)</td>
<td>40.0</td>
</tr>
<tr>
<td>4&lt;sup&gt;th&lt;/sup&gt;(b)</td>
<td>Snowballing, IC1</td>
<td>Full text</td>
<td>3 (added by snowballing)</td>
<td>1 (added by snowballing)</td>
<td>67.0</td>
</tr>
<tr>
<td>5&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Research groups</td>
<td>Full text</td>
<td>2 (added by research groups)</td>
<td>1 (added by research groups)</td>
<td>50.0</td>
</tr>
<tr>
<td>Final Result</td>
<td></td>
<td></td>
<td>80 (sources) + 5 (snowballing) + 2 (research groups) = 87</td>
<td>8 (sources) + 1 (snowballing) + 1 (research groups) = 10</td>
<td>88.5</td>
</tr>
</tbody>
</table>

Conclusion

The study describes results of nine research questions which have done investigations of the following points: (i) distribution of the selected studies over the years; (ii) research focus from the ICT perspective: (iii) research focus from the KE perspective; (iv) research type; (v) reported
problems; (vi) purposes of employing in ICT; (vii) purposes of employing in ICT towards a KE; (viii) Technologies used in ICT in KE; (ix) main conclusions reported on the ICT in KE. Understanding of ICT in KE, we can provide following conclusions: (i) the major problem in organizations are low reuse rate of knowledge in ICT for a good economy and barriers in knowledge transfer for a good KE is a recent research; (ii) features of a KE which can be used in ICT are not identified correctly in the organizations; (iii) research and development (R&D) is a key characteristic in ICT towards a KE. (iv) there is a great concern with new technologies and globalization in a KE (v) advanced technologies can be used to provide ICT in a KE.

References


Factors Affecting Students’ Self-Learning during Extra Hours:

Case of Computer Lab Utilization in the Faculty of Social Sciences and Languages

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Introduction

Self-Learning is considered a key motivating and a cognitive factor in improving Computer Literacy for preliminary learners (Ekchardt et al 2013; Dunlosky et al 2013; Tullis and Benjamin 2012). Self-learning is also encouraged as a necessary pre-condition in the language and IT skills in the Faculty Handbook (2018) the Faculty of Social Sciences and Languages, Sabaragamuwa University of Sri Lanka. In this context, the student motivation factor in relation to IT learning had to be measured in line with their availability in self-learning in the Faculty Lab facilities. Hence, based on the initial observations on lack of students’ availability during free hours in the main computer lab facility in the Faculty of Social Sciences and Languages this pilot survey investigates the key factors affecting students’ self-learning in the computer lab. It discovers that the two main labs (CC1 and CC2) available within the Faculty are heavily under-utilized during non-lecture hours. The preliminary questionnaire reveals that the students are not motivated to use the existing computer laboratory facilities in the Faculty (CC1, CC2, ELTD, and Geography) during extra hours, which is a very important factor for the improvement of their ICT skills.

Though it is deemed that the scope of this survey should be extended to investigate the lab utilization among other faculties in the university or even the situation in the lab spatiality in other Art faculties in the entire system, this pilot survey actually initiates such broader research about the student motivation in ICT learning. It can then envisage the reality.
about the usefulness of government investing massively to improve the lab capacities in the university system when the students turn to their own personal laptops for main IT learning.

**Methodology**

A questionnaire was executed among the first, second and third years to find out the reasons for the non-availability of students in the above lab facilities during extra-hours. Total sample size was 238 in the first year first semester, 62 students in the first year second semester, 295 in the second semester. 88% indicates that they use the main lab facility for only 1-2 hours as 3-5 and above is 12.1%. As evidenced in the questionnaire, majority of students does not have a personal laptop for self-studies and the most important software packages are only installed in the main computer lab making it essential for the students to use the lab. To analyze the date gathered from the questionnaire IBM SSPS Statistic Data Editor 14 was used in this study.

**Results and Discussion**

Through the initial questionnaire it finds the following reasons as potential variables for the non-availability of students for self-studies in the computer lab facility (CC 98.7%, ELTD 0.3%, GEO 1%). Non-availability of free time slots in the main time table (54.2%) & students time table (29.2%); distance from the lab facility to the hostels (63.7%); impact of hostel rules (61.7%); seniors’ negative influence (56.7% claiming no influence and 43.3% claiming yes); ragging (61% claiming no influence and 39% claiming yes); free time and main time table clash 83.3%. Based on the findings, it concludes that there are multiple interdependency aspects that faculty administration and teaching staff should look into for improving the self-centered ICT learning in the Faculty of Social Sciences and Languages.

Table 1: Potential reasons behind the non-availability of the students in the computer labs for their self-studies.

<table>
<thead>
<tr>
<th>Reason</th>
<th>95% Confidence Interval for the proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time table clashes</td>
<td>[78, 88]</td>
</tr>
<tr>
<td>Distance between the lab and the hostels</td>
<td>[58, 70]</td>
</tr>
<tr>
<td>Hostel rules</td>
<td>[56, 68]</td>
</tr>
<tr>
<td>Free Time Slots</td>
<td>[48, 61]</td>
</tr>
<tr>
<td>Seniors influence</td>
<td>[37, 50]</td>
</tr>
<tr>
<td>Ragging</td>
<td>[33, 45]</td>
</tr>
</tbody>
</table>
Problems of Students time tables
[24, 35]

Source: Survey data

The above table describes 95% confidence intervals for the potential reasons behind the non-availability of the students in the computer labs for their self-studies. According to the confidence intervals, time table clashes was identified as the major reason for the students’ non-availability in the computer labs for their self-studies. Hostel rules and the distance between the computer center and the hostels were also identified as influential factors that effects the students ‘absence in the computer lab for their self-studies.

**Conclusion**

The time table clash is recognized to be a main factor that affect the usability of IT lab in the faculty when the main lab is the most usable facility in the faculty. Distance between the lab facility and the location of main hostels seems another major obstacle for students' using the lab during extra hours. The hostel rules are also a factor that affects the above situation. Seniors' negative influences are also noted as a significant factor while ragging is marked to have comparatively less influential factor. Finally, it is suggested that the students' personal time table must be prepared in giving more space for them to use the lab despite the complex subject combinations that are available in the current Faculty Handbook.

**References**


Restructuring the Agriculture and Rural Development for an Inclusive Growth
Food Demand Analysis in Sri Lanka: Marshallian and Hicksian Approaches

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Introduction

In the present world, both developed and developing countries are experiencing a nutritional transition that occurs as a result of a shift in dietary consumption and energy expenditure due to economic, demographic, and epidemiological changes. It steers people to move away from nutritionally rich diets, while leading the way towards unhealthy diets. Unhealthy diets often consist of a lot of processed or fast food that provide more calories from fat, saturated fat, trans fat, sodium and added sugars, therefore are less nutritious. According to the World Health Organization (WHO), unhealthy diets are one of the major risk factors which are responsible for non-communicable diseases (NCDs). Currently, in Sri Lanka, the prevalence of NCDs has become the largest contributor to disease burden in the country. Sri Lanka has turned out to be a victim of nutritional transition which leads to under-nutrition, overweight, and obesity.

Policy makers on agricultural and Food sector are interest on the matrix of elasticities derived from food demand analysis in the country. These are considered to be the decisive information for food supply planning and food production related issues. Knowledge on food consumption pattern in demand analysis will help to design pricing policies of some strategic food commodities in the country. Without in-depth analysis on demand for food in the country, policy makers are problematic in implementing correct policies for economic development.

Although several studies had been published with respect to the food demand of Sri Lankan households, studies focused on national level food elasticities are scarce in the literature. Given the circumstances, this
study intends to examine household food consumption patterns in Sri Lanka, primarily focusing on nutrient intakes.

**Objectives**

Given the above description, the main objectives of this study is to analyze the effects of expenditure and price changes on demand of selected food groups in Sri Lanka and to evaluate the welfare effects of household due to changing demand.

**Literature Review**

Neo-classical consumer economics is concerned with the question of choice that consumers make during their budget allocation activities. It gives answer to the question of —which consumption basket the consumers take at time of shopping and why?” The consumption basket contains a mix of all goods the consumers purchase at given commodity prices and consumer’s purchasing power. The theory of consumer’s demand behavior is founded on a very established building Blocks (Raunikar and Huang, 1987) constituting concepts of utility function, commodity set, and the axioms governing the ordering of consumer’s preference.

The results of changes in prices of commodities and income level of the consumer are described by the partial derivatives of first order conditions by Marshallian demand function. There four basic properties of demand functions: namely, adding up, homogeneity, negativity, and symmetry that are important in providing the rationality of consumer behavior. The properties of demand functions guide the empirical analysis in testing consumer behavior from real world data. The properties are always effective irrespective of the form of utility function and take the form of mathematical restrictions on the derivatives of the demand functions.

In general, there are three broad approaches to derive the demand function. The first approach is to derive a system of demand equations from utility maximization problem assuming specific form of utility functions. The linear expenditure system and indirect addilog model are
example of this approach. The second approach is deriving demand function based on arbitrarily specified functional form, as in the Rotterdam Model, transcendental logarithmic system, and almost ideal demand system (AIDS) (Deaton, 1986, Pollak and Wales, 1992). The third methods is directly imposing theoretical restrictions as in generalized addilog model and Theil’s multinomial extension of the linear logit model. An understanding of the use of these demand systems for different purposes and situations and their limitations is helpful in selecting appropriate models to work with and assess the validity of the empirical results from implementing them. Detailed reviews of these demand systems are given by Deaton (1986). Also a number of comparative studies of demand systems have been carried out to evaluate the appropriateness of this model. (Deaton, 1986; Theil, 1975; Leontief, 1993; Pollak and Wales, 1992).

Methodology

This study depends on the cross-sectional data taken from Household Income and Expenditure Survey 2016 which was conducted by the Department of census and statistics. Generally, the HIES surveys a sample of 25,000 housing units throughout the country to facilitate the information be given at district level. Data is collected at the field in twelve consecutive monthly rounds to capture seasonal variations in income, expenditure and consumption of households. The study concerned the own price elasticity and cross price elasticity under Marshalian and Hicksian approach. Marshalian or ordinary price elasticity is defined from the Marshalian demand function that is, a demand function obtained from utility maximization subject to budget constraint. Hicksian or compensated price elasticity is elasticity obtained through solving the dual problem of expenditure minimization at a certain utility level. The compensated price elasticity measures a response of consumer on the price change, given that their income be compensated, thus at a constant purchasing power. The study applied the almost ideal demand system for measuring Marshalian and Hicksian Elasticities.
The almost ideal demand system (AIDS) that is introduced by Deaton and Muellbauer (1980) starts with a class of preference called the price-independent generalized logarithmic (PIGLOG). The aim of using this class of preference is to ensure that the necessary and sufficient conditions for consistent aggregation across consumers are satisfied. The log of the cost or expenditure function is represented by the following equation:

\[
\log c(p;u) = (1-u) \log a(p) + u \log(p) \tag{1}
\]

The formulation of AIDS uses the duality theory and expenditure function instead of utility or indirect utility function. By taking a specific functional form for \( \log a(p) \) and \( \log b(p) \) as, then the AIDS cost (expenditure) function in natural logarithmic form is specified as

\[
Inc(u,p) = a_0 + \sum_i a_i Inp_i + \frac{1}{2} \sum_i \sum_j Y_{ij}^* \text{Inp}_j p_i + \tilde{U} b_0 \sum_i p_{ij}^{bi} \tag{2}
\]

Where \( a_i, b_i \) and \( Y_{ij}^* \) are parameters. \( U \) is the utility level and \( P_j \) are prices. The expenditure function is linearly homogenous in \( P \), provided

\[
\sum a_i = 1; \sum_j Y_{ij}^* = \sum_i Y_{ij} = \sum b_i = 0 \tag{3}
\]

It is also consistent with aggregation over consumers. Differentiating the expenditure function using Shepard Lemma yields

\[
W_i = a_j \sum_j y_{ij} \text{Inp}_i + \tilde{U} b_0 b_i \exp \left( b_i \text{In}(p_j) \right) \tag{4}
\]

Substituting for \( \tilde{U} \) which is the indirect utility function derived the expenditure function

\[
w_i = a_j + \sum a_{ij} + \text{Inp}_i + b_i \text{In} \left( \frac{Y}{p} \right) \tag{5}
\]

Where;

\[
\text{Inp}^* = a_i + \sum_i a_i \text{Inp}_j + \frac{1}{2} \sum_i \sum_j Y_{ij} \text{Inp}_i \text{Inp}_j \tag{6}
\]

is an overall price index, which could be replaced by Stone’s (1954) index in empirical applications since (2.41) is highly non-linear. The Stone’s index is given by
\[ \text{Inp}^* = \sum_i w_i \text{Inp}_i \]  

When Stone’s index is used in (7) the model is termed as linear approximation of almost ideal demand system (LA/AIDS).

There are three sets of restrictions on the AIDS model given by

\[ \sum_{i=1}^{n} a_i = 1, \sum_{i=1}^{n} Y_{ij}^* = 0, \sum_{i=1}^{n} Y_{ij} = 0 \text{ and } Y_{ij} = Y_{ji} \]

### Computation of Elasticities

After derivation the Demand functions under almost ideal demand system, the own price elasticity and cross price elasticity measured as follows;

Own price elasticities 

\[ \varepsilon_{ii} = y_{ij} - (\beta_i + \beta_j) - 1 \]

Cross price elasticities 

\[ \varepsilon_{ij} = y_{ij} - \frac{(\beta_i + \beta_j) w_j}{w_i} \]

Household size 

\[ \varepsilon_{is} = \Phi_i - \frac{(\beta_i + \beta_j) w_j}{w_i} \]

The compensated or Hicksian price elasticities are derived by transforming the ordinary or Marshallian price elasticities through the Slutsky equation. Thus, the compensated own price elasticities become 

\[ \varepsilon_{ii}^H = \varepsilon_{ii} + w_i \varepsilon_{ys} \]

and the compensated cross price elasticities becomes 

\[ \varepsilon_{ij}^H = \varepsilon_{ij} + w_j \varepsilon_{ys} \]

where \( \varepsilon_{ii}^H \) and \( \varepsilon_{ij}^H \) are the compensated own price and cross price elasticities respectively,

### Results and Discussion

This section presents the results of estimation we made on the linearized AIDS Model applied on data set. The model describes the consumption behavior of Households in rural urban and estate sectors. The estimation is conducted using the STATA program version 6. The estimation applied the iterative seemingly unrelated regression (ITSUR) procedure. This procedure allows the estimation of eventually contemporaneous
correlation in error terms across equations, which can be used to derive more efficient estimates. As in table 01 own price elasticities of all food groups reveal conformity with theoretical postulate. They are all negative in sign. The ordinary price elasticity indicates an overall response of consumer on changing prices, -of own or other goods, without compensation on their income. Knowing both of them is important, as they reveal exhaustive in formation to describe household’s reaction on price changes. This delivers an important advantage on the use of the study in policy making. The question of whether price or income should be used as a policy instrument may be directed from the elasticities of both types.

Table 1: Marshallian and Hicksian Own Price Elasticities

<table>
<thead>
<tr>
<th>Food Composites</th>
<th>Marshallian Own Price Elasticities</th>
<th>Hicksian Own Price Elasticities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Urban (N=12650)</td>
<td>Rural (N=8220)</td>
</tr>
<tr>
<td>Rice</td>
<td>-0.425***</td>
<td>-0.492***</td>
</tr>
<tr>
<td>Bread and Flour</td>
<td>-0.612***</td>
<td>-0.332***</td>
</tr>
<tr>
<td>Fish</td>
<td>-1.532***</td>
<td>-2.275**</td>
</tr>
<tr>
<td>Vegetables</td>
<td>-0.565***</td>
<td>-0.872**</td>
</tr>
<tr>
<td>Meat</td>
<td>-0.875***</td>
<td>-1.542**</td>
</tr>
<tr>
<td>Dried Fish</td>
<td>-0.765***</td>
<td>-0.432**</td>
</tr>
<tr>
<td>Milk and Milk Products</td>
<td>-1.201***</td>
<td>-1.345**</td>
</tr>
<tr>
<td>Eggs</td>
<td>-0.542**</td>
<td>-0.825</td>
</tr>
</tbody>
</table>

Note: *: p < .10; **: p < 0.05; ***: p < 0.01

Table 02: Marshallian Cross Price Elasticities for Pool Sample

<table>
<thead>
<tr>
<th>Model</th>
<th>Rice</th>
<th>Bread</th>
<th>Fish</th>
<th>Vegetables</th>
<th>Meat</th>
<th>Dried Fish</th>
<th>Milk Powder</th>
<th>Eggs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td></td>
<td>+0.87**</td>
<td>-0.01*</td>
<td>-0.34*</td>
<td>-0.43*</td>
<td>-0.54*</td>
<td>-0.11</td>
<td>-0.21</td>
</tr>
<tr>
<td>Bread and Flour</td>
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<td></td>
<td>-0.12*</td>
<td>-0.30*</td>
<td>-0.41*</td>
<td>-0.43*</td>
<td>-0.02</td>
<td>-0.31</td>
</tr>
<tr>
<td>Fish</td>
<td>-0.14*</td>
<td>-0.21**</td>
<td></td>
<td>-0.30*</td>
<td>+0.57**</td>
<td>+0.54*</td>
<td>-0.16</td>
<td>+0.55</td>
</tr>
<tr>
<td>Vegetables</td>
<td>-0.52**</td>
<td>-0.14*</td>
<td>-0.32**</td>
<td>+0.23*</td>
<td>+0.22*</td>
<td>-0.22</td>
<td>+0.21</td>
<td></td>
</tr>
<tr>
<td>Meat</td>
<td>-0.44*</td>
<td>-0.25**</td>
<td>+0.67**</td>
<td>-0.43*</td>
<td>+0.53**</td>
<td>-0.15</td>
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<tr>
<td>Dried Fish</td>
<td>-0.57**</td>
<td>-0.01*</td>
<td>+0.57**</td>
<td>+0.31*</td>
<td>+0.61**</td>
<td>-0.21</td>
<td>+0.59*</td>
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<td>Milk Powder</td>
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<td>-0.14*</td>
<td>-0.14*</td>
<td>-0.33</td>
<td>-0.43*</td>
<td>-0.16</td>
<td></td>
<td></td>
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<tr>
<td>Eggs</td>
<td>-0.32**</td>
<td>-0.12</td>
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<td>+0.37*</td>
<td>+0.43*</td>
<td>-0.26</td>
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Note: *: p < .10 ; **: p < 0.05 ; ***: p < 0.01
## Table 03: Hicksian Cross Price Elasticities for Pool Sample

<table>
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<tr>
<th>Model</th>
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<th>Vegetables</th>
<th>Meat</th>
<th>Dried Fish</th>
<th>Milk Powder</th>
<th>Eggs</th>
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<td></td>
<td>+0.89*</td>
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<td>-0.35*</td>
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<td>-0.55*</td>
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<td>-0.23*</td>
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<td></td>
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<td>+0.82*</td>
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<tr>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
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<td>-0.32*</td>
<td>+0.58*</td>
<td>+0.54*</td>
<td>+0.17</td>
<td>+0.56*</td>
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<td></td>
</tr>
<tr>
<td>Vegetables</td>
<td>-0.62**</td>
<td>-0.18</td>
<td>-0.33*</td>
<td>-0.25*</td>
<td>-0.25*</td>
<td>-0.25 *</td>
<td>-0.24*</td>
<td></td>
</tr>
<tr>
<td>Meat</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>-0.47**</td>
<td>-0.27*</td>
<td>+0.68*</td>
<td>-0.44*</td>
<td>+0.53*</td>
<td>-0.16</td>
<td>+0.45*</td>
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</tr>
<tr>
<td>Dried Fish</td>
<td>-0.61*</td>
<td>-0.02</td>
<td>+0.58*</td>
<td>+0.32**</td>
<td>+0.63*</td>
<td>-0.25</td>
<td>+0.61*</td>
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<tr>
<td>Milk powder</td>
<td>-0.18*</td>
<td>-0.15</td>
<td>-0.16*</td>
<td>-0.38</td>
<td>-0.45</td>
<td>-0.18</td>
<td></td>
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</tr>
<tr>
<td>Eggs</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>-0.36*</td>
<td>-0.13*</td>
<td>+0.47*</td>
<td>-0.41**</td>
<td>+0.38*</td>
<td>+0.44*</td>
<td>-0.25</td>
<td></td>
</tr>
</tbody>
</table>

Note: *: p < .10; **: p < 0.05; ***: p < 0.01

It is notable, that Marshallian own price of rice is less elastic compared to the other food groups. This was consistent with general intuitive proposition for staple food with no close substitute, which accounts for a dominant share of the consumer’s budget, as was the case of rice in this study.

In estate and rural sectors, bread and flour is relatively more inelastic than urban sector under both approaches. Both meat and fish are relatively elastic in both rural and estate sectors compare to urban sector, while dried fish is highly inelastic in rural sector than urban estate sectors. Milk and milk products are the highly elastic item in all three sectors.

The relationship among majority of food groups may be complementary or competitive. Some are week complementarity with others and some are strong complementarity with others. With income compensation when prices change, the cross response among food groups may be changing: from complementary to competitive, and vice versa. This indicates that income effect of price changes play an important role. Seen from the magnitude of response, cross relationships among food groups are of less importance. The fact that change of rice price was responsive to other food groups confirmed the prevalent phenomenon,
that rice is main food menu of Sri Lanka. Overall, the own price elasticities are larger than that of cross price elasticities.

