



ISSN 2345-9913

SLJER

Sri Lanka Journal of Economic Research

Volume 2

Number 1

June 2014

RESEARCH ARTICLES

Economic Effectiveness of the Devolution of Power to Provincial Councils in Sri Lanka: A Resource Productivity Analysis

T L Gunaruwan and S T Dilhara

Cultural Meaning of Consumer Goods: Impact of Cross Cultural Values on Motives for Consuming Conspicuous Goods in Sri Lanka

A M Perera, U K Jayasinghe-Mudalige and A Patabandhige

Application of the Country Product Dummy Method to Construct Spatial and Temporal Price Indices for Sri Lanka

Ramani Gunatilaka and Charith Abeyratne

Substitutability of Automated Teller Machines for Tellers: With Special Reference to Bank of Ceylon

Thilini Saparamadu

Firms' Responsiveness towards Quality Management in Bottled Drinking Water Manufacturing Industry in Sri Lanka

N D K Weerasekara, U K Jayasinghe-Mudalige, S M M Ikram, J M M Udugama, J C Edirisinghe and H M L K Herath

Estimation of Demand and Supply of Pulpwood by Artificial Neural Network: A Case Study in Tamil Nadu

S Varadha Raj, N Narmadha, T Alagumani, M Chinnaduri and K R Ashok

PERSPECTIVES

Valuing Ecological Goods and Services: An Analytical Framework for Policy Makers

Chatura Rodrigo

Reflections on the Evolution of Modern Financial Science

O G Dayarathna-Banda

BOOK REVIEW

Why Nations Fail: The Origins of Power, Prosperity, and Poverty **Daron Acemoglu and James A Robinson**

Priyanga Dunusinghe

**The International Journal
of the Sri Lanka Forum of
University Economists**

*Edited and Published by
The Department of Economics and Statistics,
University of Peradeniya
Peradeniya, Sri Lanka*



SRI LANKA JOURNAL OF ECONOMIC RESEARCH



ISSN 2345-9913

Volume 2

Number 1

June 2014

RESEARCH ARTICLES

Economic Effectiveness of the Devolution of Power to Provincial Councils in Sri Lanka: A Resource Productivity Analysis

T L Gunaruwan and S T Dilhara

Cultural Meaning of Consumer Goods: Impact of Cross Cultural Values on Motives for Consuming Conspicuous Goods in Sri Lanka

A M Perera, U K Jayasinghe-Mudalige and A Patabandhige

Application of the Country Product Dummy Method to Construct Spatial and Temporal Price Indices for Sri Lanka

Ramani Gunatilaka and Charith Abeyratne

Substitutability of Automated Teller Machines for Tellers: With Special Reference to Bank of Ceylon

Thilini Saparamadu

Firms' Responsiveness towards Quality Management in Bottled Drinking Water Manufacturing Industry in Sri Lanka

N D K Weerasekara, U K Jayasinghe-Mudalige, S M M Ikram, J M M Udugama, J C Edirisinghe and H M L K Herath

Estimation of Demand and Supply of Pulpwood by Artificial Neural Network: A Case Study in Tamil Nadu

S Varadha-Raj, N Narmadha, T Alagumani, M Chinnaduri and K R Ashok

PERSPECTIVES

Valuing Ecological Goods and Services: An Analytical Framework for Policy Makers

Chatura Rodrigo

Reflections on the Evolution of Modern Financial Science

O G Dayarathna-Banda

BOOK REVIEW

Why Nations Fail: The Origins of Power, Prosperity, and Poverty **Daron Acemoglu and James A Robinson**

Priyanga Dunusinghe



Published on behalf of the SLFUE by
**The Department of Economics and Statistics,
University of Peradeniya, Peradeniya, Sri Lanka.**

Copyright © December 2013

SRI LANKA FORUM OF UNIVERSITY ECONOMISTS

National Library of Sri Lanka – Cataloguing-In-Publication Data

SRI LANKA JOURNAL OF ECONOMIC RESEARCH

The international journal of the Sri Lanka Forum of University Economists

Volume 2 Number 1 (2014)

ISSN 2345 – 9913

Published by the Sri Lanka Forum of University Economists

The Editorial Office (2014) of the SLJER

The Department of Economics and Statistics, University of Peradeniya,
Peradeniya, Sri Lanka

Telephone: + 94 812 39 26 22 Fax: +94 812 39 26 21

Web: www.slfue.org

Editor (2014): P P A Wasantha Athukorala

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted by any means, electronic, mechanical, photocopying, recording or otherwise, without written consent of the publisher.

Printed by: **Sanduni Offset Printers (Private) Limited**

4/1, Sarasavi Uyana Good Shed Road, Sarasavi Uyana, Peradeniya, Sri Lanka

Telephone / Fax: +94 812 38 77 77 E-mail: sandunioffset@gmail.com

Sri Lanka Journal of Economic Research

The International Journal of the Sri Lanka Forum of University Economists

Aims and Scope

Sri Lanka is currently facing many transitions: economic, epidemiological, demographic, technological and social. The world economy too is evolving, with technological progress, economic crises and social upheavals demanding more and alternative economic analyses. Both these factors make it imperative for economists in Sri Lanka and overseas, among the academic community as well as practitioners, to focus on economic research and its dissemination. The journal of the Sri Lanka Forum of University Economists seeks to fulfill this mandate.

The Sri Lanka Journal of Economic Research (SLJER) creates a space where research, particularly *policy related* research, can be disseminated and so contributes to the economic thinking in the country in this period. The critical evaluation of policy is essential if optimal use is to be made of the demographic window of opportunity. Equity and social welfare, the cornerstone of economic thinking in the country, and the challenges posed to such fundamentals by economic liberalization, globalization and technological progress make it vital to dwell on ideas and ideals, as well as to collate systematic evidence to support rational policy making. The aim of this journal then is to support such processes through dissemination and discussion.

The SLJER is a refereed annual journal. The journal will primarily provide an opportunity for authors presenting papers at the annual sessions of the Sri Lanka Forum of University Economists to disseminate their contributions. Apart from the research articles the journal carries a special section titled 'Perspectives' which articulates alternative thinking and approaches to Economics. Book reviews are included as well.

All articles in this journal are subject to a rigorous blind peer-review process initially, and are then reviewed by the editorial committee prior to final acceptance for publication.