**Conclusion and Recomendation**

As an attempt to fill the gap perceived in the extant literature, this study provides an insight of food and nutrient consumption in Sri Lanka. Lower sensitivity to the price changes of rice, bread and flour, vegetables, dried fish, and eggs indicates that these food groups are considered the most important in Sri Lankan dietary patterns. Conversely, price variations in meat, fish and milk products will have a huge impact on the consumption of meat, fish and milk products. Fish, meat and milk products except are found to be the most sensitive food groups to the changes in expenditure. According to the mean income of selected sample, rural and estate households were recorded low income compare to the urban household. Hence, enhanced standards of living may have a greater influence on the consumption of most of the food groups than that of price reductions. This implies that income-related policies play a crucial role in food consumption patterns, rather than pricing policies. Since no substitutions are available for dairy products and fish, their high sensitivity to price and expenditure may motivate consumers to discontinue consumptions whenever the market and economic situations are unfavorable. Tax concession policies may encourage purchasing dairy products and fish, yet, domestic producers will worse off as a result of low returns. Thus, policies that will incorporate to improve household income may be useful to achieve a sustainable change of food demand pattern in Sri Lanka. However, since both fish and dairy products supply are associated with local production as well as imports, trade policies should also be carefully investigated. Expenditure effects greatly influence households’ consumption of nutrients. Hence, policies should be targeted on improving income and living standards rather than controlling prices of food commodities.

**References**


Influences of Effluents of Thermal Power Plant on Agricultural Productivity:
An Approach Using Difference in Difference (DID) Method

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*Department of Economics, Sidho-Kanho-Birsha University, Purulia, West Bengal, India.*

**Introduction**

Creation of necessary goods using non-renewable and non-renewable resources is a debatable research issue of today. Power generating units using thermal based technology depends upon enormous capital and natural resources like coal. So, the environment economics and resource economics are actively play with the construction of such projects. Environment economics becomes the issue of discussion in terms of residuals of such projects. Adriano D.C. et al (1979) shows that the shifting to coal as a source of energy in United States creates a major problem regarding the control of residuals. As a result, management of the residuals is a significant part of the study. Coal-fired thermal power plant, which has adverse impact on environmental condition, is one of the main sources of energy especially in the developing economics. Kumar et. al. (2013) shows that thermal power plants are the major source of generation of electricity for any developing country. Environmental pollution by the coal based thermal power plants (TPPs) has been stated to be one of the major sources of pollution all over the world affecting the environment in terms of land use, health hazards and air, and water. In this paper the authors consider three thermal power plants of West Bengal for sample area. Pollutant absorption in the surrounding area of thermal power plant has made the functional changes in plants and soil (Pandey, 1983). Guttikunda S.K and Jawahar P (2014) studied emission factors and emission analysis for coal fired power plants in India.
Methodology

The study considers the assessment of impact of fly ash on the production as well as cropping pattern of major commercial crops of study area during last decade (i.e. 2007 – 2017). The different studies find out that bituminous coal-based fly ash increases the salinity of the proximate lands of the power plant. As a result, cost of agricultural production increases due to de-salinization or directly per unit production amount will be reduced. Since the previous data regarding production of commercial crops (per unit) is not available, substitution had to be found some other way. Difference in Difference (DID) technique is suitable to be used under such case. The DID approach is framed to capture the impact of TPP on agricultural productivity. The agricultural productivity is a factor which brings some sort of sustainability on the income of the agricultural operations. In DID, normally we have two groups in terms of treatment status. Since, the primary data for the agriculture before establishment of a TPP is not available, so we have to substitute them. For the search of best substitute, we draw three concentric circles with radius \( r_1 \) (0-5 Km), \( r_2 \) (5-10 Km) and \( r_3 \) (10-15 Km). As the distance from such concentric circles centre increases, probability of environmental impact of TPP on agricultural productivity will expected to be diminished. After such demarcation, three affected areas have been identified as follows: Severely damaged area with radius \( r_1 \) (0-5 Km) centering the thermal power plant, moderately damaged area, which is the difference of the area of two concentric circles with radius \( r_2 \) (5-10 Km) and \( r_1 \) (0-5 Km). This can be expressed as \( Area \, B = \pi r_2^2 - \pi r_1^2 = \pi r_2^2 - (Area \, A) \), least damaged area, which is the difference of the area of two concentric circle with radius \( r_3 \) (10-15 Km) and \( r_2 \) (5-10 Km). This can be expressed as \( Area \, C = \pi r_3^2 - \pi r_2^2 = \pi r_3^2 - (Area \, B + Area \, A) \). In this study Area-A can be regarded as the agricultural productivity survey area after establishment (Post-establishment) of thermal power plant and the Area-C can be treated as the agricultural productivity survey area substitute of the before establishment (pre-establishment) of thermal power plant. Another significant factor to justify such assumption is the soil character.
These two-survey areas are considered as treatment group in DID. If the treatment variable is identified by treatment status $T = 1$, and $0$. When $T = 0$, means we consider the agricultural productivity during the pre-establishment of TPP (APPRTP), and the required information will be collected from Area-C type of land. This group ($T = 0$) is known as control group. When $T = 1$, means we consider the agricultural productivity during the post-establishment of TPP (APPOTP), and the required information will be collected from Area-A type of land. This group ($T = 1$) is known as treatment group.

Two stage sampling process will be used for agricultural productivity measurement. Five villages from Area-A and five villages from Area-C were selected. Under such selection, research aim is to choose the villages of same geographical size. If such possibility is not available, we made some adjustment by including some parts of adjacent villages with our selected villages. This is because, in case of village selection, agricultural farming land size is our primary variable. In the second stage, from each village according to agricultural land holding we divide them in two groups in terms of cropping pattern (single and multiple). Now from two groups five agricultural land with single cropping ($t = sc$) and five land size with multiple cropping ($t = mc$) will be selected for sample survey. From such methods two possible questions can arise. That is why five agricultural land from each category will be chosen. The most pertinent answer is that here Area-C will be used as a substitute of agricultural productivity of pre-establishment of thermal power plant (APPRTP). According to DID methodology the number of cases will be same in pre and post establishment part. The study chose the under mentioned figure for two kind of agricultural land categories. Another significant factor is that under such assumption the variation in land size will not be significant because the agricultural productivity of any kind of land can be converted in per-acre unit.

Now these land holders of three concentric circles are divided in two groups, one is practicing single cropping activity and the other group practicing multiple cropping activity. Such divisions will help us to observe the economics effects of TPP on both type of farmers. Basically, single cropping practicing farmers are the representative of low-income
farmers, because it is assumed that for low economic power it is not possible for them to arrange the inputs like irrigation, fertilizer, pesticides etc. along the year. The economic power is a significant variable in the drought prone areas and agriculture practice along the season is much costlier and depend on economic power of the land owners or land leased by farmer. Based on such economic power, lands are categorised into two groups as \( t = mc \), and \( sc \), where \( t = mc \) means those lands where multiple cropping is practiced (which represents the high economic power agricultural farmers) and \( t = sc \) means those lands where single cropping is practiced (which represents the low economic power agricultural farmers). Such divisions help us to understand the impact of TPP on agricultural productivity of both kind of lands and simultaneously on both types of farmers. Here, again the study can use binary data to understand the cropping pattern. Thus, \( t = 0 \), means it is the land of single cropping and \( t = 1 \), means it is of multiple cropping. For Better understanding of the study methodology on agriculture productivity an example of selection of PSU shown in figure-1 for Mejia Thermal Power Station of Bankura district.

![Figure-1: Example for understanding of PSU selection](image)

*Source: Authors Own*
Therefore, four types of land in Area-A (severely damaged area or APPOTP or the treatment group) we have two observations, one is on single cropping \((t = sc)\) and other is on multiple cropping \((t = mc)\). We can calculate the average of each group i.e. \(\bar{Y}_{sc}^T\), and \(\bar{Y}_{mc}^T\). Now for the control group, Area-C (least damaged area or APPRTP or the control group) the averages will be \(\bar{Y}_{sc}^C\), and \(\bar{Y}_{mc}^C\). Thus, the subscripts identify the frequency of cropping and the superscripts identify the status of group with respect to establishment of thermal power plant. Now the outcome agricultural productivity is modeled as,

\[
Y_i = \alpha_0 + \alpha_1 T_i + \alpha_2 t_i + \alpha_3 (T_i t_i) + \epsilon_i
\]

Here, the agricultural productivity regressed over status of the land with respect to establishment of thermal power plant, frequency of cropping, and multiplicative effects of both.

**Results and Discussion**

The study found that agricultural productivity and land character hugely change in the study area. The study found that over the time gap TPPs reduces the agricultural productivity by at least 32 percent. Though there is an expansion of urbanity with the functioning of TPPs but the salinity of ground water, change in soil character are all become adverse. So, such kind of urban expansion can be viewed as deformed urbanity. Over time reduction of agricultural productivity forced the peasants to choose massive use of fertilizer and the financially weaker peasants migrated to non-agricultural activity or wage labour. So, the establishment of TPP in the study area undoubtedly make some physical changes in the soil and water character and as well as the social and economic character of the inhabitants also changes over time.

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Factors Affecting the Employment of Women in Rural Agriculture:

Evidence from Anuradhapura District

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Department of Economics & Statistics, University of Peradeniya

Introduction

Farming is the base of rural society and, it is the main economic activity, in many countries in the world. Agriculture plays an important part in rural development, especially due to land use, in countries where the sector is of less economic significance. The main potential contributions of farming to rural development are in terms of supporting employment, ancillary businesses, and environmental services. In peripheral regions, farming is necessary to support the economic and social infrastructure. In countries whose share of overall employment in agriculture is at high levels, for example where farmers represent over 50% of the workforce, farming is likely to be the key economic activity determining the progress of rural development (European Commission, 2000).

Along with the current Sri Lankan situation, the total unemployment rate is 4.2%. However, female unemployment rate is recorded as 6.5% while male unemployment rate is 2.9% (Central Bank Annual Report, 2017). In contrast, when considering sector vise unemployment rate, rural sector is having 52.4% unemployment rate in 2018 1st quarter. (Sri Lanka Labour Force Survey, 1st quarter-2018) Female unemployment is higher than the male unemployment rate. Sofa (et, al 2011) has pointed out that agriculture sector is an important sector for creating job opportunities, especially for women.

Objective

This paper aims at identifying the factors associated with the labor supply of women in rural agriculture sector in Sri Lanka.
Methodology

This study uses primary data were collected from Anuradhapura district, Rambewa Divisional Sectarian area. 22 DS Division Sectarian areas are take account in Anuradapura district. Among them I selected Rambawa DSD; for, compared to the number of crop farmers in Anuradhapura District, Rambawa DSDs’ include the maximum amount of farmers. (Comparison based on Economic Census, 2013/14, Agriculture Enumeration Base Report, Department and Census and Statistics) Then, there are 38 GS divisions in the Rambawa DSD. Thus, I selected two GSD: Mahawewa and Meemalwewa. Sample size is 60 agriculture households.

Using the primary data, estimated logit regression model. In this technique, the first estimate a binary dependent variable model, with the dependant variable which takes the value one if the women in concern are in the participation in agriculture sector, and zero if the women do not participate in agriculture sector. The regression which was built by some selected variables following a study conducted by Sofa et.al. (2011)

\[ L_i = \ln \left( \frac{p}{1 - p} \right) = \beta_0 + \beta_1 family + \beta_2 edu + \beta_3 lsize + \beta_4 hhs + \beta_4 land + \varepsilon \]

\[ P(Y=1) = p, y =1 \text{ Women Participate Agriculture Activities} \]
\[ P(y = 0) = 0, y = 0 \text{ Women didn’t participate in Agriculture Activities} \]

where, family is the size of family, edu is level of education level in women, lsize is agriculture land size in family, hhs is husband health status (dummy) and land is land whether women have land ownership (dummy)

Results and Discussion

Results show that, family size, land size, land ownership, husband health situation are significant variables that affect women participation in rural agriculture sector while education level is insignificant. (See appendix table 02)
Table 01. Estimated Results of Marginal Effect

| Variable | dy/dx   | Std. Err. | z    | P>|z| | X Odds | Ratio |
|----------|---------|-----------|------|-----|--------|-------|
| Family   | -0.0393 | 0.0912    | -0.40| 0.066| 3.7    | 0.8427|
| Edu      | -0.0793 | 0.0398    | -0.48| 0.628| 9.4    | 0.9193|
| Lsize    | 0.0028  | 0.0001    | -3.65| 0.000| 5.5    | 5.9997|
| hhs*     | 0.0452  | 0.0005    | -1.97| 0.002| 2.0    | 0.6348|
| Land*    | 0.6191  | 0.1484    | 4.17 | 0.000| 0.6    | 30.5201|
| Cons.    | 10.2573 | 0.8426    | 2.19 | 0.045| 2.2    | 2.5486|

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Prob> chi2 = 0.0000   Pseudo R2 = 0.7259
Source: Authors’ calculations

According to the results, when other things being constant, if the average value of size is given as 3.7, when the family size increases 1 more unit, then the probability of women not being participating in agriculture activity is 0.039%.

If average value of cultivated land size is given as 5.5, when the land size increase one unit, then probability of women not participating in agriculture activity is 0.0028%. Also, compared to the husband not suffering from chronic diseases, when women’s husbands suffering from chronic diseases, the probability of women participating in the agriculture activity is 0.452%. Compared to the non-land ownership group, land ownership group participated in the agriculture sector at 0.6191 probability level.

Conclusion

This study identifies some variables positively affect female labor participation while some variables having negative sign and insignificance. Land ownership of women is the most intensive variable to participate in agricultural sector. In this situation, the government and other responsible institutes will be able to empower women economically, set up proper land ownership for women. If the husband
suffers from chronic diseases, the wife has to fulfill that employment gap. So, she has to work instead of men. I could identify most people suffering from kidney diseases in this area. Although women earn some amount of money, that is not enough for everything. Thus, the government should intervene to standardize their living standard.

References


Appendix 01
Table 01: Summary Statistics.

<table>
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<tr>
<th>Variable</th>
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<td>0</td>
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</tr>
</tbody>
</table>
Table 02. Logit regression results.

| Y       | Coef. | Std. Err. | z     | P>|z| | [95% Conf. Interval] |
|---------|-------|-----------|-------|-----|---------------------|
| Family  | .3465 | .2469     | 1.40  | 0.061 | -.1375           .8305 |
| edu     | .1082 | .1447     | 0.75  | 0.055 | -.1754           .3919 |
| Lsize   | -.0002| .0006     | -3.22 | 0.001 | -.0003           -.0004 |
| hhs     | -.0453| .2214     | -2.31 | 0.047 | -.0521           -.3310 |
| land    | 3.5496| 1.1028    | 3.22  | 0.001 | 1.3880           5.7112 |
Farmers Abandoning Paddy Cultivation: Economic Dimensions Warranting an Alternative Policy Perspective

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Introduction

Food Security is an essential ingredient for socio-economic sustenance of a nation. This concept, expressed by the Food and Agriculture Organisation (FAO) in terms of availability, access, stability and usage of food (FAO, 2003), directly implies the importance of food production, and hence the sustenance of agriculture. This is because the future global demand for food is bound to expand rapidly when the significant share of world’s poor, hitherto under-fed owing to unaffordability, gets sufficient incomes to feed themselves properly. Thus, poverty alleviation at global level could become synonymous to food shortages, and rising food prices, unless agriculture could be expanded to cater to this potentially rising food demand.

The on-going trends observed in Sri Lanka, traditionally an agricultural economy, however cannot be considered supportive of the above strategic directions, particularly in relation to paddy cultivation. Paddy farmers, more prominently the younger generations of farming families, move away from cultivating the nation’s staple; rising input costs was identified as a main cause [ (Thiruchelvam, 2005); (Hilal, 2013)] for paddy cultivation becoming an “unprofitable venture” (Eparachchi, Jayanetti, & Weliwita, 2002),. The policy remedy implemented during the post-2005 period, which apparently was successful in making the country self-sufficient in paddy for over a few consecutive years, was to reduce the in-farm financial costs and increase yields by subsidising the inputs, particularly fertilizer. Yet, this was proven short-lived. Declining trends recommenced no sooner the subsidies were curtailed.

Many causal factors for this apparent ill-health in the paddy agriculture in Sri Lanka have been recognised in literature. Rising input costs of
paddy production which reduces margins, small plot sizes making it uneconomical to adopt mechanised farming techniques (Thibbotuwawa, Mugera, & White, 2012) and low yields in paddy varieties cultivated (Dhanapala, 2000) have been cited. The researchers therefore appear to have focused more on cost reduction and yield enhancement directions [ (Kikuchi, Barker, & Weligama, 2002) ; (Thiruchelvam, 2005)].

The problems, however, could be deeper-rooted than what is explained by these quite conventional main-stream economic diagnostics. Little attention in terms of research or policy in to the political economic aspects in particular, that could be found in literature, other than a few [such as (Wijetunga, 2011) (Razmy & Ahmed , 2005)] on pricing, and the practice of guaranteed floor-price for paddy. This gap is what is being addressed through the present research.

**Objectives**

This study attempts to examine the political economic aspects of paddy production and tries to understand whether there could be more fundamental market-end issues faced by the paddy producers, which go beyond the frequently identified problems such as unproductive farming practices, low yields or enhanced costs.

**Methodology**

The study focused on evolution of relative economics in paddy production. This was attempted by comparing the evolution of Government-administered guaranteed purchase price of paddy against the evolution of price levels of other products. The objective was to perceive the trends of farmers’ purchasing power of non-paddy requirements through their paddy-based earnings, thus revealing the evolution of their “economic standing” over the years since 1952.

The analysis was based entirely on secondary data, sourced from the Hector Kobbekaduwa Agrarian Research and Training Institute and from the Central Bank of Sri Lanka. Descriptive political economic
analytical methodology was used to examine the data, represented using charts, diagrams, scatter plots and real and nominal comparisons.

**Results and Discussion**

At the outset, the paddy sector’s contribution to GDP was appraised. The share of paddy sector in the GDP declined from 28 percent in 1982-85 to 0.5 percent in 2017 (Central Bank of Sri Lanka, 2017), indicating that the factor returns in other economic activities would have been increasing much faster compared to those in paddy cultivation. This, together with the fact that a large share of population still engaged in paddy farming, implies that the living conditions of paddy farmers, relative to those engaged in other economic activities, would have deteriorated over the years.

![Figure 1: Movements in Guaranteed Paddy Purchase Price (Rs/Bushel)](image)

Note: In Constant (1952) Prices

The Government guaranteed price for paddy was then appraised in real terms.\(^{13}\) It is evident from the depiction in Figure 1 that the paddy farmers, over the years (except for the brief period between 1971 and 1977) would have got “poorer”, even if costs of production did not increase at all in real terms during the same period. This means, if not for any favourable yield adjustment, the purchasing power of paddy

\(^{13}\) Nominal values were converted to the real value using CCPI index.
farmers, and their living conditions, could not have been improved. In other words, the capacity of the farmers to buy other family needs from their farm incomes has gradually dwindled. This is a clear indication of paddy farming being increasingly unattractive as a livelihood.

The significant augmentation of paddy purchase prices in early 1970s could be a result of the economic self-sufficiency-oriented political economic ideology prevalent during the Unity Front Government of Mrs Bandaranayake. This policy drive would have aimed at making paddy farming attractive as a livelihood, thereby achieving twin benefits, namely (a) welfare improvement of paddy producers, and (b) augmentation of the paddy production, reducing the dependence of the economy on imported rice. This pattern seems to have been arrested after 1977, the declining trend of real prices of paddy that apparently commenced with post-1977 liberalisation has continued throughout the period leading to weakening economics of paddy farming communities. The study also went into examining the comparative trends of “surplus” earned, net of costs, over the years per kilogramme of paddy produced. The Figure 2 and Figure 3 depict the trends in real terms, which further confirms the declining pattern of surpluses generated per kilogramme of paddy output and per hectare cultivated, respectively.

Figure 2: Evolution of Surplus in real terms per Kg

Figure 3: Net Surplus in real terms per Hectare

Note: In constant (1952) Rupees

Note: In constant (1979) Rupees

The trend of net surplus per hectare in real terms (constant 1952 Prices), in spite of an upward move between 1999-2001 and then again between
2005 and 2009 (possibly owing to substantive fertilizer subsidy), has been negative.

The above analysis unearths several important realities pertaining to paddy producing economics. First, the adverse trends of paddy prices in real terms would have been at the roots of this deteriorating real surpluses earned in paddy sector. Liberal trade policies that enabled easy and unabated imports of serial substitutes could have been behind the downward pressure on paddy prices in real terms. Second, the reducing surpluses per unit area cultivated appears to have been kept on check to a certain extend by the gradually improving yields, possibly enabled by higher yielding paddy varieties, and by more intensive use of chemical fertilizer, particularly during post-2005 period. Third, the occasional spells of surplus improvement appear to be a result of input cost subsidies rather than of increased prices. Fourth, the policy environment, particularly after 1977, appears to have been more pro-consumer oriented than producer supportive, seemingly with an implicit consideration of the declining paddy prices in real terms a “blessing”. Finally, this political economic conjuncture does not appear to have provided any economic rationale for the farmers to be in paddy cultivation, other than, for any desire to hold on to land they inherited without a marketable title. It is no surprise therefore that the farmers, wherever alternative livelihoods are available, and whenever the titles become marketable, abandon paddy farming. Even if they remain in paddy cultivation, they dwell in other economic activities and consider paddy farming as a “part-time involvement”. This is already visible in wet zone paddy farming where increasing number of farmers are becoming “part-timers” (Eparachchi, Jayanetti, & Weliwita, 2002).

**Conclusions and Recommendations**

The research has produced strong evidence to suggest that paddy farming in Sri Lanka is fast becoming financially unattractive to the farmers. More they stay in paddy farming, lesser would be their purchasing power in procuring other consumption and investment needs, and weaker would be their social wellbeing. Thus, farmers moving out from paddy production would be inevitable, however
undesirable that outcome would be, unless corrective strategies could be developed and implemented without delay.

Productivity gains, though could provide a breathing space, would not make paddy farming attractive, in an environment where financial yield potential of other economic activities increase much faster. Besides, as suggested in literature, productivity gains might call for a structural shift towards larger farm plot sizes, which may, inter-alia, enable mechanised farming, implying the necessity of land accumulation. An outcome inevitably associated with such a scenario would be mass-scale dispossession, farmers being made “paid workers” in their own lands, and large-scale migration to townships for better pastures; socio-political desirability of such eventualities are questionable.\(^{14}\)

The way out, from this apparent impasse, could possibly be found in alternative policy perspectives. Enhanced paddy prices, at least to match with cost escalation in other sectors of the economy so that real purchasing power of paddy farmer does not dwindle, is imperative to encourage small scale farmers to remain in paddy cultivation without losing their social wellbeing.\(^{15}\) Such is possible if the country reverts to self-sufficiency-oriented policies where import of rice and rice substitutes would be discouraged either through quantity restrictions or taxation. These policies are neither alien to Sri Lankan economic history, nor contradictory to food security goal of the Food and Agriculture Organisation. Augmented paddy prices, if an issue for urban poor could be addressed through direct and targeted subsidies. Such would be preferable, even at a neoclassical view point, compared to keeping the rice prices low in the market through production cost subsidies thereby indirectly subsidising the consumption of even the rich consumers.

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\(^{14}\) Hitherto self-employed farmers would become wage dependent employees, migration away from paddy fields to townships would cause urban social problems, and dampered wage levels in the casual employee segments would hamper income growth of urban wage earners, could be among negative socio-economic implications.

\(^{15}\) 1.8 million rural families are still engaged in paddy cultivation (DOA, 2018), and their social wellbeing cannot be ignored.
References


Farmer Perceptions on Adoption of Eco-Friendly Technologies to Reduce Chemical Fertilizer Usage in Paddy Farming in Kurunegala Area

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Introduction

The green revolution has contributed to the level of food security, both at the household and national level. Heavy usage of agrochemicals has, nevertheless, led the general public into numerous vulnerabilities, including the adverse health effects. In the light of this, the introduction of those Eco-friendly technologies (EFTs) has been of paramount importance in order to minimize the negative effects of those vulnerabilities without sacrificing the state of food security and ecosystem health.

This study dealt with two different supplementary forms of fertilizer, i.e. Bio-fertilizer (EFT₁) and Slow release urea using rice husk biochar (EFT₂), which are the potential outcomes of a multi-objective, multi-phase research study currently in place with the funding from National Research Council of Sri Lanka. Bio-fertilizer could be applied to reduce the chemical fertilizer usage while improving soil health and is formulated using microbial inoculant that improves nutrient availability to plant. Slow release urea can be applied to reduce Nitrogen losses in the field and is formulated by using a pyrolysis technique. These EFTs are, hence, intended to reduce the quantity and frequency of using synthetic agrochemicals and inorganic fertilizer in paddy farming in Sri Lanka significantly.

As a core part of this study, this analysis deals with socio-economic aspects related to use of these EFTs, where the perceptions of paddy farmers, i.e. the potential direct end-users of such technologies, were
explored. In so doing, EFT1 was evaluated against ‘Chemical Fertilizer’ (i.e. the most popular technology) and ‘Organic Amendment’ (i.e. the best alternative technology) available at present. Similarly, EFT2 was evaluated against ‘Straight Fertilizer’ (i.e. the most popular) and ‘Slow Releasing Fertilizer’ (i.e. the best alternative) available at present.

Research Problem

This study attempted to find an answer to the economic research problem of: what factors can trigger farmers involved with paddy cultivation in Sri Lanka to develop and use different eco-friendly farming technologies over and above the synesthetic agrochemicals and chemical fertilizers that are responsible for creating numerous socio-economic and environmental problems at present.

Objective

The main objective of the study was to assess the attitudes and perceptions of potential direct end-users (i.e. farmers) on development and use of two specific EFTs, namely Bio-fertilizer and Slow release urea using rice husk bio-char, in their paddy cultivations against the most popular and best alternative technologies currently available and/or in use in this respect.

Methodology

This study used six criteria identified through the “expert perception analysis” carried out on the same issue (see, Chandrasiri et al., 2018), i.e.: (1) Regulation (RT); (2) Cost of application (CT); (3) effect on the Environment (ET); (4) expected Performance (PC); (5) availability of related Services (SE), and (6) level of Acceptance (AC) to evaluate farmer perceptions. Each criterion was, in turn, further strengthened by adding 22 attitudinal statements explaining the true nature and behavior of people, in general, and farmers, in particular, and the environment etc. with respect to the criterion it stands for.

A structured questionnaire was developed, which includes, amongst other questions to reveal socio-economic and demographic
characteristics of respondents, those attitudinal statements set against a 10-point Likert-scale ranging from ‘extremely poor’ (-5) to ‘extremely good’ (+5) and the EFT in concern was always placed at ‘Zero’ on this scale. For a given attitudinal statement, we may consider that if a farmer considers that the EFT developed through this program of research performs better (worse) in compared to, for example, most popular technology in place, he would provide a negative (positive) score on the likert-scale given the EFT is located at “0”. Data were collected from farmers (n=40) engaged in paddy cultivation full-time for a longtime (i.e. more than 10 years) in the Pannala area in Kurunegala district during June to July 2018.

Data analysis techniques associated with Confirmatory Factor Analysis, including the Scale Reliability, Unidimensionality, and Multi-Trait Multi-Method Matrix (Hair et al., 1995) were undertaken with the ‘SPSS’ (Version 25) statistical software to which those six criteria and 22 attitudinal statements were considered the ‘Constructs’ and Indicators/Items, respectively. Having established the Validity and Reliability of data, Additive Indices and Mean Scores related to those criteria and statements were estimated (Jayasinghe-Mudalige and Henson, 2006).

Results and Discussion

Descriptive Statistics of the Sample

The majority of respondents were Male (73%) and nearly 45 percent of respondents were educated up to G.C.E. Ordinary Level. About 58 percent of respondents own less than 2 Acres of paddy cultivated lands and 63 percent cultivated by depending on rain fed irrigation. Almost all farmers in the sample cultivated paddy in both Yala and Maha season subsequently and 75 percent of which prefers to have fertilizer subsidy as a material. It was revealed that unavailability of labor force and limitation of water lead them to perform broadcasting technique over and above other methods.
**Outcome of the Statistical Analysis**

The results from Scale reliability (Cronbach Alpha > 0.7), Unidimensionality (Principal Axis Factoring > 0.35) tests and the MTMM matrix derived, which shows that the leading diagonal values were significantly greater than other correlation coefficients, suggest that the six Constructs and corresponding statements taken into consideration (i.e. RT, CT, ET, PC, SE and AC) were valid and reliable for further analysis.

The following figures illustrate the range of values of Additive Index (AI) estimated for each scenario. It stresses that the majority of respondents in an unaccepted position with respect to these EFTs. As Figure 1 reinforced, farmers, as a whole, pronounced that Chemical Fertilizer (i.e. the most popular technology) was better, and they do not adopt EFT1 unless so is developed to reflect those attributes up to their expected level. Similarly, as can be seen from Figure 2, a higher proportion of farmers did not accept EFT2, and they showed a greater attraction towards Straight Fertilizer (i.e. most popular technology).

The Aggregate Mean Scores derived for six criteria for the scenarios of EFT1 against (a) the Chemical Fertilizer (i.e. popular), and (b) Organic Amendments (i.e. alternative) elaborated in Figure 3.

![Figure 1 - Distribution of values of AI for Chemical Fertilizer in relation to EFT1](image1.png)

![Figure 2 - Distribution of values of AI for Straight Fertilizer in relation to EFT2](image2.png)
Figure 3: Aggregate Mean Scores for Most Popular Technology and Best Alternative Technology with Respect to EFT₁

It highlights that in a number of aspects, including CT (1.23), SE (2.36) and AC (1.50), the Chemical Fertilizer was perceived to be performing better than EFT₁. The negative values on RT (-1.23), ET (-3.40) and PC (-0.35), in turn, implies that EFT₁ was better than chemical fertilizer. Similarly, the positive value of 0.94 for SE implies that availability of services in the Organic Amendment was in a better place in compared to EFT₁. In contrary, the results claimed that EFT₁ was better than the Organic Amendment in relation to several other aspects, including RT (-0.84), CT (-0.19), PC (-0.25) and AC (-0.56). In the context of ET (0.00), both EFT and Organic Amendment are perceived to be similar.

Figure 4: Aggregate Mean Scores for Most Popular Technology and Best Alternative Technology with Respect to EFT₂
Conclusion

Although EFTs have been recognized in literature as generating remarkable social and environmental benefits to the society, by large, the outcome of analysis highlights that, at the ground level, farmers are more concerned about the economic and financial returns associated with moving into adoption of such technologies. At the moment, farmers perceived on the fact that existing regulatory and facilitative policy environment to adopt those EFTs is not encouraging. In the light of this, it is important that public regulatory institutions and others stand for EFTs should generate both short-term and direct private and market-based incentives, over and above their counterpart, for farmers to shift into those EFTs.

References


An Empirical Analysis of Factors Affecting Price Variation of Coconut in Sri Lanka

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Introduction

Coconut has been the third most important commercial crop in Sri Lanka since the colonial era. At present this industry is an important source of foreign exchange earnings and employment generation of Sri Lanka, as well as an essential component of Sri Lankan cooking, nutrition of the nation and especially of the rural livelihood. Sri Lanka is the fifth largest producer of coconut in the world (FAO, 2009, 2010). In 2017, its contribution to the GDP was 12 or 14 percent from the total agriculture, while agricultural contribution to the GDP was 7.5 % (CBSL, 2017). It occupies approximately 20 percent of arable land in Sri Lanka and the majorities are small scale production units. The average annual coconut production is around 2600 million nuts, of which around 65% is used for household consumption (CBSL, 2017). The rest is mainly used by two industries; desiccated coconut (DC) and coconut oil. Coconut products may deal with a number of prices in the market channels such as retail prices, wholesale prices, auction prices, FOB prices, CIF prices etc. All these prices undergo fluctuations making it a great risk to invest, buffer stock maintaining, to make future contracts, and in international trade, living cost of consumer’s and other associated actions. Among those prices, retail coconut price mainly affects the consumer’s living cost and their livelihood. At present, retail coconut price is highly fluctuating due to the increasing domestic demand for fresh nut consumption and vulnerability to drought conditions. This situation badly affects consumers as well as coconut related industries.

Generally, there are many factors that affect the coconut price fluctuation but some factors may highly lead to the incensement of it. Khalfan (2015) confirmed that the lack of technology, training and fertilizer leads to the decrease of production of coconut and it affects the
incensement of coconut prices in the country. Therefore, the government would support training; dissemination improved technologies, extension officers and smallholder farmers. The farmers would also be motivated in coconut production by reducing problems hindering the production such as pest control and fertilizer use. Indrajith (2014), Clarete and Roumasset (1983) have confirmed that seasonal changes highly affect the production of coconut and its price changes. Pathirana et al. (2015) identifies that climate changes and increasing population affect the coconut price fluctuation in Sri Lanka. Fernando et al. (2007) also have found that climate changes lead to the change of coconut price. Rangodan et. al. (2009) found out that seasonal (monthly) index affects to the change of coconut price. When the Sri Lankan context of coconut price fluctuation is considered, there is a lack of studies and the existing studies have also considered only mainly the common factors. This vacuum motivated us to identify the major factors which affect the retail coconut price fluctuation in Sri Lanka.

Research Problem

According to the available data, the coconut price has been fluctuating for several decades in Sri Lanka. However, at present, the coconut price is highly fluctuating whole markets and it affects the expenditure pattern of the consumers. Therefore, the research problem of this study is to identify the factors affecting the determination of retail price of coconut in Sri Lanka.

Objective

The purpose of this study is to identify the factors affecting the determination of the retail prices in coconut of Sri Lanka.

Methodology

Annual data of Sri Lanka from 1988 to 2017 is used in this study. The data of domestic average retail price of coconut (DARPC), annual coconut production (ACP), annual rainfall (ARF), average cost of production per coconut (ACPPC), annual household consumption
(AHC) and land extend of coconut cultivated (LECC) have been extracted from the annual reports of the Central Bank of Sri Lanka. ADF and PP unit root test are applied to check stationary properties of the time series data. In order to achieve the above mentioned properties, the following general version of time series model is used:

\[ \text{DARPC}_t = \beta_0 + \beta_1 \text{ACP}_t + \beta_2 \text{ARF}_t + \beta_3 \text{ACPPC}_t + \beta_4 \text{AHC}_t + \beta_5 \text{LECC}_t + \epsilon_t \]

Where, \( \text{DARPC}_t \) is the dependent variable which indicates domestic average retail price of coconut (domestic retail price in rupee). \( \text{ACP}_t \) is annual coconut production (quantity of coconut in million). \( \text{ARF}_t \) is annual rainfall (mm). \( \text{ACPPC}_t \) is cost of production per coconut (rupees). \( \text{AHC}_t \) is annual household consumption of coconut (quantity of coconut in million). \( \text{LECC}_t \) is extend land of coconut cultivated (hectares in thousand). \( \epsilon_t \) is the random error term. All variables are stationary at their level. Therefore, we used the Ordinary Least Squired (OLS) model.

**Results and Discussions**

The Augmented Dickey Fuller test was used to determine the order of integration of the variables in the model. The unit root test was done to identify stationary level of independent variables to form except the dependent variable. The result of unit root test is presented in table 1.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Intercept</th>
<th>Trend and Intercept</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t- stat.</td>
<td>t- stat.</td>
</tr>
<tr>
<td>ACP</td>
<td>0.0352**</td>
<td>0.0068**</td>
</tr>
<tr>
<td>ARF</td>
<td>0.0000***</td>
<td>0.0001***</td>
</tr>
<tr>
<td>ACPPC</td>
<td>0.0116**</td>
<td>0.0521*</td>
</tr>
<tr>
<td>AHC</td>
<td>0.0445**</td>
<td>0.0367**</td>
</tr>
<tr>
<td>LECC</td>
<td>0.0421**</td>
<td>0.0494**</td>
</tr>
</tbody>
</table>

Note: ***, ** and * represent the variables are significant at 1%, 5% and 10% level of significance respectively.

The estimated results show that all of the independent variables are stationary at their level form except the dependent variable. According to this result, it was decided to use the OLS model as well as the model
is evaluated using diagnostic tests. The results of the diagnostic tests are present in table 2.

Table 2: Results of Diagnostic Test

<table>
<thead>
<tr>
<th>Diagnostic Test</th>
<th>Statistics</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heteroskedasticity test</td>
<td>0.0222</td>
<td>0.01 (1%) No Heteroskedasticity</td>
</tr>
<tr>
<td>Serial correlation LM test</td>
<td>0.2304</td>
<td>0.05 (5%) No Serial correlation</td>
</tr>
<tr>
<td>Normality test</td>
<td>0.0127</td>
<td>0.01 (1%) Normaly distribution</td>
</tr>
</tbody>
</table>

The estimated result is given by the following estimated equation:

\[
\text{DARPC}_t = -45.75 - 0.0034\text{ACP}_t + 0.0075\text{ARF}_t + 3.056\text{ACPPC}_t \\
+ 0.00127\text{AHC}_t + 0.099\text{LECC}_t
\]

(-1.97) (2.66) (12.29) (0.04) (3.35)

Note: t-statistics are given in the parenthesis.

The estimated results show that annual rainfall, cost of production per coconut and extend of coconut cultivated land have a positive and significant impact on the domestic retail average price of coconut whereas annual coconut production has negative and significant impact on the domestic retail average price of coconut. But the annual household consumption does not have significant impact on domestic retail average price of coconut. In the model, R square was 0.94 (94%). It implies that the model is accurate. Out of that 100% variation of the domestic retail average price of coconut, all these variables explain the 94% of that variation with the model. Other factors explain only 6% variation of the domestic retail average price of coconut.

**Conclusion**

This study attempts to identify the factors affecting the determination of retail price of coconut in Sri Lanka. An OLS model which identifies factors of coconut price determination was highly fitted with independent variables showing higher R square value as 0.94. Further, the results reveal that there are several significant factors that determine the retail coconut price in Sri Lanka. Those are annual rainfall, cost of production per coconut, annual extend of land of coconut cultivated and
annual coconut production. Those all significant variables are come from supply side. According to that result it is important to note that supply side is the key determiner of domestic average retail price of coconut in Sri Lanka. As policy recommendations, authorities and producers should consider the methods to increase coconut production potential by breeding new varieties for high yield and tolerant to biotic and abiotic stresses. Further, policy makers should assist to minimize the risk caused by uncertainties in yield and market of coconut, adapt and mitigate to climate change effects to reduce vulnerability of coconut production, increase competitiveness and improve infrastructure facilities of the coconut industry.

References


Causation between the Nutritional Status and Income in Sri Lanka:

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Introduction
Currently a mass of theoretical and empirical literature is available on how the income of a country responds to nutrient intake, and vice-versa (Dawson & Sanjuan, 2011; Dawson & Tiffin, 1998; Neeliah & Shankar, 2008; Ogundari & Nanseki, 2014; Olusesan & Adeola, 2015; Salois et al., 2012; Pinstrup-Andersen, 2007). The empirical findings suggest that low income push the people into debt, lead to malnutrition, cause health problems, make labour force and their dependents extremely vulnerable to unemployment, disability, and faster deterioration in old age (Merk, 2009). This leads to the declining productivity of the workforce. A better level of nutrient intake positively influences the country’s long-run sustainable economic growth because of its positive influence on physical work capacity of the labour force and thereby labour productivity (Stiglitz, 1976; Neeliah & Shankar, 2008; Pinstrup-Andersen, 2007; Ghosh, 2018; Cole, 1971; Bleakley, 2010).

Since the introduction of the open-economic policy in 1977 in Sri Lanka, the annual average economic growth fluctuated between a low -1.4% in 2001 and a high 9.1% in 2012 with a long-term average of 5.2% for 1977-2013. At the same period, average per capita calorie and protein consumptions ranged between 2,095 kcal and 2,537 kcal, and 44.8g and 59.6g, respectively.

Though many research investigations examine the causal relationship between income and nutrition intake due to its possible bi-directional relationship, studies regarding Sri Lanka are lacking. Since Sri Lanka aims to transform its economy from the lower middle-income category to the high-income category by 2030, a survey of this nature is
imperative and timely. In this connection, the policies aimed to develop the human capital would be the best option to boost the economy in a competitive environment of the global economy. As Cole (1971) explained, one of the determinants of human capital development is the level of nutritional intake of a country owing to its positive impact on the physical and mental health of labour force. Bleakley (2010) explained health as a kind of human capital and an input to produce other forms of human capital. Since the recent past, the government took a policy decision to increase its spending on health gradually. For instance, the 2017 annual budget allocated Rs. 196,820 million for the health sector which is Rs. 58,417 million higher than the budget allocation for the health sector in 2014 (Central Bank of Sri Lanka, 2017). Given this context, the main attempt of this study is to systematically analyse the relationship between per capita national demand for nutrients and the per capita income of Sri Lanka. Following two research questions will be addressed by the study—1) Does annual per capita calorie and protein consumption increase along with the rise in per capita income? and 2) Is annual average per capita income is affected by the annual average demand for nutrients in Sri Lanka? Answers for these two questions are valuable for policymakers to enrich their understanding of the subject.

Table 1: Summary statistics of nutrient variables – per capita calorie and protein consumption in Sri Lanka: 1977-2013

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs.</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic Growth</td>
<td>37</td>
<td>5.2</td>
<td>2.028272</td>
<td>-1.5</td>
<td>9.1</td>
</tr>
<tr>
<td>Food supply (kcal/capita/day)</td>
<td>37</td>
<td>2308.108</td>
<td>101.4437</td>
<td>2095</td>
<td>2537</td>
</tr>
<tr>
<td>Protein supply quantity</td>
<td>37</td>
<td>50.76838</td>
<td>4.31851</td>
<td>44.87</td>
<td>59.65</td>
</tr>
</tbody>
</table>

Source: FAOSTAT data, 2016

**Methodology**

The nutritional data for the study were obtained from FAOSTAT database, and the per capita income data from the Annual Report of the Central Bank of Sri Lanka 2016 and expressed in US dollars. The time period considered for the study is 1977 to 2013, the period of the open economic policy. For the investigation, a time series econometric
analysis was employed to review the long-run relationship and short-run dynamics among the variables of per capita income and nutritional intake (calorie and protein). The econometric model was specified as follow:

\[ \ln PCI_t = \beta_0 + \beta_1 \ln NI(Kcal)_t + \ln NI(Protein)_t + u_t \] (1)

Where, PCI is the per capita income, NI (Kcal) represents the nutritional intake in terms of per capita calorie consumption (kcal/capita/day), NI (Protein) is the nutritional intake in terms of per capita protein consumption (g/capita/day) and \( u_t \) is the stochastic error term.

All variables are in the logarithm form. The variables were transformed into the form of the natural logarithm as it reduces the problem of heteroscedasticity since the transformation leads to reduce the scale. These explanatory variables in the econometric model were identified based on the literature available in the field.

The recent developments in the time series econometrics have revealed that most macroeconomic variables appear to be non-stationary. Prior to empirical analysis, Augmented Dickey-Fuller (ADF) test and the Phillips & Perron (PP) test were performed to check the presence of unit root in time series. Johansen Co-integration test helped to find out the long-run equilibrium relationship between nutrient intake regarding the per capita calorie and protein consumption and per capita income. This study also focused on the Granger causality test to check the causal relationship between nutrient intake concerning the per capita calorie and protein consumption and per capita income.