SPONSOR

This publication was fully sponsored by:



The National Council for Advanced Studies in Humanities and Social Sciences

64, Sukhasthan Gardens, Ward Place, Colombo 7, Sri Lanka.

Telephone: +94 112 69 39 74 Fax : +94 112 69 39 75

email: info@ncas.ac.lk Web: www.ncas.ac.lk

INQUIRIES

All inquiries to be directed to:

Secretariat (2012) of the SLJER, Department of Economics, University of Colombo, Kumaratunga Munidasa Mawatha, Colombo 3, Sri Lanka.

Telephone: +94 112 58 26 66 Fax: +94 112 50 27 22 Email: editor.sljer@gmail.com.

Secretariat (2013) of the SLJER,

Department of Economics and Statistics, University of Peradeniya, Sri Lanka.

Telephone: + 94 812 39 26 22 Fax: +94 812 39 26 21 Email: journalslerc@yahoo.com

Secretariat designate (2014) of the SLJER,

Department of Economics and Political Science, University of Ruhuna, Matara, Sri Lanka.

Telephone: + 94 412 22 26 81 Fax: +94 412 22 70 10



ISSN 2345-9913

SLJER

Sri Lanka Journal of Economic Research

Volume 2

Number 1

June 2014

Board of Editors

P P A Wasantha Athukorala (Chief Editor)

Department of Economics and Statistics, University of Peradeniya, Sri Lanka

Dileni Gunewardena

Department of Economics and Statistics, University of Peradeniya, Sri Lanka

Anuruddha Kankanamge

Department of Economics and Statistics, University of Peradeniya, Sri Lanka

S Vijesandiran

Department of Economics and Statistics, University of Peradeniya, Sri Lanka

Editorial Assistants

Navoda D Edirisinghe

Department of Economics and Statistics, University of Peradeniya, Sri Lanka

N T Anoma Priyanthi

Department of Economics and Statistics, University of Peradeniya, Sri Lanka

Amila C Siriwardana

Department of Economics and Statistics, University of Peradeniya, Sri Lanka

Senani K Wickramarathna

Department of Economics and Statistics, University of Peradeniya, Sri Lanka

Editorial Advisory Board

W D Lakshman

*Emeritus Professor, University of Colombo, and
Chairman, Institute of Policy Studies of Sri Lanka, Colombo*

Takao Fujimoto

Professor of Economics, Fukuoka University, Japan

Sarath Rajapathirana

*Former Economic Adviser to the World Bank, and
Former Member of the Editorial Board of the World Bank Economic Review*

Saman Kelegama

*The Executive Director of the Institute of Policy Studies of Sri Lanka, and
Member of the Editorial Board of the South Asian Economic Journal*

Indrajit Coomaraswamy

Former Director of Economic Affairs, Commonwealth Secretariat

Sri Lanka Journal of Economic Research

Volume 2 Number 1 June 2014

PANEL OF REVIEWERS

K U AjithaThennakoon
Professor of Economics
University of Kelaniya, Sri Lanka

D N B Gunewardena
Professor of Economics
University of Peradeniya, Sri Lanka

A S P Abhayaratne
Professor of Economics
University of Peradeniya, Sri Lanka

C R Abayasekara
Senior Lecturer (Economics)
University of Peradeniya, Sri Lanka

O G Dayaratna-Banda
Senior Lecturer (Economics)
University of Peradeniya, Sri Lanka

S S K B M Dorabawila
Senior Lecturer (Economics)
University of Peradeniya, Sri Lanka

Anura Ekanayake
The Ceylon Chamber of Commerce
Colombo, Sri Lanka

T Lalithasiri Gunaruwan
Senior Lecturer (Economics)
University of Colombo, Sri Lanka

S Vijesandiran
Senior Lecturer (Economics)
University of Peradeniya, Sri Lanka

H M W A Herath
Senior Lecturer (Economics)
University of Peradeniya, Sri Lanka

Jagath C Edirisinghe
Senior Lecturer (Agribusiness Management)
Wayamba University, Sri Lanka

A J M Chandradasa
Senior Lecturer (Economics)
University of Ruhuna, Sri Lanka

J M A Jayawickrama
Senior Lecturer (Economics)
University of Peradeniya, Sri Lanka

A D H K Kankanamge
Senior Lecturer (Economics)
University of Peradeniya, Sri Lanka

M B Ranathilaka
Senior Lecturer (Economics)
University of Peradeniya, Sri Lanka

J G Sri Ranjith
Senior Lecturer (Economics)
University of Peradeniya, Sri Lanka

K M R Karunarathna
Senior Lecturer (Economics)
University of Peradeniya, Sri Lanka

T Vinayagathan
Senior Lecturer (Economics)
University of Peradeniya, Sri Lanka

W L P Perera
Senior Lecturer (Economics)
University of Peradeniya, Sri Lanka

K Gnaneswaran
Senior Lecturer (Economics)
University of Peradeniya, Sri Lanka

T Rajeswaran
Senior Lecturer (Economics)
University of Peradeniya, Sri Lanka

S Sivarajasingham
Senior Lecturer (Economics)
University of Peradeniya, Sri Lanka

Ajantha Kalyanarathna
Senior Lecturer (Economics)
University of Jayawardenapura, Sri Lanka

A M M Musthafa
Senior Lecturer (Business Economics)
South Eastern University, Sri Lanka

Contents

RESEARCH ARTICLES

Economic Effectiveness of the Devolution of Power to Provincial Councils in Sri Lanka: A Resource Productivity Analysis 3
T L Gunaruwan and S T Dilhara

Cultural Meaning of Consumer Goods: Impact of Cross Cultural Values on Motives for Consuming Conspicuous Goods in Sri Lanka 19
A M Perera, U K Jayasinghe-Mudalige and A Patabandhige

Application of the Country Product Dummy Method to Construct Spatial and Temporal Price Indices for Sri Lanka 38
Ramani Gunatilaka and Charith Abeyratne

Substitutability of Automated Teller Machines for Tellers: With Special Reference to Bank of Ceylon 53
Thilini Saparamadu

Firms' Responsiveness towards Quality Management in Bottled Drinking Water Manufacturing Industry in Sri Lanka 67
N D K Weerasekara, U K Jayasinghe-Mudalige, S M M Ikram, J M M Udugama, J C Edirisinghe and H M L K Herath

Estimation of Demand and Supply of Pulpwood by Artificial Neural Network: A Case Study in Tamil Nadu 79
S Varadha-Raj, N Narmadha, T Alagumani, M Chinnaduri and K R Ashok