**Results and Discussions**

Since regaining independence in 1948, Sri Lanka has adopted various economic policy reforms, specifically welfare and market-oriented policy reforms, to uplift the living standard of people. In this backdrop, this paper attempts to empirically study the causality between income and nutritional intake in Sri Lanka, specifically focussing on the open economic policy period commenced in 1977. The present study focuses
on the open economic policy phase because it provides a unique policy regime, particularly in the income enhancing (economic growth-oriented) aspects of economic policies. In parallel, various welfare-oriented programmes have been implemented to alleviate poverty and inequality, reduce malnutrition, various child welfare measures, actions to uplift the educational level of children, and provision of Rs. 20,000 for pregnant mothers.

Figures 1 and 2 present the relation between calorie intake and per capita income, and protein intake and per capita income over the period of 1977 – 2013. Both figures reveal that calorie and protein intakes positively correlate with the per capita income during the concerned open economic policy period. Regarding calorie intake, the relationship gets stronger when the per capita income exceeded USD 585 in 1993. The possible reason would be the focus on poverty alleviation programmes—Janasaviya and Samurdhi programmes—to enhance the nutritional status of the poor strata of the population.

As noted in the methodology section, the first step of the analysis was to perform tests to verify the time series properties of the variables in the model. In the first stage, the ADF and PP tests were conducted to detect whether the series are non-stationary because classical regression model requires that the dependent and independent variables be stationary to avoid spurious regression (Granger & Newbold, 1974). The lag length of the time series in the ADF test was selected based on the
Schwarz criterion. According to the results, both ADF and PP tests do not reject unit root null hypothesis at level. However, the unit root null hypothesis is rejected at the first difference of the series in terms of the PP test.

Table 2: Results of ADF and PP Unit Root Test

<table>
<thead>
<tr>
<th>Variables</th>
<th>ADF</th>
<th>PP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intercept</td>
<td>Trend &amp; Intercept</td>
</tr>
<tr>
<td></td>
<td>Level 1st Difference</td>
<td>Level 1st Difference</td>
</tr>
<tr>
<td>LNY</td>
<td>0.99</td>
<td>0.006</td>
</tr>
<tr>
<td>LNX1</td>
<td>0.94</td>
<td>0.000</td>
</tr>
<tr>
<td>LNX2</td>
<td>0.99</td>
<td>0.218</td>
</tr>
</tbody>
</table>

Note: *** significant at 1% level

The Johansen co integration test was performed to analyse the long-run relationship between the variables of the model, and Table 3 presents the findings. The results of both trace statistics and maximum Eigen statistics show that the null hypothesis of no co integration rejected at 5% significant level indicates that there is at least one co integration equation, which denotes a long-run relationship among variables.

Table 3: Result of Johansen co-integration test

<table>
<thead>
<tr>
<th>Hypothesized No. of CE (S)</th>
<th>Unrestricted Co integration Rank Test (Trace)</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hypothesized No. of CE (S)</td>
<td>Eigen value</td>
</tr>
<tr>
<td>None*</td>
<td>0.554796</td>
<td>35.22944</td>
</tr>
<tr>
<td>At most 1</td>
<td>0.178649</td>
<td>6.906621</td>
</tr>
<tr>
<td>At most 2</td>
<td>0.000527</td>
<td>0.018442</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hypothesized No. of CE (S)</th>
<th>Unrestricted Co integration Rank Test (Maximum Eigen value)</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hypothesized No. of CE (S)</td>
<td>Eigen value</td>
</tr>
<tr>
<td>None*</td>
<td>0.554796</td>
<td>28.32282</td>
</tr>
<tr>
<td>At most 1</td>
<td>0.178649</td>
<td>6.888179</td>
</tr>
<tr>
<td>At most 2</td>
<td>0.000527</td>
<td>0.018442</td>
</tr>
</tbody>
</table>

Note: ** denotes the rejection of null hypothesis at 5% level

The short-run relationship among variables was identified by the Granger causality test. Under this test, the variable per capita income was regressed by its past values, past values of per capita calorie intake,
and past values of per capita protein intake. Likewise, the variable per capita calorie intake was regressed by its past values, past values of per capita income, and past values of per capita protein intake. Again, the variable per capita protein intake was regressed by its past values, past values of per capita income, and past values of per capita calorie intake. As per Table 4, there is a short-run Granger causality from per capita income to per capita calorie intake, and per capita protein intake. This indicates the importance of income enhancing policies to improve the nutritional status of the country’s population.

Table 4. Result of Granger Causality test

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Lags</th>
<th>Observations</th>
<th>F-Statistics</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNX1 does not Granger Cause LNY</td>
<td>1</td>
<td>36</td>
<td>0.72004</td>
<td>0.4022</td>
</tr>
<tr>
<td>LNY does not Granger Cause LNX1</td>
<td>5.04014</td>
<td>0.0316***</td>
<td>0.6190</td>
<td></td>
</tr>
<tr>
<td>LNX2 does not Granger Cause LNY</td>
<td>1</td>
<td>36</td>
<td>0.25194</td>
<td>0.6190</td>
</tr>
<tr>
<td>LNY does not Granger Cause LNX2</td>
<td>21.8256</td>
<td>5.E-05***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LNX2 does not Granger Cause LNX1</td>
<td>1</td>
<td>36</td>
<td>4.16672</td>
<td>0.0493***</td>
</tr>
<tr>
<td>LNX1 does not Granger Cause LNX2</td>
<td>0.07129</td>
<td>0.7911</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LNX1 does not Granger Cause LNY</td>
<td>2</td>
<td>35</td>
<td>0.33316</td>
<td>0.7193</td>
</tr>
<tr>
<td>LNY does not Granger Cause LNX1</td>
<td>2.79617</td>
<td>0.0770</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LNX2 does not Granger Cause LNY</td>
<td>2</td>
<td>35</td>
<td>0.13528</td>
<td>0.8740</td>
</tr>
<tr>
<td>LNY does not Granger Cause LNX2</td>
<td>7.76211</td>
<td>0.0019***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LNX2 does not Granger Cause LNX1</td>
<td>2</td>
<td>35</td>
<td>2.10587</td>
<td>0.1394</td>
</tr>
<tr>
<td>LNX1 does not Granger Cause LNX2</td>
<td>0.40669</td>
<td>0.6695</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: ** *denotes the rejection of null hypothesis at 5% level

The results further reveal a unidirectional causality association from the per capita protein intake to per capita calorie intake. It indicates the nature of items in the food basket. Table 5 presents the nutritive value

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of selected food items common in the Sri Lankan food basket. It shows that food items with relatively high protein contents contain relatively higher energy (Kcal) as well. The causation of income towards calorie intake and protein intake indicate that the income encourages people to move to nutritive food items or concern the nutritious food items in the food basket. However, calorie intake and protein intake do not have Granger cause the income. It implies that the economy is not sufficiently ready to employ or upgrade the utilisation of labour force to a potential capacity from the underutilised level. Specifically, the weak physical and mental status of the workforce leads to a low productivity level of the already employed workforce in the economy. Thus, the nutritional status of the population and the income level would have positive and significant impacts on the income by improving the labour productivity of the employed workforce and expanding the employed workforce in the economy. Thus, the results – calorie intake and protein intake do not have Granger cause the income - question the readiness of the economy to gain advantages from the improved nutritional status of the population to enhance the economy.

Table 5: Nutritive value of selected foods – values are per 100g of edible portion

<table>
<thead>
<tr>
<th>Name of the food stuff</th>
<th>Energy (Kcal)</th>
<th>Protein (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td>349</td>
<td>8.5</td>
</tr>
<tr>
<td>Cowpea</td>
<td>323</td>
<td>24.1</td>
</tr>
<tr>
<td>Dhal red</td>
<td>343</td>
<td>25.1</td>
</tr>
<tr>
<td>Dhal yellow</td>
<td>335</td>
<td>22.3</td>
</tr>
<tr>
<td>Green gram</td>
<td>334</td>
<td>24</td>
</tr>
<tr>
<td>Black gram</td>
<td>347</td>
<td>24</td>
</tr>
<tr>
<td>Soybean</td>
<td>432</td>
<td>43.2</td>
</tr>
<tr>
<td>Dambala</td>
<td>404</td>
<td>33</td>
</tr>
<tr>
<td>Dried chilli</td>
<td>291</td>
<td>15</td>
</tr>
<tr>
<td>Powdered milk</td>
<td>357</td>
<td>38</td>
</tr>
<tr>
<td>Dried halmassa</td>
<td>408</td>
<td>48.1</td>
</tr>
<tr>
<td>Hurulla</td>
<td>125</td>
<td>19.2</td>
</tr>
<tr>
<td>Dried Iriankutta</td>
<td>255</td>
<td>54.9</td>
</tr>
</tbody>
</table>

Source: Report of the Medical Research Institute, 1973
Conclusion

Sample quantities of empirical and theoretical literature have investigated the impact of low income on the living standard of the people. The nutritional level of the population of any economy plays a crucial role in the human living standards due to its theoretical and practical implications with economic prosperity. This study aims to systematically analyse the relationship between per capita national demand for nutrients and per capita income in Sri Lanka. The analysis covers the period from 1977 to 2013 by employing the ADF test and PP test, Johansen co integration test, and Granger Causality test.

The unit root null hypothesis was rejected at the first difference of the series in terms of both trend, and trend and intercept by the PP test. Johansen co integration test confirmed the presence of the long-run relationship between the variables. The results of Granger causality test indicated a unidirectional causal relationship runs from the per capita income to nutritional intake regarding the per capita calorie consumption (kcal/capita/day), per capita income to nutritional intake in terms of per capita protein consumption (g/capita/day), and nutritional intake in terms of per capita calorie consumption (kcal/capita/day) to nutritional intake in terms of per capita protein consumption (g/capita/day). Such causation of income towards calorie intake and protein intake denotes that the income encourages people to move to nutritive food items or concern nutritive food items in the food basket. The indication- calorie intake and protein intake do not have Granger cause the income in Sri Lanka- questions the readiness of the economy to gain advantages from the improved nutritional status of the population to enhance the economy.

References


An Evaluation of Inter-Relationship among Agriculture, Industry and Service Sector and Composition towards the Growth of GDP of Sri Lanka

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Introduction

Historically, the agriculture sector of Sri Lanka was an important fraction of Gross Domestic Production (GDP) of Sri Lanka. And, it was 38.8% in 1959. It is contributing around 7.5% in 2016 (Central bank annual report, 2017). Even though agriculture sector has the lowest contribution to the gross domestic product in Sri Lanka, it is providing second largest percentage value in labour force to the national accounts. When we consider about the population prevalence, rural sector is 77.4%, urban sector is 18.2% and Estate sector is 4.4% in 2016 in Sri Lanka (Central Bank of Sri Lanka, 2016). Nonurban people possible to easily tend to agriculture sector. In 2016, the contribution of main three sectors to the GDP was as agriculture sector 7.5%, Industry sector 27.1% and service sector 57%. The labour force participation rate of those three sectors are agriculture, forestry and fishing sector 32.8% contribution, Industry sector 26% and service sector 41.2%. Agriculture was and is primary livelihood, employment and food security in Sri Lanka. But now the fractions of three sectors has already changed in Sri Lanka proportional but still it is clear that agriculture adding values to increase the fraction of industry and service sector also because agriculture sector provides material to industry sector in one way to evaluate that time series econometrics techniques have used. In the other side agriculture sector provides country exports. So, it is important to identify the inter relationship among three sectors of GDP in Sri Lanka. And also, Sri Lanka had good development among other countries in past. This paper is aimed to study causal inter-relationship among agricultural sector, industry sector and services sector. And, their composition to GDP of Sri Lanka. Time series econometrics techniques such as Augmented Dickey Fuller (ADF) test, Granger causality Test, Johnson
Cointegration Test Vector Error Correction Model have used to have the estimations.

**Research Problem**

There are three main sectors which are contribute GDP of Sri Lanka. Agriculture played a main role in the GDP historically. But now it has changed. Econometric does a great job to have significant ideas for economic situations. It seems that agriculture sector was facilitated by increase the industry and service sectors. So, it is needed to study whether there are significant relationships among agriculture sector, industry sector and service sector. And, are there any short run and long run relationship from those sectors towards the GDP in Sri Lanka.

**Objectives**

This study aimed;
- To examine causal relationship among the agricultural sector, Industry sector and service sector.
- To examine the short run and long run relationship from agriculture, industry and service sectors towards the gross domestic production in Sri Lanka.

**Methodology**

The study used time series econometrics techniques to take the results of the study. Time series secondary data from 1960-2016 have used to estimations and data has obtained from the central bank annual report 2017, Sri Lanka. GDP growth rate, proportional contribution of agriculture sector, industry sector and service sector to the GDP have used as time series variables of the study. And Eviews 8 statistical software has used to have the results of the tests. ADF (Augmented Dickey Fuller Test) test has used to test the stationary of data, Granger causality test has used to examine the causal relationship among the three sectors of GDP, Johansson cointegration test has used to test the long run relationship of the variables and Vector Error Correction model has used to estimate the short run adjustment process working behind the long run equilibrium relationship.
Results and Discussions

![Figure 1: Time series plot of Variables](image)

Figure 1 shows the first rule of handling time series data as a time series plot. Figure 01 contains the fraction of agriculture, industry and service as a percent and the GDP growth rate of Sri Lanka. It seems that there is an upward trend in industry sector and service sector proportions. And, there is a highly downward trend in agriculture sector. But still Sri Lanka is a developing country. Developing countries has comparatively higher contribution to the GDP than other sectors. But, Sri Lanka not going on that manner. After 90th century service and industry sectors have increased than agriculture because of the open economic policy. So, this study full fill the vital need of having a clear idea about the behavior of Sri Lankan Economy.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Form of the Variable</th>
<th>Lag length</th>
<th>T statistic</th>
<th>p value</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP Growth Rate</td>
<td>Level</td>
<td>02</td>
<td>-</td>
<td>0.1513</td>
<td>Series is not stationary</td>
</tr>
<tr>
<td></td>
<td>1st Difference</td>
<td>02</td>
<td>2.954536</td>
<td></td>
<td>Series is stationary</td>
</tr>
<tr>
<td>Agricultural sector contribution</td>
<td>Level</td>
<td>02</td>
<td>-</td>
<td>0.2253</td>
<td>Series is not stationary</td>
</tr>
<tr>
<td></td>
<td>1st Difference</td>
<td>02</td>
<td>2.739989</td>
<td></td>
<td>Series is stationary</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6.660312</td>
<td>0.0000</td>
<td>Series is stationary</td>
</tr>
</tbody>
</table>
Table 01 have the results of ADF test. According to that all variables are in ratio scale and all variables are stationary in 1\textsuperscript{st} difference. So, It’s clear that study can tent to find the long run relationship among the variables because of I (1) condition (Integrated order 01 condition). Due to this situations when it is checking the stationarity of the series with 02 lag terms at all. GDP growth rate is I (1) (Integrated order is 01). Other all variables also are in I (1) (Integrated of is 01) process.

Table 02: Significantly causes variables of Granger Causality Test

<table>
<thead>
<tr>
<th>Lag length</th>
<th>Significant Value</th>
<th>Null Hypothesis</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>10%</td>
<td>GDP does not granger causes Agriculture</td>
<td>0.0869</td>
</tr>
<tr>
<td>3</td>
<td>5%</td>
<td>Service does not granger causes Agriculture</td>
<td>0.0385</td>
</tr>
<tr>
<td>4</td>
<td>5%</td>
<td>Service does not granger causes Agriculture</td>
<td>0.0218</td>
</tr>
<tr>
<td></td>
<td>10%</td>
<td>GDP does not granger causes Agriculture</td>
<td>0.0935</td>
</tr>
<tr>
<td>5</td>
<td>5%</td>
<td>Service does not granger causes Agriculture</td>
<td>0.0212</td>
</tr>
<tr>
<td></td>
<td>industry does not granger causes GDP</td>
<td>0.0378</td>
<td></td>
</tr>
<tr>
<td></td>
<td>GDP does not granger causes Agriculture</td>
<td>0.0238</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10%</td>
<td>Industry does not granger causes Service</td>
<td>0.0688</td>
</tr>
<tr>
<td>6</td>
<td>5%</td>
<td>GDP does not granger causes Agriculture</td>
<td>0.0375</td>
</tr>
<tr>
<td></td>
<td>10%</td>
<td>Service does not granger causes Agriculture</td>
<td>0.0552</td>
</tr>
<tr>
<td></td>
<td>Industry does not granger causes GDP</td>
<td>0.0645</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Industry does not granger causes Service</td>
<td>0.0716</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>10%</td>
<td>GDP does not granger causes Agriculture</td>
<td>0.0647</td>
</tr>
<tr>
<td></td>
<td>Service does not granger causes Agriculture</td>
<td>0.0643</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Industry does not granger causes GDP</td>
<td>0.0886</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>5%</td>
<td>Service does not granger causes Agriculture</td>
<td>0.0497</td>
</tr>
<tr>
<td></td>
<td>10%</td>
<td>GDP does not granger causes Agriculture</td>
<td>0.0641</td>
</tr>
<tr>
<td></td>
<td>Industry does not granger causes Services</td>
<td>0.0805</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>5%</td>
<td>GDP does not granger causes Agriculture</td>
<td>0.0379</td>
</tr>
</tbody>
</table>
Service does not granger causes Agriculture 0.0060
10%
Industry does not granger causes GDP 0.093
Industry does not granger causes Service 0.0944
10% 5%
Service does not granger causes Agriculture 0.0066
Agriculture does not granger causes Service 0.0467
Service does not granger causes Industry 0.0312
10%
GDP does not granger causes Agriculture 0.0799
GDP does not granger causes industry 0.0916

Table 02 consists with the results of granger causality test. The Granger causality test used to test the causal relationship among Agriculture, Industry and services sectors. The table compiles with the results with various lag lengths. But anyway, the variables with have causal relationship can identify using table 02. It could be finalized that there are causal relationship among three sectors of GDP in Sri Lanka. And, it is better to find whether there are any long run and short run relationships among these variables. All variables are in I (1) process. So, it is possible to have a long run relationship among variables. There are two methods in time series econometrics to examine the long run relationships. But Engel Granger Cointegration test identify only one long run relationship. As an alternative to that matter Johnson Cointegration test has come. Table 03 consist with the Johnson Cointegration test results and table 04 consist with the VECM (Vector Error Correction Model) results.

Table 03: Cointegration Test Results

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Eigenvalue</th>
<th>Trace Statistic</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>0.586082</td>
<td>136.0469</td>
<td>0.0000</td>
</tr>
<tr>
<td>At most 01</td>
<td>0.536246</td>
<td>88.41408</td>
<td>0.0000</td>
</tr>
<tr>
<td>At most 02</td>
<td>0.389650</td>
<td>46.92046</td>
<td>0.0000</td>
</tr>
<tr>
<td>At most 03</td>
<td>0.312831</td>
<td>20.025942</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Unrestricted Cointegration Rank Test (Maximum eigenvalue)

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Eigenvalue</th>
<th>Trace Statistic</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>0.586082</td>
<td>47.63278</td>
<td>0.0000</td>
</tr>
<tr>
<td>At most 01</td>
<td>0.536246</td>
<td>41.49362</td>
<td>0.0000</td>
</tr>
<tr>
<td>At most 02</td>
<td>0.389650</td>
<td>26.66104</td>
<td>0.0004</td>
</tr>
<tr>
<td>At most 03</td>
<td>0.312831</td>
<td>20.25942</td>
<td>0.0000</td>
</tr>
</tbody>
</table>
Johansson cointegration test has used to test the long run relationship among variables. The test found that there are 4 cointegration equation according to the trace and max-Eigen values at the 0.05 level. Vector Error Correction Model (VECM) has used to estimate the short run adjustment process working behind the long run equilibrium relationship. VECM prove that with long run relationship also Industry sector (in two past period) affects to the GDP and service sector (in one past period) affects to the industry sector. Using these time series econometrics test it could have a clear image about the interrelationship among the variables.

**Conclusion**

According to the ADF test, Cointegration test, Granger causality test and VECM model it can conclude that there are four long run relation among the contribution of agriculture sector, industry sector, service sector and gross domestic product of Sri Lanka. VECM prove that with long run relationship also Industry sector (in two past period) affects to the GDP and service sector (in one past period) affects to the industry sector. Even though the Keynesian theory explain that a developing country should have a development in industry and service sectors not only that with our own specialties Sri Lanka should increase the agricultural sector also. Because, the industry, service, agriculture sectors and GDP has causal relations among them. Agriculture maintain the employment, livelihood and food security of a country. So, Sri Lanka should increase in agricultural not only for consumption but also to export.
References


Causes of Less Interest of Young in Continuing with Farming in Sri Lanka: Evidence from Huruluwewa Modern Colonization Scheme in Anuradhapura District


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prasannarjt@gmail.com

Introduction

Modern agricultural colonization schemes (MACSs) were introduced to the Dry Zone of Sri Lanka to achieve country’s food self-sufficiency, particularly in rice farming—the main crop and the staple food—via expanding the cultivated land and addressing the problem of unemployment by settling people in the schemes. There are more than 110 agricultural colonization schemes with over one million settled people (Chandrasiri, 2010). It is no doubt that the country had been able to achieve its main goal of introducing the MACSs, i.e., achieving self-sufficiency in rice.

However, many issues are currently associated with the MACSs that lead to unsustainable farming. Among them, less profitability of (particularly) rice farming, stagnated nature of productivity and marketing problems, lack of agriculture-based value-added system, issues in the agricultural extension network, problems of the land ordinance specific to the colonization schemes, and less interest of young farmers to continue with farming are cited in many studies (World Bank, 2003; Rupasena & Wijayakumar, 2006; Sandika, 2009; Rupasena & Naik, 2009; Weerahewa, 2002; Thiruchelvum, 2005; Prasanna, 2006). Among the emerging issues in the MACSs, less interest of the young generation to continue with farming is recognized as a critical issue, owing to its negative consequences to sustain the schemes that largely contribute to the country’s food production. As there are no adequate alternative off-farm employment opportunities to young in the schemes, this issue leads to make social and economic unrest among the young
generation in the schemes and increase the retirement age of adult farmers. However, studies on the research subject, specifically focused on MACSs in Sri Lanka is rare. Therefore, it is a critical requirement to identify the influential factors affecting young generation to move away from farming in the MACSs in Sri Lanka, since those findings are essential to sustain the schemes and ensure country’s food security, and address the unemployment issues in the farming areas of the country.

**Objectives**

The overall objective of the study is to analyse the factors leading to less interest of young generation in MACSs in Sri Lanka to involve with farming. In this connection, the following specific objectives were established for the study; (1) to examine the socio-economic profile of the young who are not interested in continuing with farming; (2) to identify the economic and social factors that influence young farmers to move out of full-time farming; (3) to learn lessons from progressive young farmers to encourage farming activities among both the young (not interested in continue with farming) and unemployed in the MACSs.

**Methodology**

In order to deal with the research subject, data were collected from a field survey conducted in the Huruluwewa Modern Colonization Scheme (HMCS) in the North Central Province (NCP) of Sri Lanka during January to February 2018. The HMCS was selected as a case study, because, it is one of the major colonization schemes established in the late 1950s, and currently, the third generation of the settled families in the scheme is practising farming. Thus, this scheme is a unique case to understand the origin of the causes which influence the young generation to move out of farming.

The field sites were selected considering both the right-bank and left-bank of the HMCS due to the difference of the settled people in the area—traditionally lived and outside people. Of both banks, thirteen Grama Niladari (GN) divisions from the left-bank and the right-bank were designated for the farmer household survey.
The study selected young farmers below 40 years of age. This age limit was defined for the study because the retirement age of the elderly farmers is higher compared to the retirement age of government and private sector workers. The survey covered 155 farm households by employing random sampling method. The total sample consists of 120 young farmers and 35 of parents. Out of 120 of young farmers, 111 young farmers reported, who are still continue with farming, they are not interested in continuing with farming while 9 young farmers have the vision to stay with farming activities. Sampled farmers were interviewed by administering a pre-tested survey questionnaire. Descriptive and inferential analytical methods were used to analyse the collected data.

Results & Discussion

Socioeconomic Profile of the Surveyed Young Farmers

According to young farmers not interested in continuing with farming, 87.4% are males, i.e., the majority of the gender category, while females represent 12.6%. Considering the education level of the young farmers, the majority (89.2%) have less than GCE A/L qualifications, and of them, 54.9% of farmers have not participated even for GCE O/L examination. This indicates that young remain in farming is less educated. Furthermore, a bulk of the younger (87.4%) is married. In terms of average farm size, 35.1% of farmers own less than one acre, and only 26.1% farmers own more than two acres, while the rest of the farmers owned between 1 - 2 acres. Farming is done in the land of parents who were the initial settlers in the scheme in an informal way, as the children of the initial settlers. The young farmers revealed issues specific to the land ownership in the colonization schemes.

Factors Affecting the Less Interest of Young Farmers in Continuing with Farming

Economic Factors

Table 1 presents the economic factors prompting the young farmers’ decision to move out of farming. The analysis of economic-based push factors revealed that less income security or income instability, or less
predictability of farming income is influential on their decision to quit farming in the scheme. According to key informant interviewees and parents’ views, drought is a major issue in the scheme forming a negative impact on the income security of the farmers in the scheme.

According to farmers’ experience, drought weakened the earnings of farming during both Yala and Maha Seasons in 2017. The HMCS is primarily based on a paddy-based monoculture system, and as per the interviewed farmers, the institutions dealing with water management of scheme are unable to manage the crop systems per the rainy calendar and water availability in the tanks. Thus, the impacts of water scarcity on farming communities in the scheme continue to become worse.

Less income from farming is the second decisive factor influencing young to abandon farming. This mainly associates with the third and fourth factors—higher cost of production and issues in the agricultural marketing system—reported by farmers. The cost and income analysis of rice farming, which is the main crop in the scheme, clearly indicates that a farmer earns a net income of Rs. 12,989 per acre, which is Rs. 23,380 for an average farm size in the scheme (1.8 acres), by spending Rs. 42,575 per acre.

Credit facility is an influential factor to young farmers’ decision to remain with farming in the system. According to farmer views, the weakened financial situation of farmers, particularly during the harvesting time of the main crop, rice, has resulted in farmers’ dependence on local money-lenders at relatively higher interest rates indirectly. The reason is these local money-lenders are the traders in the agricultural commodity marketing chain in the region, and the farmers have to keep their harvest as the guarantee. Hence, the farmers sell their harvests at relatively low prices during the harvesting time, as this money-lending system has weakened their bargaining power in the market.

Among the pull factors, availability of job opportunities in the private and government infrastructure development projects are influential. It revealed that government-initiated mega development projects such as
road development projects, tank renovation, and building constructions had created short-term working opportunities for young in the area.

Table 1: Economic factors influencing youth to move out of farming

<table>
<thead>
<tr>
<th>Rank</th>
<th>Push Factors</th>
<th>Average Value</th>
<th>Pull Factors</th>
<th>Average Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Less income security</td>
<td>4.43</td>
<td>Availability of job opportunities in the private sector</td>
<td>3.52</td>
</tr>
<tr>
<td>2</td>
<td>Less income from farming</td>
<td>4.32</td>
<td>Created job opportunities at the government-initiated infrastructure projects</td>
<td>3.52</td>
</tr>
<tr>
<td>3</td>
<td>A higher cost of production</td>
<td>4.29</td>
<td>Self-employment opportunities</td>
<td>3.45</td>
</tr>
<tr>
<td>4</td>
<td>Issues in the agriculture marketing system</td>
<td>4.15</td>
<td>Job opportunities with higher income security</td>
<td>3.11</td>
</tr>
<tr>
<td>5</td>
<td>Fewer credit facilities for farming</td>
<td>4.01</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Field survey, January and February 2017

*Note: 1-Strongly not agree, 2-Not agree, 3-Moderate, 4-Agree, 5-Strongly agree

Social Factors

As presented in Table 2, less social recognition on agriculture is a critical factor for young farmers in the scheme. According to the views of young farmers and their parents, root causes of this problem are the issues related to the land title and thereby the land fragmentation issue, less earning opportunities and high-income vulnerability, and the stagnated nature of farm household economies in the scheme for many decades. The family members, particularly the educated and the ones who have already migrated from the scheme, encourage young members to find alternative income opportunities, specifically due to the high-income vulnerability of farming.

The third critical factor is the less attention of the government to address the issues prevailing in agriculture, in the colonization schemes in particular and in the country at large, for many decades. The young farmers and their parents realize there is no future is for farming due to
less realisation by the government of issues prevailing in the colonisation schemes. They have a negative perception on this regard and state ‘Kudammage Salakili,’ which means less attention or neglect of agriculture.

The fourth factor is the poor attention paid to agriculture in the formal educational system. Although Sri Lanka is recognized as an agricultural country, no adequate space is provided for agriculture in curricular at school level or university level, other than the agriculture stream. Young farmers believe that available jobs in other sectors are socially recognizable, and further, they observe the illegal earning opportunities available in the government infrastructure development projects such as selling fuel, soils, and parts of machinery. These illegal, but short-term opportunities have also pulled the young from farming.

Table 2: Social factors influencing youth to move out of farming

<table>
<thead>
<tr>
<th>Rank</th>
<th>Push Factors</th>
<th>Average Value</th>
<th>Pull Factors</th>
<th>Average Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Less social recognition of agriculture</td>
<td>4.62</td>
<td>Socially recognized job opportunities at other sectors</td>
<td>3.68</td>
</tr>
<tr>
<td>2</td>
<td>Influence of the family members</td>
<td>4.55</td>
<td>Availability of higher income opportunities in the urban area</td>
<td>3.59</td>
</tr>
<tr>
<td>3</td>
<td>Inadequate government support</td>
<td>3.51</td>
<td>Illegal earning opportunities at the government infrastructure development projects</td>
<td>3.10</td>
</tr>
<tr>
<td>4</td>
<td>Less agriculture-based education</td>
<td>3.25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Field survey, January and February 2018

*Note: 1-Strongly not agree, 2-Not agree, 3-Moderate, 4-Agree, 5-Strongly agree

Lessons Learnt from the Selected Progressive Farmers

This section of the paper analyses the results of four cases of progressive young farmers in the scheme by considering their risk minimizing behaviour in terms of yield and output price. These four case studies were selected based on their resource endowment and interest in
continuing with farming. The profile of the selected farmers revealed they are middle-aged and educated and have sufficient experience in farming. Compared to other young in the scheme, they are rich concerning the land size and assets owned at present. Almost all selected young progressive farmers practice alternative crops—papaya, banana, mango, and minor crops—to paddy in the area. They experienced relatively higher market value for these crops and thereby relatively higher net income.

*Risk Minimizing Behaviour Concerning Yield and Output Price*

These farmers have used different approaches to minimize the risk of farming in terms of yield and price of output they experience in yield fluctuations due to changing weather patterns (drought and floods), the spread of diseases and pests, and high price volatility of agricultural commodities due to changes in supply and demand patterns.

In the selected case (A), the farmer used papaya seed marketing information to determine the extent of land he plans for papaya cultivation in a particular season. Before deciding the land extent, he collects details of seed marketing from traders in main papaya growing regions of the country such as Embilipitiya and Puttalam, and compares such details with the previous season to predict whether the concerned season’s papaya cultivation is high or low. If the amount of seeds sold is less compared to previous season, he increases the extent of land for papaya cultivation, assuming less harvest at the aggregate level in the harvesting period. The reason is the less extent of papaya cultivation leads to less harvest and thereby instigates higher price.

Further, selected case (A) applies different crop plans—vertical and horizontal crop plans—to address price volatility and thereby minimize the income vulnerability. He knows that the price of agricultural commodities fluctuates differently based on weather patterns (drought and floods), festival seasons, harvesting periods, and government policies on imports of agricultural commodities. Hence, farmer A applies a horizontal crop plan (see Figure 1) for a particular marketable crop, in this case, chilli. In this connection, two acres of land, suitable
for chilli cultivation, is divided into four plots and cultivation starts for each plot at different periods of the year, ignoring the weather patterns (rainy and dry periods) but considering the demand patterns.

Farmer (A)’s experiences have proved this horizontal crop plan for a particular crop is a success because of his predicted price fluctuation for the year 2016 (see Figure 2). The horizontal crop plan for a particular crop has been applied by selected farmer case (B) in terms of papaya cultivation by dividing the land into two plots. His purpose is not addressing the issue of possible price fluctuations at the market since he has an agreement with an export company, but to minimize the harvest loss due to possible threats of adverse weather patterns to the cropping system.

![Figure 1: Annual cultivation plan of Chilli - horizontal approach](image)
![Figure 2: Farmer prediction on price movements - case of chilli](image)

All interviewed progressive farmers apply crop diversification method in the form of a mixed approach, i.e., horizontal and vertical approaches. This denotes, the farmers grow short-term, mid-term, and long-term crops such as coconut, mango, papaya, banana, and minor crops, via an integrated approach. By applying this method, farmers expect to stabilize agricultural income, generate income throughout the year, and
minimize the possible risk of price down of certain crops on farm income. This is an interesting point discovered in the study since rice farming generates income only twice per year. It proves that the mixed approach stabilizes and generates farm income throughout the year.

Moreover, these farmers apply different cultivation techniques and crop management systems to minimize the risks associated with yield and price. First, in case of papaya, before starting the cultivation, Farmer A and B search the degree of prevalence of diseases in papaya cultivation in the area. If they were confirmed that diseases in papaya cultivation are high in the area even during the previous season, they move to a new cultivation region – in this case, from Huruluwewa area to Horowpothana area; if the disease prevalence is low, stay with cultivation in the area. Farmers apply this technique to avoid the possible threat of diseases to papaya cultivation.

Second, all selected progressive farmers do farming against the rainy calendar in the region. Specifically, minor crops and mid-term crops such as banana are grown at the time when other farmers who solely depend on the rainy calendar and irrigated water do not cultivate. According to the selected farmer case (A), in this technique, planting period may fall into a heavy rainy period not favourable for planting. However, to address this issue, they use different land preparation techniques and water management techniques, compared to other farmers. These farmers apply this technique to gain price advantages during the off-season or high demand periods such as festival seasons, or fewer supply periods such as off-season.

Third, all farmers control diseases following the guidelines provided by the extension officers in the area. Mainly, techniques adopted in land preparation, planting, fertilizer application, disease control, and harvesting stages are highly based on the guidance from the extension officers in the region. Selected farmer cases (A) and (B) follow the guidelines given by the buying companies also, to provide quality products to the buying companies.
In concluding the analysis of these selected four cases, it is noted that these farmers are innovative farmers who think out of the box (beyond the traditional farming system in the scheme). They have entrepreneurial freedom to farm.

**Conclusion**

This study attempted to identify the reasons for the young generation in the colonization schemes in Sri Lanka to be less interested in continuing with farming, by testing the Huruluwewa Colonization Scheme in the NCP as a case. The economic factor analysis indicated that yield and price risk of farming are the critical factors that affect farming income. The specific concern of the farmers in the scheme is drought and thereby the water management issues.

Less profitability of farming system in the scheme is another economic reason for the lack of interest of young in farming. This is mainly due to the absence of innovativeness in farming or less ability of the farmers to think out of the box as most farmers traditionally grow rice same as the first generation did at the establishment of the scheme. Analysing the social factors indicated less social recognition on farming is the main reason for the younger generation’s decision to quit farming. The root causes here are the economic and social stagnation or less or slow transformation of these communities for many decades. This has created multiplier effects on the second and third generation of the scheme in terms of societal, for instance, out-migration (both temporary and permanent), social issues in terms of marrying, crimes, and drug addictions. The selected progressive farmer cases revealed that they are innovative farmers who think beyond the traditional farming system in the scheme, with entrepreneurial freedom for farming.

**References**


Variation of Welimada Potato Price based on Weather and Other Competitor’s Price

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Introduction

Potato is one of the most important crop types in Sri Lanka as well as the world. In Sri Lanka, there are three types of local Potato; Welimada, Nuwara Eliya and Jaffna (Henegedara, Senanayake, Aheeyar, Wickramasinghe, Shantha & Vidanapathirana, 2005). Among them, Welimada Potato is the major contributor to the total local potato production in both Yala and Maha seasons (Henegedara et al., 2005). So the potato is the most important cash crop in the farming system of upcountry (Henegedara et al., 2005). However, the producer price of potato is subjected to fluctuation within a short period of time and hence the farmers face great difficulties when selling their products. The aim of this research is to find the relationship between the producer price of potato and the other factors such as potato wholesale prices, potato imported prices and weather conditions.

Research Problem

While Welimada potato is a major contributor to the total local potato production. There is a computable issue of an uncontrollable variation in Welimada Potato producer prices within a short time period. Hence, the decisions makers are unable to take fair decisions and the farmers are uncertain about their production. Sometimes this will negatively be effecting for the farmers because they are unable to cover up their production cost from the sales earnings. This situation is not only for them but also for customers. Because Potato is one of the main food types in the food market and has the number of food varieties related to Potato. Within such a situation, fluctuation
of Welimada potato producer price is highly effecting for the different parts of the society.

Objectives

In view of this situation, it is required to find out the triggering forces behind this issue. The general objective of this study is to identify factors effecting for the variations of producer prices of Potato grown at Welimada area in Sri Lanka. Specific objective is find out relationship among the Welimada potato producer price and other factors: Weather and Other competitor’s price, using Data Mining techniques.

Methodology

Weather conditions, production, demand and foreign trade are the factors effecting to the potato price (Bonnieux & Mahe, 1977). Cultivar selection, cultural practices, planting and harvesting schedules, packaging and market selection factors which are effecting for the potato market price and those factors are ultimately controlled by farmers (Goodwin, Stephen, Fuller, Oral Capps, & Oladimagi, 1988). Vegetable prices are affected by several factors such as climate, supply, demand, and festival (Nasira & Hemageetha, 2012). So the prediction. Also, there is another category of factors, which cannot be controlled by farmers. In this study, some of uncontrollable factors are considered as independent variables. Weather conditions and other competitor’s prices are known factors effecting for the potato price variation. Wholesale prices of Welimada, Nuwara Eliya, and imported potato and Producer price of Nuwara Eliya potato are identified as competitors of producer price of Welimada potato. Weather factors such as rainfall of the Welimada area, temperature (minimum/maximum) and relative humidity (minimum/maximum) in Badulla district are also considered. The data for this study were collected from the Meteorological Department of Sri Lanka and the Hector Kobekaduwa Agrarian and Research Institute of Sri Lanka (HARTI) for the time period of ten years (from 2005 to 2015). The data were preprocessed as there were missing values. Each and every data was converted into weekly data. Weather data were collected as daily basis and hence, converted into weekly data as follows: Weekly
maximum rainfall value is considered as the weekly rainfall data of the Welimada area. Badulla district weekly maximum temperature and maximum relational humidity values are considered as the weekly maximum temperature and maximum relational humidity values. Badulla district weekly minimum temperature and minimum relational humidity values are considered as the weekly minimum temperature and minimum relational humidity values. Prices values were collected from HARTI as weekly values. The final dataset consists 574 records. Welimada, Nuwara Eliya and imported potato wholesale prices, producer prices of Nuwara Eliya, Welimada potato, Welimada rainfall, temperature (minimum and maximum) and relative humidity (minimum and maximum) in Badulla district are considered as predictor variables.

Table 01: List of Explanatory Variables

<table>
<thead>
<tr>
<th>Predictor Variable</th>
<th>Short form Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welimada Potato Producer Price</td>
<td>WPP</td>
</tr>
<tr>
<td>Welimada Potato Wholesale Price</td>
<td>WPW</td>
</tr>
<tr>
<td>Nuwara Eliya Potato Producer Price</td>
<td>NPP</td>
</tr>
<tr>
<td>Nuwara Eliya Potato Wholesale Price</td>
<td>NPW</td>
</tr>
<tr>
<td>Imported Potato Wholesale Price</td>
<td>IPW</td>
</tr>
<tr>
<td>Welimada Rainfall</td>
<td>WR</td>
</tr>
<tr>
<td>Badulla District Maximum Temperature</td>
<td>BMxT</td>
</tr>
<tr>
<td>Badulla District Minimum Temperature</td>
<td>BMinT</td>
</tr>
<tr>
<td>Badulla District Maximum Relative Humidity</td>
<td>BMxRH</td>
</tr>
<tr>
<td>Badulla District Minimum Relative Humidity</td>
<td>BMinRH</td>
</tr>
</tbody>
</table>

Different types of data mining model such as Linear Regression, M5Rules, Decision Table, M5P Model tree, M5P Regression tree, RandomForest tree, RandomTree, REPTree were trained. The models were trained and tested using 10 fold cross validation and the M5P trees perform the best prediction quality. M5P is a binary regression tree model where the last nodes are the linear regression functions that can produce continuous numerical attributes. (Kumar, Chowdary, Venkatramaphanikumar, Kishore 2016).

**Results and Discussion**

The prediction quality of the models is evaluated using correlation coefficient, mean absolute error, root mean squared error, relative
absolute error and root relative squared error. According to the results, the prediction quality of M5P models is generally better than the other models. The M5P smoothed model tree out performed all the other models. Moreover, the prediction quality of M5P models significantly higher than the linear regression model and hence, we can claim that there is a non-linear correlation between the dependent variable and independent variables. Following is the prediction quality of the different types of M5P models.