PERSPECTIVES

Valuing Ecological Goods and Services: An Analytical Framework for Policy Makers 89
Chatura Rodrigo

Reflections on the Evolution of Modern Financial Science 107
O G Dayarathna-Banda

BOOK REVIEW

Why Nations Fail: The Origins of Power, Prosperity, and Poverty 123
Daron Acemoglu and James A Robinson
Priyanga Dunusinghe

RESEARCH ARTICLES

**ECONOMIC EFFECTIVENESS OF THE
DEVOLUTION OF POWER
TO PROVINCIAL COUNCILS IN SRI LANKA:
A RESOURCE-PRODUCTIVITY ANALYSIS**

Sri Lanka Journal of
Economic Research
Volume 2 (1)
June 2014: 3-18
Sri Lanka Forum of
University Economists

T L Gunaruwan
S T Dilhara



Abstract

The devolution of power through the establishment of Provincial Councils in Sri Lanka is a highly debated subject, but hardly on economic grounds. The present research addressed the subject through the analysis of recurrent and capital expenditure patterns of the Provincial Councils in comparison to those of the National Government. The outcomes of the study clearly shows that the Provincial Council system is still overwhelmingly dependent on Government grants, even for its recurrent expenditure requirements, after 24 years of its existence. The study revealed that the Sri Lankan process of devolution has not been founded on any enabling economic justifications, and has not been able to produce any cost economics, generally expected through economically rational devolution of power. But, the study found that the process has resulted in negative economic implications, particularly by its apparent retarding effect on public investment, to the effect that over half-a-percent additional GDP growth push could be secured annually if the Provincial Council system could be abandoned. The devolution of Power through the Provincial Council system, brought about by the 13th amendment to the Constitution, cannot therefore be concluded as justifiable on economic grounds.

Key Words: *Devolution, Recurrent expenditure intensity, Personnel emolument overhead, Supplementary investment, ICOR*

JEL Codes : *E22, E62, H72, H77, O16, O23, R51, R53*

T L Gunaruwan

University of Colombo, Colombo, Sri Lanka

Telephone: +94772282808, email: tlgun@econ.cmb.ac.lk

S T Dilhara

University of Colombo, Colombo, Sri Lanka

Telephone: +94710486802, email: thilini.dil88@yahoo.com

INTRODUCTION

Devolution of power in Sri Lanka was a heavily debated subject ever since the introduction of the Provincial Council system in 1988 based on the 13th Amendment to the Constitution.¹ Though the advocates of the Provincial Council system (PAFFREL, 2013; Siboti, 2013; Knutsen, 2004; Satyendra, 1988) attempt to justify devolution on the grounds that the centralised system of management has failed to satisfy the aspirations of the people while devolution will guarantee that the developing world economies mitigate the effects of corrupt management in central government and as such will grant these devolved systems the power to ensure their endurance in the competitive global economy (Siboti, 2013). Also, there was growing insistence in Sri Lanka on the necessity of decentralisation of administrative processes in order to achieve rapid economic and social development of the country (thirteenth amendment to the constitution of Sri Lanka, 2013).² However, there are divergent opinions expressed regarding its effectiveness and also with respect to future action. Some argue for much deeper devolution of power to Provincial Councils (commonly referred to as 13+) in response to demands for more “autonomy” by the Northern political forces, while others demand the complete abolition of the Provincial Council system out of fear that it would eventually threaten the “unitary status” of the Country’s political administration. Several others suggest continuing with the system, but with further constitutional amendments to remove some of its provisions.

It is a fact that Sri Lanka’s devolution was politically motivated, and therefore, it is unclear as to whether the economic incentives for devolved management of the affairs of the nation were given due consideration. According to literature, fiscal decentralization may lead to economic efficiency, cost efficiency, accountability and resource mobilization; (Knutsen, 2004) but reaping these benefits, requires the prior existence of significant local administrative capacity, responsive officials, substantial discretionary financial control and geographic incentives (such as large land areas and distantly spread regional activities) which could offer scope for saving on administration and coordination costs (Bird and Vaillancourt, 1998).

Unfortunately, the research that has hitherto been conducted on the Sri Lankan case of devolution have been mainly on the political aspects and does not entail a significant analysis of these economic and developmental aspects of devolution.³ Economics of provincial management in general, and the impact of Provincial Councils on the

¹ Through the Provincial Councils Act No 42 of 1987 (Provincial councils, 2014).

² Government website (<http://www.priu.gov.lk/ProvCouncils/ProvincialCouncils.html>)

³ One rare exception is the study conducted at the Institute of Policy Studies by Waidyasekara (2004), which point outs several inherent weaknesses and deficiencies of the “fiscal devolution” activity that has assumed importance in Sri Lanka for political reasons in the context of the ethnic crisis.

country's overall resource utilisation efficiency in particular, have not yet been adequately appraised.

The present study was conducted with the objective of appraising the economic impact of devolution in Sri Lanka, particularly through a fiscal effectiveness stand-point. It focused particularly on the behavior of the economy's overall fiscal expenditure efficiency, before and after the establishment of Provincial Councils, in order to derive lessons for future. A comparative analysis among the provincial councils was also attempted in order to fathom the differences in relative expenditure intensities. It was also intended that the research would contribute towards enriching the discussion on further action pertaining to devolution of power based on the 13th Amendment, particularly by adding the economic dimension in to it.

MATERIALS AND METHODS

The research approached the question via appraising the recurrent and capital expenditure patterns of Sri Lanka's economic activity before and after coming into effect of the Provincial Council system. The economic effectiveness of the provincial management structure was examined on the premise that there would be administrative cost efficiencies to be gained, such as advantages of geographic proximity to user communities (Bird et al, 1998) and the possibility of area specific service production without having to bear undue communication, networking or chain-of-command related costs considered to be inherent in centralised or unitary management of public service provision (Samaratunge, Bennington, 2002). Such advantages, if any, would be reflected in a reduced level of recurrent expenditure intensities after the devolution, compared to those before.

When analysing the recurrent and capital expenditures between the national Government and the Provincial Councils, care was taken to include only those comparable expenditure headings. This was because an inclusion of those expenses on activities that are not performed by the Provincial Councils (such as defense, foreign debt service payments or financial allocations to Provincial Councils) would make the analytical bases incomparable.

The analysis was performed using secondary data, sourced from the Annual Reports of the Central Bank of Sri Lanka, the Ministry of Finance and Planning, the National Finance Commission reports and the Financial Statements of the Provincial Councils.

The period from 1981 to 2012 was included in statistical comparisons where the data pertaining to the period after 1990 were considered to be reflecting post-devolution patterns, as separate financial data pertaining to Provincial Councils were not available

until 1990, even though the Provincial Council system came into effect in 1988⁴. For the comparative analysis among the Provincial Councils, the authors used the data pertaining to the year 2012 which was the latest available on all Provincial Councils except for the Northern Provincial Council.⁵

Graphical observation of comparative trends, analysis of recurrent and capital expenditure ratios, statistical comparison of averages, regression analysis and an investment productivity appraisal were used as analytical methods.

ANALYSIS AND RESULTS

The first and foremost observation that emerged through comparative analysis of expenditure patterns was that the Provincial Councils have been overwhelmingly dependent on Government grants. The highest percentage of total expenditure financed through the “earnings” of the Provincial councils during the period between 1990 and 2012 was 29% (average was 21%) and the share of recurrent expenditure and capital expenditure of the Provincial Councils met through the National Government allocations were never less than 68% and 71% respectively (Table 1).

This implies that the Provincial Councils, even after over two decades of existence, have not yet been able to become “financially self-reliant”, and continue to be dependent on the resources pumped in from the parent National Government for their existence.

The information in the Table 1 also reflects the disproportionately high share (nearly 85%) of total expenditure of the Provincial Councils being recurrent. It is also noticeable that the Provincial Councils, in some years, have invested less than the capital grants received from the national coffers, pointing at the possibility of misappropriation of funds,⁶ where the possibility of meeting recurrent expenditures through votes granted for development effort could not be excluded.

Recurrent Expenditure Analysis

The question was further examined through a comparative analysis of recurrent expenditure patterns of the National Government and the Provincial Councils after the devolution, the results of which are depicted in the Figure 1.

⁴According to the National Finance Commission sources, provincial financial management came into effect only by 1990, and no statutes were available until then for such an activity.

⁵Except the Northern Provincial Council, which started its fully fledged functioning only after the elections held in November 2012.

⁶ Needs further investigation.

Table 1: Evolution of Recurrent and Capital Expenditures of the Provincial Councils

Year	Rec. Ex. Dependence of PCs (%)	Capital Ex. Dependence of PCs (%)	Rec. Exp. / Tot. Exp. of PCs (%)	Rec. Esp. / Tot. Exp. of Gov. (%)	Salaries / Rec. Exp. of PCs (%)	Salaries / Rec. Exp. of Gov. (%)
1990	100.0	100.0	83.84	66.70	NA	9.71
1991	84.3	100.0	85.87	64.75	NA	6.25
1992	79.4	100.0	87.88	65.40	NA	10.22
1993	79.4	100.0	88.89	57.41	NA	7.32
1994	79.9	100.0	90.07	61.81	NA	5.72
1995	71.1	115.6	94.93	67.86	80.98	13.12
1996	75.6	70.9	94.64	76.30	77.66	11.96
1997	76.4	106.6	94.03	70.58	77.38	13.75
1998	76.1	93.0	94.37	66.52	78.26	14.05
1999	80.4	68.4	91.53	62.48	77.73	15.25
2000	80.5	98.2	77.30	69.59	76.93	16.29
2001	73.9	93.7	83.37	74.17	78.29	17.55
2002	79.9	104.9	84.54	74.43	78.38	17.94
2003	76.5	78.2	80.86	66.25	76.84	20.18
2004	77.5	93.4	81.29	72.40	77.91	16.63
2005	79.7	90.7	80.99	63.69	78.60	20.65
2006	81.6	92.5	80.90	65.07	79.16	22.44
2007	76.3	86.4	82.01	63.23	80.58	22.72
2008	74.4	72.4	85.99	64.30	77.25	19.61
2009	69.5	87.8	85.47	59.22	77.73	20.88
2010	71.6	82.5	81.90	55.06	76.91	22.42
2011	73.0	78.4	82.35	53.09	78.62	21.69
2012	67.5	86.5	85.35	56.82	74.46	21.01

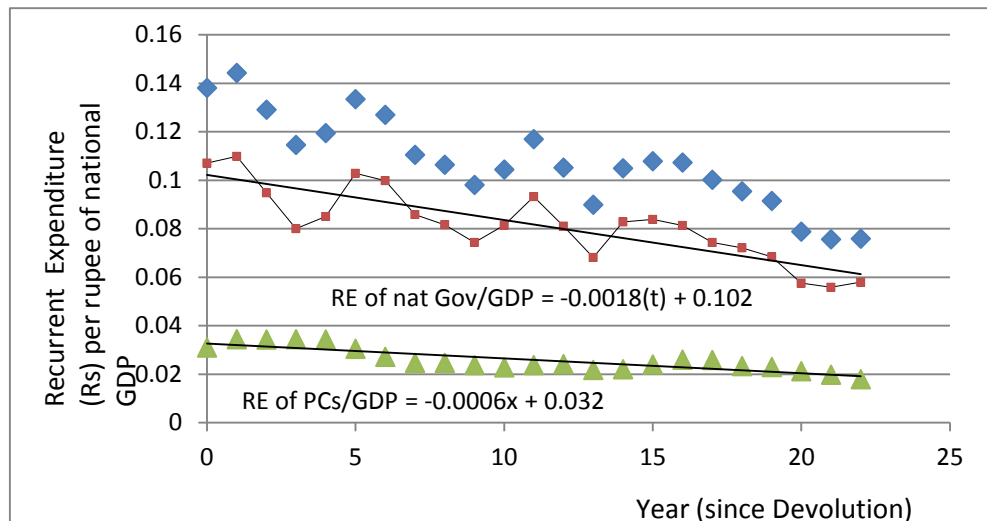
Source: National Finance Commission Annual Report (2004) CBSL Annual Reports (1995-2012)

It is evident from the Figure 1 that an overall declining trend in recurrent expenditure intensity of GDP⁷ (which is naturally expected through increased per capita GDP and increased economic productivity in a growing economy) can be observed over the years after the devolution. The trend lines however indicate that the National Government was

⁷ Share of recurrent expenditure as a ratio of GDP

managing to reduce its recurrent expenditure as a share of National GDP much faster (tangent of -0.0018) than the Provincial Councils (tangent of -0.0006), both tangents being statistically significant (Table 2)