Table 02: Prediction of quality of the different prediction models

<table>
<thead>
<tr>
<th>Classifier</th>
<th>Correlation coefficient</th>
<th>Mean absolute error</th>
<th>Root mean squared error</th>
<th>Relative absolute error</th>
<th>Root relative squared error</th>
</tr>
</thead>
<tbody>
<tr>
<td>M5 pruned smoothed model tree</td>
<td>0.77</td>
<td>7.76</td>
<td>10.23</td>
<td>58.93%</td>
<td>63.24%</td>
</tr>
<tr>
<td>M5 pruned unsmoothed model tree</td>
<td>0.76</td>
<td>8.00</td>
<td>10.65</td>
<td>60.71%</td>
<td>65.81%</td>
</tr>
<tr>
<td>M5 pruned smoothed regression tree</td>
<td>0.73</td>
<td>8.04</td>
<td>11.00</td>
<td>61.07%</td>
<td>67.73%</td>
</tr>
<tr>
<td>M5 pruned Unsmoothed regression tree</td>
<td>0.72</td>
<td>7.99</td>
<td>11.25</td>
<td>60.64%</td>
<td>69.54%</td>
</tr>
</tbody>
</table>

Figure 01: M5 Pruned smoothed model tree
Table 03: Results of the different rules

<table>
<thead>
<tr>
<th>LM num: 1</th>
<th>LM num: 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>WPP =</td>
<td>WPP =</td>
</tr>
<tr>
<td>-0.008 * IPW</td>
<td>-0.0051 * IPW</td>
</tr>
<tr>
<td>- 0.1827 * NPP</td>
<td>+ 0.419 * NPP</td>
</tr>
<tr>
<td>+ 0.2808 * NFW</td>
<td>+ 0.0099 * NFW</td>
</tr>
<tr>
<td>+ 0.2861 * WFW</td>
<td>+ 0.0071 * WFW</td>
</tr>
<tr>
<td>- 0.0039 * WR</td>
<td>- 0.1074 * WR</td>
</tr>
<tr>
<td>- 0.7047 * BMxT</td>
<td>+ 0.8971 * BMxT</td>
</tr>
<tr>
<td>- 1.1412 * BMinT</td>
<td>- 0.0306 * BMinT</td>
</tr>
<tr>
<td>- 1.1408 * BMxRH</td>
<td>- 0.0157 * BMxRH</td>
</tr>
<tr>
<td>+ 0.1636 * BMinRH</td>
<td>+ 0.2767 * BMinRH</td>
</tr>
<tr>
<td>+ 177.1491</td>
<td>+ 0.4087</td>
</tr>
</tbody>
</table>

As in the Figure 01, the tree contains two (2) rules. According to these rules, both rules confirmed that imported potato wholesale price, Welimada rainfall, Badulla district minimum temperature and maximum relational humidity factors are negatively effecting for the WPP. Nuwara Eliya and Welimada potato wholesale prices and Badulla district minimum relational humidity are positively effecting for the WPP. Nuwara Eliya Potato producer price, Badulla maximum temperature are averagely effecting for the Welimada Potato producer price. This rules pointed out that maximum rainfall in Welimada is negatively effecting for the WPP. While maximum temperature is averagely effecting to the WPP minimum temperature is negatively effecting for the WPP. Maximum relative humidity is averagely effecting to the WPP and minimum relative humidity is positively effecting to the WPP.

Conclusion

The Walimada potato producer price can be predicted using the above factors with a reasonable accuracy. According to this results, the non-linear models are better than the linear models for predicting the producer price of potato grown at Walimada. Nuwara Eliya potato producer and wholesale prices, Welimada potato wholesale price, Maximum rainfall in Badulla and minimum relative humidity have a positive impact on the WPP. Extent of potato, imported potato
wholesale price and minimum temperature of Badulla district have a negative impact on the WPP.

In this study we considered only some of the environmental factors, which cannot be controlled by farmers. According to the findings there are positive and negative factors on the Walimada potato producer price. Hence, the farmers can avoid the negative factors while optimizing the positive factors. As an example, farmers are able to change their cultivation planning and harvesting period according to the above factors and hence, farmers can continue potato farming as a profitable industry.

References


Tourism, Trade, Investment and Global Economic Integration
The Impact of Trade Openness and FDI on Industrial Sector Output in Sri Lanka

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Introduction

Countries in the global economy have well integrated through trade and capital flows under liberalized economic policies. There are two broader categories of global economic integration indicators, namely those focusing on prices and quantities while degree of openness is the most widely used integration measure based on quantity (Arribas et al., 2006). Capital flows and human flows also caused to tighten the interaction and integration among diverse economies and it directly links with globalization process. With this ambience, impacts of global economic integration, especially trade and financial openness on various perspectives such as industrial and services sectors of the economy have gained interest among existing academic discourses. Umoh and Effiong (2013) found that trade openness has a positive impact on manufacturing productivity in Nigeria. Meanwhile, FDI in the services sector appear to have promoted growth in the manufacturing sector through cross-sector spillovers in India (Chakraborty and Nunnenkamp, 2017).

In the Sri Lankan context, with the introduction of the liberalized economic policies, Sri Lanka has gained benefits as well as faced some adverse effects by opening the economy to the world market. Specifically, export-oriented manufacturing in industrial sector has gained considerable importance and become one of the main destinations for inward FDI. Industries like manufacturing including rubber, mining, textile and IT industry have been gained the priority as major contributors for the international trade while, investors form outside find better destination for their investment of capital in this sector. However, developing this sector is challengeable with deep rooted and inherent obstacles of industrial sector such as high
dependency of imported goods, labor incentive production process, and skill mismatches. Therefore, the effects of international economic integration on the industrial sector output are under heated debated. Being on this backdrop, it is timely inevitable to find ways and means from global economic integration through trade openness and FDI to boost the industrial sector as one of the major drivers of the economy.

**Research Problem**

Is there an impact of global economic integration through trade openness and FDI on industrial sector output in Sri Lanka, and how is this industrial sector boosted by such an integration process?

**Objectives**

Identifying the impact of trade openness and FDI on industrial sector output in Sri Lanka and identifying the other factors which affect the industrial sector output.

**Methodology**

This study uses annual data covering the period from 1980-2016 and data were extracted from annual reports of Central Bank of Sri Lanka and the World Bank. A time series econometric method (Auto Regressive Distributed Lag - ARDL model) is employed for this study following an empirical framework developed by Belloumi (2014) on his study. The regression is shown in Equation 1.

\[
LRIND_t = \beta_0 + \beta_1 TO_t + \beta_2 LF DI_t + \beta_3 LGDCF_t \\
+ \beta_4 LDCP_t + \beta_5 INF + \beta_6 URP + \varepsilon_t
\]  

(1)

where, variables LRIND, TO, LF DI, LGDCF, LDCP, INF and URP denote respectively logarithm of Real GDP of Industrial Sector, trade openness, logarithm of Foreign Direct Investment, logarithm of Gross Domestic Capital Formation, logarithm of Domestic Credit to Private Sector (Real term), Inflation rate and Urban Population. \(\varepsilon_t\) is the white noise error term, \(t = 1, 2, \ldots T\). Global economic integration is measured by using TO and LF DI variables as proxy variables. As the first step of the estimation, ADF and PP unit root tests were adopted to test the
stationary property of data. When the series are stationary at the combination of I(0) and I(1) Autoregressive Distributed Lag (ARDL) model, which was developed by Pesaran et al. (2001) can be employed to find out the long-run and short-run relationship and long-run adjustment. The ARDL co-integration bound testing procedure is shown in equation (2).

$$\Delta LRIND_t = \rho_0 + \vartheta' LZ_{t-1} + \sum_{i=1}^{p} \eta_i \Delta LRIND_{t-i} + \sum_{i=0}^{p} \pi_i' \Delta LZ_{t-i} + u_t$$  \hspace{1cm} (2)$$

where, $\vartheta' = [\vartheta_1, ..., \vartheta_7]$ refers to the long-run coefficients; $LZ_{t-1} = [LRIND_{t-1}, TO_{t-1}, LFDI_{t-1}, LGDCF_{t-1}, LDCP_{t-1}, INF_{t-1}, URP_{t-1}]$ is the vector of explanatory variables with lag one; $\eta_i$ and $\pi_i' = [\pi_{1i}, ..., \pi_{6i}]$ refers to the short-run dynamic coefficients.

$$\Delta LZ_{t-i} =$$

$$[\Delta TO_{t-i}, \Delta LFDI_{t-i}, \Delta LGDCF_{t-i}, \Delta LDCP_{t-i}, \Delta INF_{t-i}, \Delta URP_{t-i}]$$ denotes the vector of explanatory variables with lag $i$ and $u_t$ is the white noise error term.

The error correction version (ETC$_{t-1}$) of ARDL model is shown in equation (3) as a transformation of equation (2)

$$\Delta LRIND_t = \beta_0 + \sum_{i=1}^{p} \eta_i \Delta LRIND_{t-i} + \sum_{i=0}^{p} \pi_i' \Delta LZ_{t-i} + \gamma ETC_{t-1} + u_t$$  \hspace{1cm} (3)$$

where $\gamma$ is speed of adjustment which should be statistically significant and should have a negative sign. $\mu_t$ is pure random error term.

**Results and Discussions**

According to the results of ADF and PP tests (Appendices Table A.1), INF is stationary at level while the other variables are stationary at 1st difference implying that variables are stationary at combination of I(0) and I(1), so that it is suggested to proceed with ARDL model. According to lag length automatic selection following Akaike Information Criterion (AIC), the best model is ARDL (2,3,3,2,2,0,1) for the analysis.
As a pre-requisite for accurate estimations, diagnostic tests were employed and the results are given in Table 1.

Table 1: The Results of Diagnostic Tests

<table>
<thead>
<tr>
<th>Test</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normality Test (Jarque-Bera)</td>
<td>0.4221</td>
</tr>
<tr>
<td>Ramsey RESET test</td>
<td>0.1980</td>
</tr>
<tr>
<td>Heterokedasticity test (BPG)</td>
<td>0.8707</td>
</tr>
</tbody>
</table>

The results of diagnostic tests confirm that residuals distributed normally have no specification errors in the estimated model and disturbance term is homoscedastic respectively. Meanwhile, recursive estimates CUSUM plot lies within the upper and lower critical bound at 5% significant level, so it ensures the stability of parameters. As the next step of estimation, the results of bound test show that F-statistic is 5.4113 which exceeds the critical value of upper bound of I(0) and I(1); 3.15 and 4.43 respectively ensuring the presence of the long-run relationship.

Table 2: Results of ARDL (2,3,3,2,2,0,1) Model

<table>
<thead>
<tr>
<th>Dependent Variable: LRIND</th>
<th>Panel A: Long-run Coefficient Estimates</th>
<th>Panel B: Short-run Coefficient Estimates</th>
<th>Panel C: Error Correction Representation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Constant</td>
<td>TO</td>
<td>LFDI</td>
</tr>
<tr>
<td></td>
<td>6.379</td>
<td>-0.005***</td>
<td>0.095***</td>
</tr>
<tr>
<td></td>
<td>[1.062]</td>
<td>[-4.801]</td>
<td>[2.606]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: t-statistics are given in parenthesis. *, **, *** show significant at 10%, 5% and 1% level respectively.
According to the results (see Panel A in Table 2) all independent variables are significant except URP variable in long-run implying that significant variables affect LRIND in the long-run. In the line with one of objectives of the study, global economic integration which is measured by TO and LFDI variables affects the industrial sector output in the long-run. The results indicate that TO affects negatively, while LFDI affects positively implying that the economy has gained mix results from global economic integration. In the Sri Lankan context, FDI inflows are greater than the FDI outflows and net FDI assists to induce industrial sector output through generating positive spillover externalities, especially technological transfer, since the industrial sector gains one of the larger parts of FDI inflows in the county. In contrast, TO affects the industrial output negatively. Although the industrial sector gains benefit from international trade, the sector has faced challengeable issues in its production and international trading process such as increasing the import expenditure on intermediate goods, while recording insufficient export earnings, continuous depreciation of exchange rate and less competitiveness of industrial products in the world market. This adverse ambience makes the industrial sector an unfavorable competitor in the global trade process. Moreover, LGDCF and LDCP affect positively while INF affects negatively the industrial sector output in the long-run.

The results of short-run relationship and long-run adjustment coefficient are represented by Panel B and C respectively (see Table 2). All variables are not significant in the short run except LDCP (-2) implying no instant response from the dependent variable on the changes of independent variables. However, two periods lagged value of LDCP has a positive and significant impact. Meanwhile, ECT (-1) appears with negative sign, but insignificant implying that there is no long-run equilibrium related to this model.

**Conclusion**

This study examines the impact of trade openness and FDI, and other selected variables on the industrial sector output in Sri Lanka adopting an econometric technique. The empirical results show that two proxy
variables of global economic integration, namely FDI and trade openness affect the industrial sector output positively and negatively respectively in the long-run, but not in the short-run implying that global economic integration results in a mix effects the industrial sector output. Hence, it is advisable to pay more attention on creating a FDI friendly environment through proper policy measurements to accelerate the industrial sector output. In contrast, trade openness affects the industrial sector output negatively. This adverse effect arises mainly due to high dependency on imported intermediate goods stemming larger amount of expenditure and prevailing unfavorable conditions in the global market and difficulties in implementing sound macroeconomic policies. Therefore, robust macroeconomic policies on international trade should be implemented by addressing prevailing difficulties to stimulate the industrial sector. Meanwhile, LGDCF and LDCP affect positively, while inflation affects the dependent variable negatively in the long-run suggesting more inducements for domestic capital formation and domestic credit to private sector, while making proper control over the inflation to boost the industrial sector output.

References


Appendices

Table A.1: Results of ADF and PP Unit Root tests

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level</th>
<th>1st Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ADF</td>
<td>PP</td>
</tr>
<tr>
<td>LRIND</td>
<td>0.3315</td>
<td>0.2763</td>
</tr>
<tr>
<td>TO</td>
<td>0.6856</td>
<td>0.6155</td>
</tr>
<tr>
<td>LFDI</td>
<td>0.7105</td>
<td>0.8491</td>
</tr>
<tr>
<td>LGDCF</td>
<td>0.6300</td>
<td>0.1411</td>
</tr>
<tr>
<td>LDCP</td>
<td>0.8946</td>
<td>0.8608</td>
</tr>
<tr>
<td>INF</td>
<td>0.0005***</td>
<td>0.0005***</td>
</tr>
<tr>
<td>URP</td>
<td>0.6770</td>
<td>0.0298</td>
</tr>
</tbody>
</table>

Note: *, **, *** show significant at 10%, 5% and 1% level respectively
The Effect of Information Content in Final Dividend Announcements on Stock Price in Colombo Stock Exchange (CSE)

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Introduction

The effect of information content of the published information is a well-established area in the corporate finance and the academics and the practitioners have very extensively investigated this phenomenon. Although there are abundant theoretical and empirical studies on this area yet it is inconclusive. And also, it is evident that much of the studies on the effect of information content in publicly available information for testing the efficiency of the stock markets based on developed stock markets and there is a paucity of such studies in emerging capital markets. In Sri Lanka, few attempts have been made to test the relevance of corporate public announcements in assessing stock prices hence, an investigation of the different types of corporate public announcements and shareholders’ responses becomes relevant to the CSE. In fact, Sri Lankan Capital Market is as an emerging capital market, and unique from the other in terms of geographical location, economic development, institutional and legal framework. Therefore, this study is contributing in a number of ways. So far, the studies conducted to explore the dividend announcements in the CSE used only Market Model in generating abnormal returns in and around the dividend announcements. This study uses three standard methods to capture expected returns namely Mean Adjusted Model, Market-Adjusted Return Model, and Market Model. The market model enriches by including of the stock volatility clustering phenomenon which is excluded by the prior studies in CSE. In addition, it uses volatility time series modelling in generating abnormal returns in and around announcement of final dividends which is novel approach for the event study methodology. Thus, the findings of this study give an opportunity
to compare the findings of studies conducted on this phenomenon in the
developed and other emerging markets with the CSE and it shows
whether the behavior of stock returns in line with the other markets. It
provides the investors including present and potential with valuable
information about the share price behavior and an understanding about
the state of the market. The findings are also useful for Securities
Exchange commission (SEC) of Sri Lanka in carrying out their
functions like setting plans, drafting new legislation or amending
existing legislation related to CSE, monitoring and controlling capital
market activities.

Research Problem

There is a number of studies on the developed markets as well as on the
emerging markets in the world in respect to the information content in
dividend announcements. The findings of those studies are somewhat
similar but some findings are somewhat different from one another. For
examples the findings of Asquith and Mullins (1983) and Brickley
(1983) show that dividend increase announcements were associated
with positive abnormal returns and dividend decrease announcements
were associated with negative abnormal returns surrounding dividend
announcements day. Subsequently, in Sri Lankan context Bandara and
Perera (2011), and Dharmarathna (2013) have made studies and findings
are somewhat different from each other. In fact, this paper attempts to
find answers for the following questions. How the investors respond, as
soon as the information of final dividend announcement is published
over the CSE and how the Semi-strong Form Efficient Market
Hypothesis\(^\text{16}\) acts according to the information of dividend
announcements.

Objective

The objective of this study is to examine how the stock price reacts as
soon as the information of Final Dividend Announcements is published

\(^{16}\) Security price reflects the publicly available information immediately and
accurately (Fama.1970).
thereby provide a test of semi-strong from efficiency of Sri Lankan Share Market.

**Methodology**

This study employs the event study methodology. This study enriches the event study method by incorporating stock volatility clustering phenomenon to the Market Model. Also, the event study method is further extended with the application of volatility time series modelling instead of market model, market adjusted model and mean adjusted models. Taking the fact which is, especially availability of data this study has based on the period from 2008 to 2013. The sample consists of 221 final dividend announcements in relation to highly liquid 100 companies for the period. The data is collected through the Daily Market Reports published by the CSE and Computerized Data Base System of them. The sample has been selected subjectively assigning the applicable criterion. For example, there should not be another published announcement during the event window Thus, the total event period that is to be examined is 31 trading days. The event period starts with the day, immediately before the event date and goes back to 15 trading days. It closes with the day immediately after the event date and goes ahead to 15 trading days. This period is divided into three windows, namely pre-event window (-15 to -1), event window (0-day) and post-event window (+1 to +15). The event window represents immediate effect. Pre-event window and post-event window represent earlier and delayed effects respectively. Also, this study uses 120 of past returns over the pre-identified estimation window to estimate the return generating models.

**Results and Discussion**

Overall CAAR, which is information content in final dividend announcements based on each model are presented in Figure 1. It is clear from the figure 1 CAARs reported under Time Series Models (TSM) and Mean Adjusted Model (MEADJ) are somewhat inflated compared to the other two models. This is because four models are communicating slightly different meaning through their abnormal returns. For example; Market model (MM) identifies abnormal returns after making
allowances for risk as measured by equity beta and individual stock’s component of return which is not dependent on market as measured by alpha. Therefore, this model tends to undercast the abnormal returns compared to the other models. Though the size of the CAARs reported under each model over investigation window varies slightly, the sings of the CAARs seems to be almost similar over the investigation window (31-day window).

![Figure 1: Overall Behaviors of CAAR on Final Dividends](image)

All models indicate that the AAR on the day of dividend announcement is statistically significant at 5 percent level. Also, all models indicate that the CAARs on the day of +1 and +2 within post-event window are positive and statistically significant at 5 percent level. It strongly confirms that considerable usage of dividend signal by the investors. These results strongly confirm that stock market uses dividend announcements as a signal from management to investors about the future earnings prospects of the firms. This finding supports information content of dividend hypothesis proposed by Ambarish, et al. (1987). Also, this finding is consistent with cash flow signaling theory, developed by Bhattacharya (1979), John and Williams (1985). Subsequently, these findings support the findings of Asquith and Mullins (1983) and Brickley (1983).

Consequently, the analysis shows that there are significant earlier reactions. It may be a reason expectation of having a final dividend at the latter part of the accounting period, by looking at firm’s historical dividend actions and patterns. In this circumstance, market is considered
as efficient though there is any earlier reaction. However, in following situations, market is counted as inefficient. The results of the use of insider dealings, for example, close association of market participants with company official and access the information regarding the potential dividend declaration decision of the board of directors. Then, market participants’ ability to access the dividend information, which has already been sent to the SEC, immediately before the publication over the CSE. Also, findings show that there is a significant delayed reaction information subsequent to a public announcement of declares final dividend. This delayed reaction may be due to information asymmetry or lack of access to enjoy with new information. Further delayed response on forgone response would be due to lack of financial literacy. Both, the earlier and delayed reaction imply that CSE is inconsistent with semi-strong form efficient market hypothesis in respect to information of final dividend announcement.

**Conclusion**

The overall results confirm that the information of Final dividend announcements contains valuable information to the market participants in setting their investment strategies. More specifically, the market response is positive for the final dividend announcements in CSE. It implies that the invertors in CSE interpret the event as a favorable news and assume that the stock price will increase and persist in future which in turn yield positive returns for the investors. Consequently, the result emphasizes that, information content of the dividend announcement is a message that the future earning capacity of the firm is stable and important piece of insider information for the investors. The results well establish the validity of the Dividend Signaling Theory and Cash Flow Signaling Theory in CSE. However, it showed earlier and delayed reaction. This finding is somewhat peculiar to CSE as compared to the other develop market counterpart. The overall results confirmed that the Sri Lankan Stock Market is not a Semi-strong Form Efficient Market and contradicts with the EMH.
References


Stimuli Underscoring Differences in Productivity Dimensions among Container Terminals: The Case of Port of Colombo

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Introduction

The attraction of a seaport for maritime transportation is largely determined by the performance and productivity of its operations. In that respect, productivity of terminals would be crucial, not only for their own commercial viability, but also for the port within which they are located. In the ever-increasing competitive environment, shipping lines look for time saving on their voyages. Given that their incomes, and thus profits, depend on the share of voyage time spent for sailing rather than for berthing at a terminal, shipping lines look for such ports which have terminals with such high levels of vessel handling efficacy that permit them depart in the shortest possible berthing time for discharging and loading. This element of terminal productivity is vital for the Port of Colombo, the 24\(^{th}\) busiest container Port in the world and 18\(^{th}\) busiest in Asia (Lloyd's List, 2018), if it is to consolidate its position in the international maritime industry.

It is impeccable that productivity dimensions pertaining to Sri Lanka’s main seaport of Colombo captures strategic attention, as a hub contemplating to anchor its strategic development through trade and maritime activities. It is in that respect, technical productivity becomes lucrative in leading the economy towards a pleasant growth trajectory, easing both the transportation and trade globally. The general perception of technical productivity is that it signifies the extent of output produced from an engaged input. In terms of technical sphere, it is the ratio of output against the input. As asserted by (Stephens, Stephens, Nze, Ibe, & Ukpere, 2012) productivity is “the total resources engaged to achieve the output, usually labor, assets and machineries, vessels and cargo handling equipment”. Similarly, ‘Technical Productivity’ in this study
excludes financial aspects, and focuses on “physical” efficacy of operations. As asserted by (Esmer, 2008), Crane Productivity is one of the core productivity indicators of a container terminal, which plays a key contributory role towards terminal productivity of a seaport.