Figure 1: Evolution of Recurrent Expenditure since Devolution



Source: Author’s calculations

Table 2: Statistics Pertaining to Recurrent Expenditure Trends

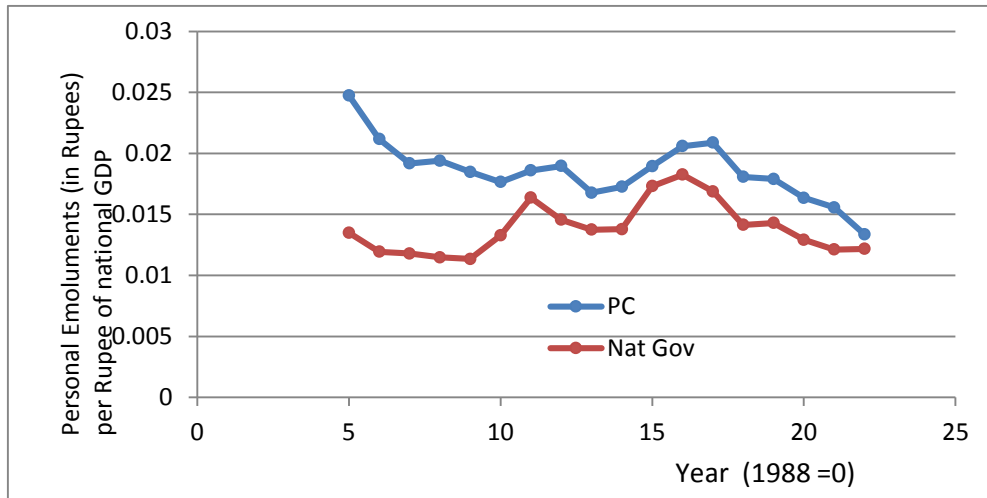
Model Tested	[Recurrent Expenditure / GDP] = A + B (Time)	
	National Government	Provincial Councils
Constant (A)	0.1022 (0.000)	0.0327 (0.000)
Tangent (B) (RE intensity of GDP)	-0.0018 (0.000)	-0.0006 (0.000)
R ²	0.71	0.72
F-Value	51.06	54.43

Note: Within brackets are p-values

What can be hypothesized through these results would be either (i) the relative “inefficiency” of Provincial Councils in managing their “consumption” budgets in comparison to national Government during the post-devolution period, or (ii) a functional peculiarity associated with devolution which might have allocated to Provincial Councils those highly “recurrent intensive” activities (such as health services and education) which are difficult to control.

It is generally understood that personal emoluments constitute a significant component of the recurrent expenditure of public service, both at the national and provincial levels. The study attempted to do a comparative examination of these expenditures in order to shed light on the reasons behind the above perceived differential evolution of recurrent expenditure intensities between the central and devolved administrations.

Figure 2: Evolution of Personal Emoluments after Devolution



Source: Author’s calculation

It is notable (in the Figure 2) that the curve corresponding to the national Government is positioned below that of the Provincial Councils in the case of personal emoluments, whereas the positioning was the opposite with regard to curves pertaining to recurrent expenditure (Figure 1). This indicates that the recurrent expenditure of the national Government, in the early years of devolution, has been much less “bureaucratic intensive”⁸ than that of the Provincial Councils, bringing further evidence to support the hypothesis made earlier that the pattern of the allocation of functions at the time of devolution would have been “skewed”.

It is interesting, however, to note that the gap between the two curves has been narrowing over the years, and they are much closer to each other by 2012, reflecting an increasing trend of “bureaucratic intensity” of the functioning of the national Government while the Provincial Councils, having started from a much higher level, have managed to better their bureaucratic intensity over the years.

⁸ Bureaucratic Intensity of GDP is defined here as the public sector salaries and wages share of GDP

This could reflect a few possibilities. First, it could be an indication of the provincial administrations being more successful than the National Government in managing their human resources with increasing productivity over the years. Starting with a much lower intensity level than that of the Provincial Councils, the National Government, over the years, has not been able to manage its bureaucratic intensity gap compared to Provincial Councils. This could possibly be a reflection of the increased presence of wasteful duplication of basic functions, which figures among the possible “adverse effects of devolution” discussed by Andres Rodr Guez-Pose and Nicholas Gill (2005).⁹ Taking over several provincial hospitals and schools under the central administration, constructing provincial and local roads by the central authorities and duplicated bus passenger transport administration could be among examples of increased central Government intervention into constitutionally devolved subjects, which would have prevented the central bureaucracy from keeping pace with Provincial Councils in reducing bureaucratic intensity. Second, the National Government being able to reduce its overall recurrent intensity much faster than the Provincial Councils (as depicted in the Figure 1), in spite of it being unable to maintain the gap against the Provincial Councils with regard to bureaucratic intensity, could mean more and more emoluments being spent by the national Government to manage less and less “non-emolument oriented” recurrent expenditures. This possibly reflects deteriorating human resource productivity at the central administration. Third, this could also be read as a reflection of increasingly more “non-emolument type” expenditures incurred per rupee of personnel emoluments paid by the Provincial Councils compared to the National Government. While this could be argued as a reflection of relatively high human resource productivity of Provincial Councils as against the central Government, the possibility of this being a reflection of the relative presence of wasteful spending in “non-emolument based” recurrent expenditures at Provincial level cannot be excluded.

This prompted the authors to examine the bureaucratic expenditure patterns of each of the Provincial Councils in detail, and in comparison with those of the National Government, the results of which analysis are summarised in Table 3. This analysis mirrors the overwhelmingly dominant share of personal emoluments in recurrent expenditures of the Provincial Councils (over 80%, except with regard to the Western Provincial Council) compared to the national Government (Table 2).

While it is quite possible that this is a result of the above hypothesised “skewed” devolution of functions by the 13th Amendment to the constitution, the question pertaining to the overwhelming “consumption orientation” of the Provincial Councils cannot be ignored. The very high bureaucratic intensity of Provincial Councils (possibly excluding the Western Provincial Council, to some extent) prompts us to question the

⁹ Andres Rodriguez-Pose and Nicholas Gill (2005) discussed possible “Adverse effects of devolution” which included wasteful duplication of basic functions, inefficiencies, or equity-related drawbacks

economic rationale of their existence as barely any development orientation is seen through these expenditure patterns. The question of re-unification of these functions naturally becomes pertinent (particularly if these high bureaucratic intensities are owing to any other reason than a mere “skewness” in functional devolution) as any “economies of scale” that could be secured, and any bureaucratic expenditure savings that could be realised, through such re-unification would amount to an “efficiency gain”, sparing more investable resources, thus enabling greater growth potential.

Table 3: Personal Emoluments as a Share of Recurrent Expenditure in 2012

Entity	Share (%)
National Government	21%
Provincial Councils (overall)	77%
Western Provincial Council	65%
Wayamba Provincial Council	80%
Uva Provincial Council	85%
Southern Provincial Council	81%
Sabaragamuwa Provincial Council	81%
North-Central Provincial Council	80%
Eastern Provincial Council	81%
Central Provincial Council	80%

Note: Northern Provincial Council was excluded as it became fully functional only in 2015

Source: Financial statements of each province for year of 2014

This observation prompted the study to research into the apex provincial administrative burden, which could possibly be avoided if the Provincial Council system were not to be. In such a scenario, the costs of the service wings of the public service (such as health, education, etc.), now under the Provincial System, would persist under a re-unified management of affairs by the national administration, but the apex provincial administration and political management would be done away with. The recurrent expenditure heading of each Provincial Council was thus categorised into their individual sub-headings to identify those cost items which would be “specific” to Provincial Council system, and would not be incurred should the Provincial Council system be abolished. The Table 4 summarises the results of this analysis.

As per the results of this analysis, Rs 12 Bn. per year of recurrent expenditure (nearly 9% of the recurrent expenditure of the Provincial Councils or over 1% of the country’s overall public spending in 2012) would become “unnecessary” if the Provincial Council system were to be abolished. Unlike in the case of the “public service functions” delivered by the Provincial Councils, this apex political and administrative over-burden of the devolved power units will be a direct saving to the economy if the Provincial Council based devolution of power is to be reversed. Such saving could be added on to

the Gross Domestic Capital Formation of the economy under the hypothesis that the entire amount savable would be invested by the national Government, thus generating an additional growth impetus.

The recurrent expenditure analysis thereby enables a few interesting inferences. First, the devolution in Sri Lanka does not appear to have produced any economies of scale advantage as no significant gains in recurrent expenditure intensity of economic activity, over and above any naturally expected trend in a growing economy, could be observed at the national or provincial levels after the implementation of devolution.

Table 4: Recurrent Expenditure on Apex Political and Administrative System of PCs

	recurrent expenditure of Governors, chief secretaries, chief ministries and other ministries of provincial councils. (2012)				recurrent expenditure of Other departments of provincial councils.(2012)			
	Rs. '000	per head	As a % of total Rec. Ex	As a % of GDP	Rs. '000	per head	As a % of total Rec. Ex	As a % of GDP
Southern	1,498,499	606.19	9.29	0.17	14,626,176	5,916.74	90.71	1.68
Western	4,693,178	804.18	15.11	0.14	26,358,838	4,516.59	84.89	0.80
Uva	552,254	436.56	4.91	0.16	10,702,269	8,460.29	95.09	3.12
Eastern	668,905	429.34	5.22	0.14	12,146,485	7,796.20	94.78	2.56
Central	1,458,381	567.68	8.10	0.20	16,540,033	6,438.32	91.90	2.22
North Central	586,948	464.73	17.07	0.17	2,852,522	2,258.53	82.93	0.81
North Western	1,787,805	751.49	10.43	0.25	15,357,126	6,455.29	89.57	2.11
Sabaragamuwa	711,464	369.59	5.94	0.15	11,269,874	5,854.48	94.06	2.42
Nothern	360,982	339.59	3.43	0.12	10,174,812	9,571.79	96.57	3.33
Total	12,318,416	529.93	9.31	0.16	120,028,135	6,363	90.69	1.58

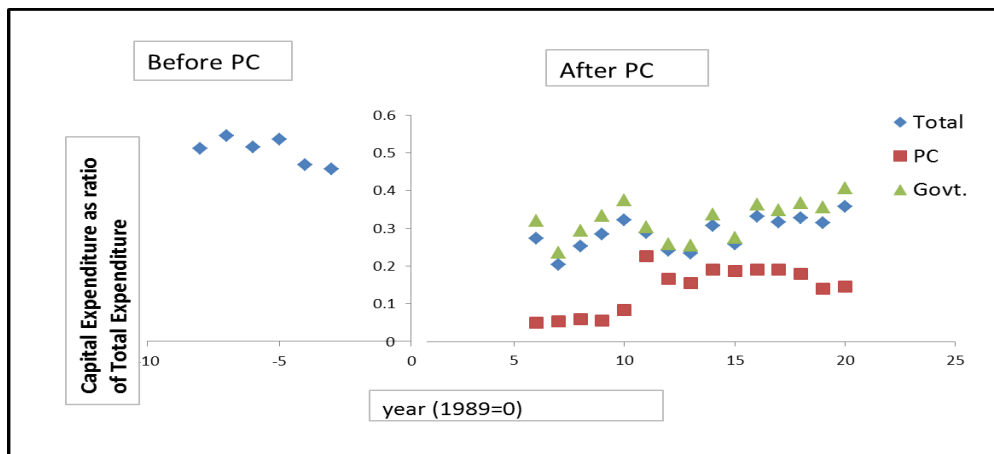
Second, the devolution, as it has been undertaken under the 13th amendment, appears to be “skewed” with regard to its functional allocation where more “bureaucratic intensive” functions have been devolved. This is likely to be the cause behind the relatively lower bureaucratic intensity of the National Government compared to that of the Provincial Councils in the early phases of devolution. Duplication by the National Government of such “highly personal emolument intensive” devolved functions as well as taking back of some elements of such functions under the central administration, could possibly explain why the National Government has not been able to keep pace with the Provincial Councils in reducing bureaucratic intensity. Third, the devolution in Sri Lanka appears nothing but “handing over” to Provincial Councils of several functions hitherto managed by the National Government, where the individual “regional branches” of the formerly national hierarchical management structures (such as operational wings of the Education and Health departments) became simply detached and brought under Provincial Councils. The devolution thus appears to have not produced any administrative economies. On the other hand, significant savings could be envisaged through re-unification of structures, particularly by doing away with the overarching political and administrative bureaucracies in the Provincial Councils (which

would be made redundant if devolution under the 13th amendment were to be abolished); which, if invested, could fuel growth.