Even though a number of research studies on technical productivity and efficiency in terminals could be found in literature [ (Radimilović & Jovanović, 2006), (Ting, 2011), and (Ilmer, 2003)], not many could be found focusing on Crane Productivity and other productivity indicators and their pertinent determinants, particularly comparing among different terminals of a port concurrently. The study conducted by (Jayaweera, Karunanayake, Gunaruwan, & Ranasinghe, 2018) on comparative terminal productivity at the Port of Colombo appears to be a pioneering research effort in this direction, which has comparatively examined the technical productivity of the three container terminals at the Port of Colombo, namely the State-owned Jaya Container Terminal (JCT), and privately owned South Asia Gateway Terminal (SAGT) and Colombo International Container Terminal (CICT). The results of the previous research affirmed that apart from the “Crane Productivity” in which the CICT appeared significantly ahead of other two terminals, no other dimension of productivity had any significant difference of means among the three terminals. The two privately operated terminals, equipped with better container handling facilities, were found having failed to match the significantly higher average working hours per berth hour recorded by the State-owned JCT, disabling them recording a significantly positive difference of means over JCT in terms of Vessel Productivity and Berth Productivity.

**Research Problem**

This revelation raised curiosity as to how the significantly positive Crane Productivity difference CICT appears to have had against the other two terminals have not reflected on to Berth Productivity, Vessel Productivity and Terminal Productivity. The obvious suspicion was

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17Crane Productivity, the most fundamental root of overall terminal productivity, reflects total moves per gross crane working hour
“inefficiency” elsewhere; digging into which was the subject of the present research.

Objectives
The present study was therefore conceived to dive deeper into the problem as to what contributory factors could possibly have caused the observed divergent productivity patterns, particularly between Crane Productivity and other productivity dimensions, among the three terminals of the Port of Colombo.

Methodology
The research examined the following constituent parameters in relation to the JCT, SAGT and CICT that could influence their technical productivity dimensions of container operations, namely Berth Productivity\(^ {18}\), Vessel Productivity\(^ {19}\) and Terminal Productivity\(^ {20}\), looking beyond Crane Productivity, which is fundamental to the overall container handling efficacy:

- Working Duration per Berth Hour (WKHBH): Working Hours/Berth Hours
- Crane Hours per Working Hour (CHWH): Crane Hours / Working Hours
- Ave Working Hours per Crane (WHCR): Working Hours/No. of Cranes
- Waiting Time per Berth Hour (WTHBH)\(^ {21}\): Waiting Hours / Berth Hours

The four productivity dimensions that had been estimated for the three terminals in a preceding study conducted by the authors (Jayaweera, Karunanayake, Gunaruwan, & Ranasinghe, 2018) were used as the departure point of the present study. Data required for the computation of ‘productivity influencing’ factors intervening among different productivity dimensions were also borrowed from the same source.

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\(^{18}\)Total moves per Berth Duration (i.e. the number of hours that the vessel is at berth or the time between berth arrival, or ‘lines down’ and berth departure, or ‘lines up’)

\(^{19}\)Total moves per Gross Working Hour

\(^{20}\)Total moves per Port Duration

\(^{21}\)Waiting Time is the duration since the arrival of a ship at the port entry until its berthing. Thus, Waiting Time = Port Duration – Berth Duration
Thus, 102 Vessel Reports of the same shipping line\textsuperscript{22} were examined for this purpose. Information from newspaper articles, annual reports of Sri Lanka Ports Authority and official websites of JCT, SAGT, CICT and Ceylon Association of Shipping Agent respectively, were also gathered. The factors driving the changes of productivity hierarchy of terminals when compared among different technical productivity dimensions thus worked out were subject to quantitative and statistical analyses, which utilized ANOVA\textsuperscript{23} and Multiple Comparison Method under Post-Hoc Test, deploying statistical software SPSS 22.0.

**Results and Discussions**

The Table 1 depicts the resultant factors that could possibly have influenced productivity differences between the Crane Productivity and other productivity dimensions, namely Berth, Vessel and Terminal Productivity.

Results revealed that except for Working Hours per Berth Hour (WKHBH), all other factors, namely, Crane Hours per Working Hour (CHWH), Working Hours per Crane (WHCR) and Waiting Time per Berth Hour (WTHBH) have significant mean differences among terminals.

A noteworthy finding is that the JCT, which had a lower Crane Productivity (meaning, number of container moves per crane hour) in the previous study, showing a significantly positive difference of means against CICT in terms of Crane Hours per Working Hour. This could therefore be a “nullifying effect” of the significantly greater Crane Productivity CICT had over JCT for it to have not been reflected in Berth Productivity or Vessel Productivity. This also indicates that the

\textsuperscript{22} The name of the shipping line cannot be revealed due to strict confidentiality reasons.

\textsuperscript{23} The applicability of ANOVA as a tool to compare means was examined through normality test performed using Shapiro Wilk Test (30 \leq \text{sample size} \leq 2000), and confirmed.
State-owned JCT would possibly have managed to operate more crane hours within an average working hour, compared to the privately owned CICT. Having much better technical facilities such as ‘twin lifts’ and practices such as ‘hot seat system’, CICT should have achieved a significantly positive Vessel Productivity and Berth Productivity differences against JCT, had it been at least equally efficient as JCT in utilizing working hours for crane operations.

Table 1. Factors Influencing differences in Productivity dimensions between Crane Productivity and other Productivity Categories

<table>
<thead>
<tr>
<th>Variables</th>
<th>(i) Terminal</th>
<th>(j) Terminal</th>
<th>Mean Difference (i-j)</th>
<th>Std. Error</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>WKHJ</td>
<td>JCT</td>
<td>SAGT</td>
<td>-0.04824</td>
<td>0.03825</td>
<td>0.420</td>
</tr>
<tr>
<td></td>
<td>CICT</td>
<td>JCT</td>
<td>0.02066</td>
<td>0.04006</td>
<td>0.864</td>
</tr>
<tr>
<td></td>
<td>SAGT</td>
<td>CICT</td>
<td>0.04824</td>
<td>0.03825</td>
<td>0.420</td>
</tr>
<tr>
<td></td>
<td>CICT</td>
<td>JCT</td>
<td>0.06892</td>
<td>0.03791</td>
<td>0.169</td>
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<tr>
<td></td>
<td>JCT</td>
<td>SAGT</td>
<td>-0.02066</td>
<td>0.04006</td>
<td>0.864</td>
</tr>
<tr>
<td></td>
<td>CICT</td>
<td>SAGT</td>
<td>-0.06892</td>
<td>0.03791</td>
<td>0.169</td>
</tr>
</tbody>
</table>

Another interesting finding is that the JCT has managed to operate more working hours using the cranes deployed (WHCR) compared to other two privately-owned terminals. This is a noteworthy achievement in spite of the fact that it does not have modern and technologically more advanced equipment possessed by the other two terminals, particularly the CICT. This demonstrates a significantly high deployment efficacy of available equipment (including cranes) at the JCT. This leads to
hypothesis that the JCT would have performed even better, thereby enhancing the overall productivity of the Port of Colombo, had it been similarly equipped with better equipment. On the other hand, the finding that SAGT and CICT spending significantly higher waiting time per berth hour compared to JCT implies that both the SAGT and CICT should have achieved a significantly greater Terminal Productivity had this weakness been addressed.

**Conclusions and Recommendations**

This study explored the factors which influence operational productivity beyond Crane Productivity at the three terminals of the Port of Colombo, namely the JCT, SAGT and CICT. It unleashed the causes of the curious finding of the previous research that the significantly higher Crane Productivity of CICT has not reflected on its Berth Productivity, Vessel Productivity and Terminal Productivity. The results of the analysis suggest that the two privately operated terminals, equipped with better container handling facilities, have failed to match the JCT’s significantly higher effectiveness in utilizing berthing time for crane operations, preventing them from recording significantly positive differences of means over JCT in Vessel Productivity and Berth Productivity. Given that the Port Productivity is a concern in the eyes of international and regional competitiveness of the Port of Colombo, these findings warrant strategic intervention by the management of the two privately owned terminals as well as the Government. The management of the CICT and the SAGT may focus on minimizing the waiting time (before berthing), which could possibly improve their overall Terminal Productivity levels.

It is also recommended that the Government should exploit the comparative edge the JCT has demonstrated in operating more crane hours per working hour, to enhance its Berth and Vessel Productivities, by providing better and more advanced machinery and equipment (such as those possessed by the CICT, or better) to JCT.

The evidence revealed through this study, however suggestive and subjective they are (owing to the operational records of only a single
shipping line being examined through a limited set of Vessel Reports, and many possible factors not being considered, warranting future research), point at the scope for gaining significant overall Port Productivity improvements at the Port of Colombo, and also at the necessity of appropriate and strategic policy interventions by the Government of Sri Lanka.

References


The Effectiveness of the Global Competitiveness Index as a Measure of National Competitiveness: A Case Study of the Sri Lankan Experience

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Introduction

National competitiveness is a serious concern among policy makers and is considered an important indicator of the economic wellbeing and prospects of a country. International indices that rank national competitiveness are closely monitored, especially by policy makers in developing countries (Lall, 2011). They are used as a diagnostic tool about what is preventing the country from improving as well as an important yardstick of how well governments are managing their economy. Research is often instigated based on these rankings and is often cited in research reports, policy briefs and budget proposals, indicating the high importance attached to such rankings (Boltho, 1996).

Although competitiveness indices have been mainstreamed into economic and policy discussions, very little is known about their economic foundations, how soundly they are based in theory and constructed in practice (Lall, 2011).

There are many indices that rank national competitiveness, for example: The Ease of Doing Business Index; Travel and Tourism Competitiveness Index; and the Global Innovation Index. Among such indices the World Economic Forums (WEF) Global Competitiveness Index (GCI) is perhaps the best-known and most widely cited competitiveness index (Lall, 2001). Unlike most other indexes that are sector focused the GCI provides a macro-economic snap shot of the entire economy. The 2017-18 edition of the Global Competitiveness Report (GCR) released at the end of September ranks Sri Lanka 85 out of 137 countries. Compared to last year, Sri Lanka experienced a significant drop of 14 places. Further Sri Lanka’s 2017 country score in the GCI declined to 4.09 out of 7 (1=worst outcome, 7=best outcome).
This is the lowest score Sri Lanka received since 2010. In addition, it is the lowest the country has been ranked since being included in the GCI in 2001.

**Research Problem**

Over the past 10 years, Sri Lanka has experienced varying levels of fluctuations in its GCI score and rank. Figure 2 illustrates Sri Lanka’s GCI rank and score from 2007 to 2017. Among these fluctuations three sharp discontinuities in the trend stand out. That is the 17 places rise in ranking from 2009 to 2010, the 16 places drop in rankings from 2011 to 2012 and the 14 places drop from 2016 to 2017.

![Figure 2: Sri Lanka’s position in the global competitiveness index from 2007 to 2017](image)

The end of the Sri Lanka’s 30-year conflict is one explanation for the increase in Sri Lanka’s competitiveness rank and score observed in 2009. The rank improved from 79 in 2009 to 52 in 2012. In the same period, the score improved from 4.0 to 4.3. The 14 places decline in Sri Lanka’s rank from 2011 to 2012 is largely attributable to the different weights assigned to each sub index in calculating the overall index. In 2011 and 2012, Sri Lanka was in the transition stage from a factor driven economy to an efficiency driven economy. In calculating Sri Lanka’s 2011 score, the basic requirements, efficiency enhancers and Innovation sub-indexes were weighted by 51.3%, 41.9% and 7.2%. In 2012 the weights assigned were 42.5%, 48.2% and 9.4% respectively.
However, the third drop in Sri Lanka’s competitiveness rank and score from 2016 to 2017 is somewhat puzzling. The weights of the sub-indexes have remained the same after 2014. Further, there was no significant event (such as the end of the war) or significant changes in Sri Lanka’s policy environment that could have dramatically affected Sri Lanka’s competitiveness environment.

This paradox gives rise to the central research question in this paper. In the absence of any major economic, policy or methodological changes in calculating the index, what caused the huge decline in Sri Lanka GCI rank and score from 2016 to 2017.

**Objective**

The objective of this study is to examine the usefulness of global indexes in ranking countries competitiveness. Within this context, the paper examines the causes for the massive drop in Sri Lanka’s GCI experienced from 2016 and 2017 to further understand the useful of such indexes in capturing actual competitiveness.

**Methodology**

*The World Economic Forums’ Global Competitiveness Index*

The GCI is a composite index and is constructed based on a set of 114 indicators which are categorized into 12 pillars of competitiveness. The report defines competitiveness as “the set of institutions, policies, and factors that determine the levels of productivity of a country”. The level of productivity in turn, sets the level of prosperity that can be reached by an economy. The 12 pillars are grouped into three sub-indexes: the basic requirement sub index, efficiency enhancer sub index and innovation and sophistication sub index. Different weights are assigned to each sub-index in the calculation of the overall index depending on the country’s stage of development. This is because the relative importance of each sub-index as a driver of competitiveness is dependent on a country’s stage of development. Figure 1 illustrates this framework. The GCI score provides an assessment of the country’s absolute performance and the rank provides an assessment of the country’s relative performance against other countries. A higher score
reflects better performance. In terms of rank, the best performer is ranked 1 and worst performer 137 (In 2017, 137 countries were evaluated).

![Global Competitiveness Index](image)

The 114 indicators included in the GCI are chosen to capture concepts that matter for productivity and long-term prosperity of an economy. These 114 indicators can be divided into 80 subjective indicators and 34 objective indicators. The 34 objective indicators are measured using economic data which is collected from sources such as the International Monetary Fund, World Bank, UNESCO and government data. The 80 subjective indicators are measured using the WEF’s Executive Opinion Survey (EOS). The survey measures qualitative aspects of competitiveness for which comprehensive and reliable sources of statistical data is not available. The survey is administered every year.
during the period of February to June and captures the opinions of business leaders and is administered through the Forum’s network of partner organizations.

The EOS scores responses on a scale of 1 to 7. For example, indicator 1.08 measures the efficiency of government spending. The EOS question to measure this indicator is: In your country, how efficient is the government in spending public revenue? [1= extremely inefficient; 7= extremely efficient]. Therefore, scores for all the subjective indicators are reported on a scale of 1-7, which is consistent with the way the overall GCI scores are recorded. However, the objective indicator scores record the actual value of each indicator. For example, indicator 3.02 measures gross national savings as a % of GDP and for Sri Lanka this value is 27.1. Therefore, the objective indicator scores need to be transformed into a score from 1 to 7. The GCR adopts a min-max transformation procedure for this purpose. The min-max transformation used is as follows:

$$6 \times \left( \frac{\text{Country indicator score} - \text{Sample min}}{\text{Sample max} - \text{Sample min}} \right) + 1$$

For indicators which higher values indicate worse outcomes (eg: government debt, disease incidence), the following min-max transformation is used:

$$-6 \times \left( \frac{\text{Country indicator score} - \text{Sample min}}{\text{Sample max} - \text{Sample min}} \right) + 7$$

This ensures that 1 – 7 still corresponds to the worst and best possible outcomes.

This paper uses a different and innovative method to reverse engineer and subsequently disaggregate the GCI into two separate subjective and objective indexes. Since the overall scores for each pillar and sub-index is given, it is possible then to subtract the subjective indicator scores to deduce the objective indicator score.
Calculation of the GCI score:

\[ GCI_N = \sum_{j=1}^{3} S_j W_j \quad j = 1, 2, 3; \quad N = 1, 2, 3 \ldots 137 \text{ (for the year 2017)} \]

Where, \( N \) = Country, \( S \) = sub-index and \( W \) = weights assigned to each sub index. The GCI score of each country is the summation of the weighted scores of each of the three sub-indexes, basic requirements sub-index, efficiency enhancer sub-index and innovation and sophistication sub-index.

Calculation of the sub-indexes score:

\[ S_j = \sum_{i=1}^{l} P_i V_i \quad i = 1, 2, 3 \ldots l \]

Where, \( P \) = pillars and \( V \) = weights assigned to each pillar.

Calculation of score of each pillar:

\[ P_i = \sum_{k=1}^{K} X_k M_k + \sum_{k=1}^{K} Y_k M_k \quad k = 1, 2, 3 \ldots K \]

Where, \( X \) = Subjective Indicator, \( Y \) = Objective Indicators and \( M \) = the weights assigned to each indicator.

The formula can be rearranged as follows:

\[ \sum_{k=1}^{K} Y_k M_k = P_i - \sum_{k=1}^{K} X_k M_k \quad k = 1, 2, 3 \ldots K \]

Since \( P_i \) and \( \sum_{k=1}^{K} X_k M_k \) is given, the above formula will provide the scores of the objective indicators for each of the pillars.

**Results and Discussion**

The main results are presented in Figure 3. It is evident that the decline in Sri Lanka’s GCI score is driven by the steep decline in the subjective index score which overshadows the steady improvements recorded in the objective indicators. In 2017, of the 80 perception indicators, Sri Lanka’s score increased for only 6; declined for 67 and remained the
same for 7. Meanwhile, of the 34 objective indicators, Sri Lanka’s score increased for 21; declined for 7; and remained the same for 6 indicators. Objective indicators include, government budget balance and gross national savings as a percentage of GDP; exports as a percentage of GDP; domestic market size; and foreign market size. The marginal improvements recorded in the objective score suggest that the competitiveness of the country should have largely remained comparable to last year.

![Figure 3: GCI Score disaggregated into subjective and objective indexes](image)

**Conclusion**

Although there is a strong case for constructing indices that are reliable and objectively benchmark national performance, one must be cautious about the methodological integrity of the index when drawing broad conclusions. The analysis of the WEF’s GCI shows that the index is largely an opinion survey. Moreover, the 2017 edition of the EOS contained 12,755 valid response from 133 economies – this would mean on average 95 responses are collected from each country, questioning the generalizability of the survey results to the entire economy. While the GCI covers a wide range of important indicators, the index itself may not be a good indicator of the competitiveness of the economy, especially in terms of benchmarking against other economies. However, the index provides an interesting diagnosis of the internal business sentiment of the country. Opinions – whether positive or negative – should not be dismissed, even when it is at odds with objective reality.
This is because people tend to act based on their sentiment which in turn can shape real outcomes.

References


Terminal Selection by Shipping Lines: 
Identifying the Key Decisive Factors

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Introduction

Maritime trade plays a major role in logistics, supply chain, thus international maritime trade that connects countries. Therefore, ports and terminals are indispensable in economic activities in any country (Edirisinghe, 2013). Controlling logistics costs allows companies to maintain a competitive edge, since lower logistics costs translate into competitive external trade (Edirisinghe & Jayathilake, 2014). Logistics chains are assumed to be at the core of production processes (Edirisinghe & Rashika, 2017) and global supply chains are extremely varied and complex (Edirisinghe & Muller, 2013).

The container shipping industry has undertaken some main progressions over the last two decades. Most liner shipping companies compete in the industry with almost equivalent products/service features. Infrastructure is a necessary condition for efficient cargo handling operations; thus, after containerization, ports were compelled to invest heavily in more efficient and effective terminals consistent with the speed and the attitudes demanded by the carriers. Containerization has its own problems despite the huge benefits it provides (Moon, Ngoc, & Konings, 2013). The core issue that prevails in the liner shipping industry is to find a mechanism to decrease the costs thus better utilize resources (Edirisinghe, 2017).

Usually, efficient cargo handling operations are dependent on the necessary infrastructure (Edirisinghe & Jin, 2018). Commercial traffic
never seems to be in balance (YUR & Esmer, 2011) and very rarely does a port experience a well-balanced container inventory of a shipping line due to many practical reasons. International trade patterns (Karmelic, Dundovic, & Kolanovic, 2012). The shipping lines and the terminal operators together play a major role in the supply chain. The shipping lines and the terminal operators can be identified as two main major capital-intensive links in the shipping industry that has been created by the globalization of trade.

Shipping lines, ports and terminals face challenges in the competitive environment with the increasing demand for shipping industry. Globalization has increased the need for interconnectedness (Edirisinghe & Ratnayake, 2015) and it continues to hold the command in today’s global community (Edirisinghe, 2017). Shipping lines are faced with a dilemma to strike a balance between the demand and supply (Edirisinghe, Zhihong, & Wijeratne, 2016 b) which is a global problem. Given global warming and other sustainability issues, there is intense pressure to reduce the carbon footprint (Edirisinghe & Zhihong, 2016 a). Even though the global context concern more about the global port competition, the inter competition between terminals within the port is more essential to analyze in order to create policy for future growth of the industry as well as growth of the economy in the country.

The purpose of this paper to identify the factors considered by major shipping lines and feeder services influencing the decision making when selecting a container terminal and break-bulk berth in Colombo port Sri Lanka.

**Research Problem**

How does terminal selection by shipping lines correlate with services factors and port performance in the port of Colombo?

**Objective**

The overall objectives of this paper have been grouped into two folds:
- To identify the factors affecting for the terminal selection by shipping lines in Colombo port thorough analyzing the determinants and criteria affecting on terminal selection.
- To identify the overall convenience level when selecting the terminal by shipping lines.

**Methodology**

The conceptual framework refers to twenty eight independent variables namely, Crane productivity (Vessel turnaround time); Total volume handled per call; Truck turnaround time; Age of equipment; on arrival berth; Time taken for document processing; Accessibility of information; Reputation for damages; Safety practices; Quick response; Terminal capacity; Yard capacity; Gantries per berth; Equipment availability; Maximum draft; Quay length; Congestion; Land connectivity; Tariff charges; Reliability of services; Terminal operators’ reputation; Labor unrest; Flexibility on export cut-off time; Ability to handle special cargo; Ability to handle larger vessels; Terminal service agreements; Terminal layout policies and public private terminal agreements; and Competitor’s terminal selection. The information of shipping lines currently operating in Colombo port was taken from Ceylon Association of Ship Agents (CASA) weekly publication. Currently there are 135 shipping companies registered in CASA publications. Amongst the population of above, finally 27 shipping companies were selected based on convenient sampling through details provided in CASA weekly publication in the Month of June 2018 for the research.