Analysis of Capital Expenditure Patterns

The capital expenditure patterns of the Provincial Councils were examined in order to perceive the effects of devolution on investment. When examined in proportion to total expenditures incurred, a breakdown of the “investment share” of overall public spending, since the coming into effect of Provincial Councils, could be observed (Figure 3). While the apparent relatively high investment intensity¹⁰ of national Government’s expenditure compared to that of the Provincial Councils, particularly in the earlier years after devolution, could be explained as an outcome of an unbalanced or skewed structure of functional devolution (in which highly service intensive activities were devolved while retaining the development oriented functions at the centre), such reasoning could not explain the overall reduction of investment intensity in the economy’s public expenditure. In fact, the average investment share of 46% of the overall public expenditure of the economy prior to devolution has come down to 31% after devolution, the difference being statistically significant (t-value: 6.1). Even though an increasing trend in the investment intensity of overall public expenditure since devolution could be observed over the years, that also appears to be driven essentially by the capital expenditure intensity of the national Government spending.¹¹ A preliminary hypothesis could therefore be advanced that the devolution would have caused an adverse effect on the overall capital formation drive of the economy’s public investment.

Figure 3: Evolution of Capital: Total Expenditure Ratio



¹⁰ Investment intensity is defined here the Capital Expenditure as a ratio of National GDP

¹¹ Capital Expenditure Intensity of National Government spending is defined here as the capital expenditure to total expenditure ratio of the National Government

Source : Author’s calculations

This overall effect was further studied through an Ordinary Least Square regression analysis where the investment intensity of the overall public spending (Provincial Councils and the national Government together) was examined. In this analysis, the national political orientation towards “State interventionism” was represented by the fiscal deficit ratio the successive Governments chose to run,¹² while the effects of “internal insurgency” and “devolution” conjunctures were examined by introducing two dummy variables.

$$KEI_t = B_1 + B_2 (FDR_t) + B_3 (D_{1t}) + B_4 (D_{2t}) + U_t$$

where, KEI_t : Capital expenditure share of the total public spending of year t

FDR_t :National Fiscal Deficit as a ratio of GDP of year t

D_{1t} : Devolution dummy (=0 without PCs, =1 with PCs) of year t

D_{2t} : Insurgency dummy (=0 when in peace, =1 when under insurgency)

Table 5 : Results of the OLS Regression Analysis

Dependent Variable: KEI

Method: Least Squares Durbin-Watson Index = 1.75

Sample: Annual data from 1981 to 2012 included observations: 32

Adjusted R-squared = 0.871745

F-statistic = 63.43842

Variable	Coefficient	Std. Error	t-Statistic	Probability
Constant	0.661300	0.049441	13.37564	0.0000
FDR	-0.011288	0.004203	-2.685732	0.0120
Devolution Dummy	-0.184412	0.017852	-10.33012	0.0000
Insurgency Dummy	-0.093358	0.015524	-6.013771	0.0000

Source : Author’s calculations

¹²A national political regime willing to run high budget deficits could spend more on public investment than a political regime with a neo-liberal ideology. This effect was captured by the introduction of budget deficit ratio as an explanatory variable, which was also proven significant in the regression analysis.

As per the results of the regression analysis summarised in Table 5, the R^2 and t-statistics confirm that nearly 87% of capital to total public expenditure ratio is explained by the selected independent variables and all three variables have statistically significant effects on the overall investment intensity of public spending. Also, the results bring further evidence to strengthen the hypothesis (advanced through the graphical examination) that devolution has had a significant negative impact on the investment orientation of the country's overall public spending. Quantitatively, this revelation estimates that approximately 18.4 cents more could have been invested per each rupee publicly spent, if the Provincial Council system did not exist.

This enables estimation of the additional growth impetus under the hypothetical condition of the absence of Provincial Councils, where the public investment would increase with no augmentation of the overall fiscal burden. For instance, an 18.4% growth of investment intensity of public expenditure (or approximately Rs 160 Bn in 2012, of which nearly 8% would correspond to the direct recurrent expenditure savings that would be secured by getting rid of the provincial apex political and administrative over-burden) would mean a supplementary public investment ratio in the economy of around 2.3%; the possible augmenting effect of which on the country's GDP would be around half-a-percent under the prevailing average level of Sri Lanka's Incremental Capital Output Ratio (ICOR)¹³ of 4.4.

CONCLUSIONS

The study leads to the inferences that (a) the provincial management in Sri Lanka has been overwhelmingly dependent on the grants received from the national Government indicating that one of the widely recognised conditions for successful devolution, namely the control over its own finances, has been quasi-absent, (b) the process has not generated any significant administrative cost savings that are generally expected through economically rational devolution, (c) inefficiencies appear to have stemmed in through wasteful expenditures and duplicity of functions, particularly with the central Government showing signs of bureaucratic expansion even after significant devolution of power to Provincial Councils, (d) the management of public funds in favour of capital formation has been negatively impacted during the post-devolution period, and (e) an abolition of the Provincial Council system could generate an additional GDP growth push of over around half-a-percent, nearly one-tenth of which would correspond

¹³ICOR = Incremental Capital Output Ratio = $I/\Delta Y = (I/Y) / (\Delta Y/Y) = \text{Investment ratio} / \text{GDP Growth rate}$. Sri Lanka's ICOR over the past 5 years being approximately 4.4 (authors' estimates based on the data published in the Annual Reports of the Central Bank of Sri Lanka), each 4.4% growth of the Investment ratio would give rise to 1% additional GDP growth impetus. [Incremental Capital Output Ratio (2013), Walters, A. A. (1966)]

to direct economic gains corresponding to saving of the recurrent expenditure on apex political and administrative bureaucracy of the Provincial Councils and investing such savings in development ventures not less productive than what is reflected by the prevailing ICOR of the economy.

Based on the above analytical inferences, it could be reasonably concluded that the devolution of power in Sri Lanka through the establishment of Provincial Councils enacted by the 13th amendment of the Constitution, has not been based on any economic rationale; neither has it been able to demonstrate any economic justification through its existence over 25 years. On the contrary, the study reveals that the economic impact, if any, has been negative, in relation to public investment and to the economic growth potential therein.