**Results and Discussion**

In the demographic analysis, out of questionnaires which were distributed among terminal users in port of Colombo Sri Lanka, 95 valid responses were collected whereas most of the response’s accounts into the main line category. However, 94% of the respondents are by container operators and then 6% are break bulk operators.
The total variance table and scree plot wraps up that all the 28 factors can be categorized into final 5 factors which represents the variance with 67.504%. Those summarized factors are Congestion and safety, Infrastructure availability, Efficiency, Terminal Layout and Terminal charges where these factors help to identify the scenarios where the shipping lines should be prioritized as they are important when selecting a terminal. 28 variables are categorized into 05 extracted factors and the summary of extracted factors and its variables are categorized as follows namely, Congestion and safety; Infrastructure Availability; Efficiency; Terminal layout; and Terminal charges.

Firstly, congestion and safety contain Equipment ability, Congestion, reliability of service, terminal service agreement, accessibility of information, reputation for damages, safety practices and quick response. Secondly, infrastructure Availability refers to on arrival berth, terminal capacity, yard capacity, Gantries per berth, maximum draft, and quay length). Thirdly, efficiency comprise crane productivity, total volume handle per call, truck turnaround time, and ability to handle larger vessels. Fourthly, terminal layout (terminal operator reputation, labor unrest, flexibility on export cutoff time, terminal layout policies. Finally, terminal Charges describe tariff charges, Competitor’s terminal selection, and Document processing expenses.

Conclusion

After further analyzing the data set concludes that infrastructure availability, efficiency and terminal charges have better relationship with type of shipping line the company is operating thereby those shipping lines majorly consider those factors than others when selecting a terminal for operation. Hence having these facilities in a better level will confirm the port business. Finally, percentages of overall convenience level of terminal selection in Colombo port Sri Lanka are 1% on very hard category, 2% on hard category 15% on average category, 39% on easy category and 43% on very easy category which can be concluded that the current situation of selecting a port terminal in Colombo port is easy which will deliver higher convenience level of terminal selection in Colombo port Sri Lanka.
In ‘port/terminal marketing’ the terminals should practice more ‘Value driven practices’ with the efficient and more productive operational practices. Mega ships may choose CICT deep water terminal JCT, UCT, ECT and SAGT terminals. If the terminals tend to provide recreation facility, food and beverages for a reasonable price to the shipping lines /agencies that are operating inside the terminal for a considerable period, will be a motivational factor for them in terminal preference. One of the major competitors to Sri Lankan ports is the port of Singapore and they provides provisions and bunkering facilities for vessels. When it comes to the geographical position of Sri Lanka, Sri Lankan terminals should be able to provide all the above said facilities for a cheaper price than Singapore. Finally, there is no competition in between the terminals for break bulk cargo and currently terminals under SLPA are only catering break bulk vessels and private terminals have not focused to this business. There is a monopoly for SLPA in break bulk operations and terminals in port of Colombo.

References


Statistics Methods and Applications
Assessing the Goodness-of-Fit of Bayesian Models against Model Complexity

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Introduction

Statistical models, in general, are developed based on few fundamental assumptions. The distributional assumption on the data, for instance, plays a key role in the plausibility of the inference that is based on the fitted model. A model that exhibits poor plausibility tends to produce misleading inferences. Therefore, an assessment of these assumptions is always a good practice. Generally, it is essential to check the statistical capability of a model in order to produce a realistic summary of the data at hand (Gelman, Meng, & Stern, 1996). In the classical (frequentists’) approach, comparisons between the observations and the predictions (expected results under the model) are used as the basis of goodness-of-fit tests that quantify the inconsistency in terms of a probability value (p-value). In the context of Bayesian data analysis, the posterior predictive distribution, which describes the characteristics and statistical behavior of unobserved future observations conditioned on the observed real data at hand, is used to answer the prediction problems (Vehtari & Ojanen, 2012).

Statistical models are widely used in explanation, prediction, or making inferences on some real-world phenomena. It is possible to approximate a given phenomenon with more than one model. Accordingly, the complexity of a model can vary from simple to very complex. However, a model that is rich enough to approximate the behavior of data including essential uncertainties is generally accepted as a good model.
Research Problem

Usually, it is more convenient to build different models based on one particular probability distribution (e.g. regression models with normal distribution). A set of such models can be easily compared using an appropriate criterion. Model comparisons are complicated with the use of different models adopting various modeling concepts. For example, a situation that requires selecting one out of a set including hierarchical, mixture, and hierarchical mixture models will be very complicated in practice.

Objectives

Assessing Bayesian models can involve evaluation of the fit of a model to data and comparisons of several candidate models for predictive accuracy and for improvements. In posterior predictive checks, data simulated under the fitted model are compared with the actual data (Gelman & Hill, 2006). Therefore, it examines whether there are systematic differences between the actual and replicated data (Gelman et al., 2013). Predictive model accuracy is estimated using information criteria. The goal of information criteria is to obtain an unbiased measure of out-of-sample prediction error (Gelman, Hwang, & Vehtari, 2014; Vehtari, Gelman, & Gabry, 2016). Since posterior checks use the data twice; once for model estimation and once testing, a penalty constant or bias correction is applied to these criteria. Although, these criteria are unable to reflect the goodness-of-fit in an absolute sense, the differences (in the information theoretic criterion of choice between competing models) can measure the relative performance of the models of interest. However, the use of some of these measures is only valid under certain circumstances. The aim of this study is to compare and discuss the performance of these information criteria along with their restrictions using a set of different models developed to improve the stutter prediction in forensic data.
Methodology

Predictive accuracy of probabilistic predictions is evaluated using scoring rules such as quadratic, logarithmic, and zero-one scores (Gelman et al., 2013). The logarithmic score is a widely used scoring rule in probabilistic predictions and in selecting models (Gelman et al., 2014; Vehtari & Ojanen, 2012). Consider a model with parameter $\theta$, that is expected to fit on data $y^T = (y_1, y_2, ..., y_n)$. Assuming the independence of data, the likelihood function $p(y|\theta)$ of the model is defined as

$$p(y|\theta) = \prod_{i=1}^{n} p(y_i|\theta).$$

Then the log-likelihood (LL) is defined as

$$LL = \log p(y|\theta) = \log \prod_{i=1}^{n} p(y_i|\theta) = \sum_{i=1}^{n} \log p(y_i|\theta).$$

The log density of the unobserved future data given the model parameters and observed data is generally referred to as log predictive density. It is a well-known summary measure of predictive fit (Gelman et al., 2014).

Information Criteria

Measures of predictive accuracy are generally known as information criteria (Gelman et al., 2013). The probability of data conditional on estimated model parameters is often expressed in a logarithmic scale and labelled as the log-likelihood.

Akaike Information Criterion (AIC)

When the data, number of parameters in the model, and maximum likelihood estimators of model parameters are denoted by $y$, $k$, and $\hat{\theta}_{mle}$ respectively, the AIC is formulated as

$$AIC = -2 \log p(y|\hat{\theta}_{mle}) + 2k.$$  

Bayesian Information Criterion (BIC)

In 1978, Schwarz proposed Bayesian information criterion (BIC) as a competitive measure for AIC in model comparison (Schwarz, 1978).
Replacing the factor 2 of the penalty parameter $2k$ in AIC by the natural log of the sample size ($\ln n$), BIC is defined as

$$BIC = -2 \log p(y|\hat{\theta}_{mle}) + 2 \ln n.$$ 

The BIC, unlike AIC, adjusts for the number of fitted parameters with a penalty that increases with respect to the sample size. The penalty per parameter in BIC is steeper for bigger datasets that has more than seven observations. As BIC heavily penalizes complex models, it favors smaller models (in terms of number of parameters) than AIC. In both AIC and BIC, the calculation of number of free parameters under the models that involves hierarchical structures or informative priors are always misleading.

**Deviance Information Criterion (DIC)**

The DIC is considered to be the Bayesian analogue of AIC (Gelman et al., 2013) as it blends the frequentist approach of AIC and Bayesian thinking in its derivation process (Burnham & Anderson, 1998). The DIC replaces the maximum likelihood estimate of $\theta$ in the AIC with its posterior mean $\theta$ ($\hat{\theta}_{Bayes}$) and the penalty parameter $k$ with a data-based bias correction which is as twice as posterior variance of the log predictive densities, and it represents the effective number of parameters in the model (Gelman et al., 2014; Gelman et al., 2013). DIC is calculated as below sing the posterior samples that are generated through Markov Chain Monte Carlo (MCMC) techniques

$$DIC = -2 \log p(y|\hat{\theta}_{Bayes}) + 4 Var_{post}[\log p(y|\theta)].$$

The use of DIC in model comparison has some practical limitations in relation to missing data models such as mixture and random effect models (Celeux, Forbes, Robert, & Titterington). The DIC exhibits some inconsistency in the results of mixture models as posterior estimates of means are quite delicate under these models.

**Watanabe-Akaike (or Widely Available) Information Criterion (WAIC)**

A learning machine or a statistical model is described as regular if its Fisher information matrix is positive definite and if the map taking parameters to probability distributions is one-to-one (Watanabe, 2010).
Many machine learning methods including normal mixtures, artificial neural networks, Bayes networks, and hidden Markov models do not have this property, hence they are known as singular. WAIC was introduced in 2010 (Watanabe, 2010) as a fully Bayesian method for estimating the out-of-sample expectation. WAIC is applicable for both singular and non-singular models. When there are $s$ number of posterior samples, there will be $s$ values for model parameters $\theta$. Posterior variance of each $\log p(y_i|\theta)$ is calculated based on $s$ posterior samples and WAIC is as

$$
WAIC = -2 \sum_{i=1}^{n} \ln \left[ \frac{1}{s} \sum_{i=1}^{s} p(y_i|\theta_s) \right] + 2 \sum_{i=1}^{n} Var_{post}[\log p(y_i|\theta)].
$$

This study assesses the performance of 11 models using normal, log-normal, gamma, and Student’s distributions to improve the PCR stutter prediction in forensic data. These models include four profile-wide variance models, four locus-specific variance models, and three two-component mixture models. The mean stutter ratio (SR) in each model is modelled as a locus-specific simple linear regression of the longest uninterrupted sequence (LUS) (Bright, Taylor, Curran, & Buckleton, 2013; Brookes, Bright, Harbison, & Buckleton, 2012). Using the inversely proportional relationship between the variance of stutter height and the template DNA, the locus-specific and profile-wide variance models are used to model the variance of SR (Bright, Curran, & Buckleton, 2013, 2014).

The models proposed based on Log-normal, Gamma, Normal, and Students’ t distributions are labeled as LN, G, N, and T respectively. The models that use profile-wide and locus-specific variance models are distinguished by the subscript 0 and 1 respectively. The two-component mixture models are specially labeled with additional letter M at the beginning of the label.

**Results and Discussion**

All the models considered in this study can be compared using both AIC and BIC, however none of them are based on Bayesian estimators of the model parameters. DIC cannot be used as a model comparison criterion.
as there are three two-component mixture models. WAIC can be used to compare all the models, however, larger posterior variances of log predictive densities of the models (> 0.4) restrict the use of WAIC as well.

This study has used vague flat priors for model parameters, hence it does not expect a difference between maximum likelihood estimators and Bayesian estimators. Under this assumption, BIC is used as the model comparison criterion. The following table summarizes the difference between BICs for these models for NGM SElect™ dataset.

Table 1: The differences of BIC values for the NGM SElect™ dataset

<table>
<thead>
<tr>
<th>Model</th>
<th>LN0</th>
<th>G0</th>
<th>LN1</th>
<th>G1</th>
<th>N0</th>
<th>MLN1</th>
<th>N1</th>
<th>T1</th>
<th>T0</th>
<th>MN1</th>
</tr>
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<tbody>
<tr>
<td>G0</td>
<td>1723</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LN1</td>
<td>2100</td>
<td>377</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G1</td>
<td>2727</td>
<td>1004</td>
<td>627</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>N0</td>
<td>3053</td>
<td>1330</td>
<td>953</td>
<td>326</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MLN1</td>
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<td>1861</td>
<td>1484</td>
<td>857</td>
<td>531</td>
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<td></td>
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<td>586</td>
<td>55</td>
<td></td>
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<tr>
<td>T1</td>
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<td>1644</td>
<td>1017</td>
<td>691</td>
<td>160</td>
<td>105</td>
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<tr>
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<td>769</td>
<td>238</td>
<td>183</td>
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<td>1050</td>
<td>995</td>
<td>812</td>
<td>890</td>
<td>656</td>
</tr>
</tbody>
</table>

The models are arranged in increasing order of their performances. The magnitude of the differences reflects the extent that the models in rows are better than the corresponding models in columns, with respect to BIC. The two component non-standardized Student’s t mixture (MT1) and the two-component normal mixture (MN1) have been selected as the best and the second-best model respectively. Non-standardized Student’s t models, one with locus-specific variance (T1) and the other with profile-wide variance (T0) outperform over all the non-mixture models. Normal models perform better than log-normal models and non-standardized Student’s t models perform better than both normal and log-normal models among all the three modelling categories: profile-wide variance, locus-specific variance, and mixture models.
The normal model with locus-specific variance \( (N_1) \) is the best and the most convenient option for forensic practitioners who are not much comfortable with advanced modelling techniques.

**Conclusion**

The comparison of various models under different distributions is very complicated. The use of various information criteria is restricted in model comparisons due to their theoretical limitations. Two-component mixture models of both non-standardized Student’s t and Normal distributions performed better than Gamma and Log-normal models in predicting the behavior of Stutter ratio. The normal model with locus-specific variance \( (N_1) \) is the best and the most convenient option for the forensic practitioners who are not comfortable with advanced modelling techniques such as mixture models or rarely used statistical distributions such as non-standardized Student’s t.

**References**


Can We Rely on Random Number Generators in Statistical Software?

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Introduction

Distributional assumptions especially the Normality assumption which is the spearhead of most parametric analysis assumptions (Thorode 2002) & (Knuth, c1981) are made quite often in statistics and more so when generating random samples from pseudorandom number generators available in statistical software. The generated samples however, don’t always conform the distributions upon which they were generated. The purpose for this study was to determine the discrepancies in random number generators in statistical software. This was done by reviewing the pseudorandom number generators in SPSS, Minitab and R. The Mersenne Twister (Matsumoto & Nishimura, 1998) pseudo random number generator (PRNG) which has a higher astronomical period of $2^{19937}-1$ compared to other pseudorandom number generators is used in SPSS and R.

Various samples generated from the respective software were tested to see whether they actually fitted to the said distributions. The samples were generated to follow the Normal, Uniform and Gamma distributions respectively. The Shapiro-Wilk, Anderson-Darling, Jarque-Bera, and Kolmogorov-Smirnov tests were used to test the goodness of fit of the generated distributions. As a sub-objective, using simulations for thin-tailed symmetrically distributed samples (Normal distribution), heavy-tailed symmetrically distributed samples (Students’ t-distribution), and asymmetrically distributed samples (Gamma distribution), the study also compared the statistical powers of the Shapiro-Wilk, Anderson-Darling, Jarque-Bera, Kolmogorov-Smirnov, and Lilliefors tests to determine the best Normality test under the different scenarios respectively.
Through the tests conducted on the various samples, the study found that a small percentage of them didn’t indeed conform to the distributions upon which they were generated. This implies that if such samples were to be used for further parametric analysis without being tested, they would violate the distributional assumptions such as Normality. The power comparison found that all the four formal tests for Normality used had lower powers in small samples (less or equal to 30) and these powers improved for medium-to-large samples. This implies that parametric tests should be conducted on samples that are large enough to represent populations from which they’ve been drawn, since its difficult to capture deviations from Normality in smaller samples.

**Objectives**

The main objective of this research is to study the discrepancies in random number generators in Minitab, SPSS, and R software. In addition, the study intends to analyze the behavior of the p-value with varying sample sizes in order to explore the various random number generators available in SPSS, Minitab, and R, and to compare the statistical powers of the Shapiro-Wilk, Anderson-Darling, Kolmogorov-Smirnov, and the Jarque-Bera tests for determining the most powerful normality test.

**Methodology**

At significance levels: 0.01, 0.025, 0.05, and 0.1, 1000 samples of sizes 10, 50, 100, 500, and 1000 each were generated from Minitab, SPSS, & R to follow Normal, Uniform, and Gamma distributions. Normality was tested using the Shapiro-Wilk, Anderson-Darling, Jarque-Bera, & Kolmogorov-Smirnov tests. The Kolmogorov-Smirnov test was also used to test the samples generated from Uniform and Gamma distributions. In the power study via Monte Carlo simulations, samples of sizes 30, 250, and 1000 were generated from R following 10,000 simulations each. Two families of goodness of fit tests i.e. based on order statistics (Shapiro-Wilk test) and based on plotting of the theoretical versus empirical distributions (Anderson-Darling, Jarque-Bera, & Kolmogorov-Smirnov and Lilliefors’ tests) were considered.
The powers and their respective confidence intervals were obtained and analyzed.

Results and Discussion

Discrepancies

![Percentage of Insignificant Samples](image)

Figure 2: 1000 samples generated from SPSS

As it’s evident in Figure 1 above, even though the percentages of samples declared insignificant at given significance levels were small, they were nonetheless existent. This is true for all sample sizes from all the three software. The overall level of insignificance appeared to be consistent throughout regardless of the sample size.

Power study

The results of the power study below demonstrate the difficulty of detecting deviations from normality for symmetrically distributed samples with thin tails. The powers increased when tested on heavy-tailed symmetrically distributed as well as samples with skewed distributions. The p-values and confidence intervals were obtained via simulation for over 10,000 samples.
Powers of testing

Table 2: Sample size, n=30 for standard Normal distribution

<table>
<thead>
<tr>
<th>Test</th>
<th>Shapiro-Wilk</th>
<th>Anderson-Darling</th>
<th>Kolmogorov-Smirnov</th>
<th>Jarque-Bera</th>
<th>Lilliefors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powers</td>
<td>0.0496</td>
<td>0.0519</td>
<td>0.0478</td>
<td>0.0297</td>
<td>0.0497</td>
</tr>
<tr>
<td>Lower 95% confidence interval</td>
<td>0.0455</td>
<td>0.0477</td>
<td>0.0437</td>
<td>0.0265</td>
<td>0.0456</td>
</tr>
<tr>
<td>Upper 95% confidence interval</td>
<td>0.0541</td>
<td>0.0565</td>
<td>0.0522</td>
<td>0.0333</td>
<td>0.0542</td>
</tr>
</tbody>
</table>

Source: Author calculation

Figure 3: Power study on thin-tail symmetrically distributed samples
Figure 4: Power study on heavy-tail symmetrically distributed samples

From the two figures above, the Shapiro-Wilk and Anderson-Darling tests seem to follow the same pattern and tend to have consistent powers which coincides with (Stephens, 1993) findings. In Figure 3, it’s clear that the powers are small for small samples and increase with increase in sample size. It’s also clear that the Kolmogorov-Smirnov test lags behind in the power comparisons while the Lilliefors test has lower powers compared to the other tests. The Jarque-Bera test does well in Figure 3 because it considers both Kurtosis and Skewness measures and the t-distribution presents longer tails with a considerable higher peakedness, the test is well placed to capture the non-normality.

The exemplarily high powers in large samples can be attributed to the over conservative nature that formal Normality tests tend to have when samples sizes are large. However, since the deviation from Normality in large samples is usually not high enough to affect parametric tests, the Normality assumption could be waived.

**Conclusion**

In the power study, Shapiro-Wilk and Anderson-Darling goodness-of-fit tests performed almost similarly and were proved to have the best powers in symmetrically distributed thin-tailed samples and in samples with skewed distributions over the other tests. The Jarque-Bera test had
the highest powers in symmetrically distributed heavy-tailed samples whereas the Kolmogorov-Smirnov test had the lowest powers in both heavy-tailed symmetrically distributed samples and the samples with skewed distributions. The overall statistical powers for all the tests were low for small samples and high for larger samples. This may point out the need to always generate or use sufficiently large samples for any analytical purpose. Based on the results, the study recommends that any generated samples from any random number generator must be tested for distributional conformance before they are used for further analyses. Random number generation in Minitab is has limited options for selecting which random number generator to use and it’s also hectic if very many samples (above 900) are to be selected and so it should be avoided for purposes of Monte Carlo simulation studies. The study also recommends the use of the Shapiro-Wilk and Anderson-Darling tests for their considerably higher statistical powers under several alternatives. The Jarque-Bera tests could be useful for making comments on skewness and kurtosis, and testing Normality in heavy-tailed symmetric distributions. The Kolmogorov-Smirnov test is unreliable under most alternatives since it usually gives low powers (Razali & Wah, 2011), and, larger samples are always preferred since tests such as the Shapiro-Wilk are vulnerable to sample size (Kim, 2013). The need to perform formal tests with graphical illustrations to get a clear view of a given dataset cannot be understated since the shape of the data distribution could point out which formal test is more likely to capture deviations from Normality.

It is however important to note that goodness of fit tests alone isn’t the best measure of the overall performance of a random number generator, other tests such as the battery diehard test, poker test, runs test, frequency test which are discussed at length in (Dutang &Wuertz 2009) and (Knuth, c1981), etcetera are also available via the randtoolbox package in R and may provide a better view of the general performance of said pseudorandom number generators.
References