The study also reveals that Sri Lankan case could possibly be another demonstration of the possible “economic ill-effects” of devolution when done in the absence of “prerequisite conditions” and where a nation would be forced to forfeit any transaction cost internalisation advantages it may have enjoyed prior to devolution (Bird and Vaillancourt, 1998). Further research requires the collection of more refined and disaggregated data on provincial and national expenditure to investigate and identify such enabling and disabling determinants as may have been active with regard to Sri Lankan devolution of power.

REFERENCES

- Rodriguez-Pose, Andres and Nicholas G. (2005). On the ‘Economic Dividend’ of Devolution. *Regional studies* 39: 405-420.
- Central Bank of Sri Lanka (1995-2012) *Annual Reports*. Colombo: Central Bank of Sri Lanka.
- Incremental_capital-output_ratio*. Retrieved 08 12, 2013, from http://en.wikipedia.org/http://en.wikipedia.org/wiki/Incremental_capital-output_ratio
- Knutsen, J. F. (2004). The Benefits of Devolution and Local Control. Retrieved from *www.basiclaw.net*: <http://www.basiclaw.net/Principles/Devolution.htm>
- Paffrel. (2013). *PROVINCIAL COUNCILS IN SRI LANKA*. Retrieved from People's Action for Free and Fair Election: <http://www.paffrel.com/posters/131202101231Sri%20Lankawe%20Palathsabha%20-%20English.pdf>

- Provincial Councils*. (2014). Retrieved from the official website of the Government of Sri Lanka: <http://www.priu.gov.lk/ProvCouncils/ProvincialCouncils.html>
- Samaratunge, R. & Lynne B. (2002). New Public Management. *Asian Journal of Public Administration*, 24(1): 87-109.
- Bird, Richard M. and Francois V. (1998). Fiscal Decentralization in Developing Countries: *An Overview*. New York, Cambridge University Press.
- Satyendra, N. (1988). Thirteenth Amendment to Sri Lanka Constitution. Retrieved from *Tamilnation.org*:
<http://tamilnation.co/conflictresolution/tamileelam/88comicopera.htm>
- Siboti, T. (n.d.). Role of Devolution of Power and Resources in Development of Least Developed Countries. Retrieved from *Academia.edu*:
http://www.academia.edu/5117730/Role_of_Devolution_of_Power_and_Resources_in_Development_of_Least_Developed_Countries
- Thirteenth Amendment to the Constitution of Sri Lanka*. (2013, may 29). Retrieved august 8, 2013, from <http://en.wikipedia.org/>:
http://en.wikipedia.org/wiki/Thirteenth_Amendment_to_the_Constitution_of_Sri_Lanka
- Two Sample t test for Comparing Two Means* . (n.d.). Retrieved august 25, 2013, from <http://www.cliffsnotes.com>:
<http://www.cliffsnotes.com/math/statistics/univariate-inferential-tests/two-sample-t-test-for-comparing-two-means>
- Waidyasekera, D. (2004). Decentralization and Provincial Finance in Sri Lanka: 2004 - An Update. Colombo: IPS.
- Walters, A. A. (1966). Incremental Capital-Output Ratios. *The Economic Journal* [818] of 818-822.
- Wanasinghe, S. (1999). Effective Local Governance: the Foundation for a Functioning Democracy in Sri Lanka. Colombo: IPS.

**CULTURAL MEANING OF CONSUMER GOODS:
IMPACT OF CROSS CULTURAL VALUES ON
MOTIVES FOR CONSUMING
CONSPICUOUS GOODS IN SRI LANKA**

Sri Lanka Journal of
Economic Research
Volume 2 (1)
June 2014: 19-37
Sri Lanka Forum of
University Economists

A M Perera
U K Jayasinghe-Mudalige
A Patabandhige



Abstract

This research examines empirically the impact of cross cultural values of Sri Lankan consumers on their motives for conspicuous consumption, which is broadly defined as “obtaining extravagance goods at higher prices to demonstrate their status and wealth to the public”. The primary data collected from 225 respondents selected from four districts (i.e. Hambantota, Nuwara Eliya, Puttlam, Vavuniya) to represent various ethnicities were taken up with a number of multivariate data analysis techniques to explore their attractiveness towards consumption of conspicuous products in terms of four types of motives, including: Conformist, Hedonic, Status, and Uniqueness. The results suggest that the demand for such products largely increases in line with the perceived scarcity of the product, and there exists a greater variability amongst different ethnic groups with regard to their perception towards conspicuous consumption.

Key Words: *Conspicuous consumption, Conspicuous motives, Cross culture, Cultural values*

JEL Codes : *C12, D11, D12, D91, E22*

A M Perera

Wayamba University of Sri Lanka, Kuliyaipitiya, Sri Lanka
Telephone: +9471 4411470, email: methsila240@yahoo.com

U K Jayasinghe-Mudalige

Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka
Telephone: +94713628911, email: udith@hotmail.com

A Patabandhige

University of Kelaniya, Kelaniya, Sri Lanka
Telephone: +94773637407

INTRODUCTION

All consumers are not identical, and thus, it is possible to observe differences in consumer behavior among the members of different societies. One of the foremost reasons for differences in consumption is that all aspects of consumer behavior are culturally-bound. The well-known marketing guru, Philip Kotler (1998) states that;

“consumer buying decisions are often affected by factors that are outside of their control but have direct or indirect impact on their consumption... one example of this is cultural factors... the average consumption decisions attributed to different values by societal members reflect the fundamental thrust of their shared enculturation” (p. 46).

Moreover, the existing literature proposes that the people in different cultures have different value orientations, and these cultural value orientations may cause variations in preference for products and brands, in particularly which are more visible in nature (Allen *et al.*, 2004; Allison, 2008; Gupta, 2010; Jai-Ok Kim, 2002). Therefore, it is sensible to take a closer look at this literature and explore the relationship, if any, between the motives for consumption of conspicuous products and the cross cultural value orientations of Sri Lankan consumers.

This research focuses on the impact of cross cultural values of Sri Lankan consumers on their motives for consumption of conspicuous products. In particularly, it investigates as to why people engage in conspicuous consumption and explores whether, and the extent to which, different cultural value orientations have influenced conspicuous consumption by varying degrees. Moreover, it examines the impact of different cultural attributes of consumer (*i.e.* Power Distance, Individualism, Masculinity, Uncertainty Avoidance, and Time Orientation) on their desire to exhibit social status through conspicuous consumption.

LITERATURE REVIEW

Conspicuous Consumption – Concepts & Definitions

Conspicuousness is explained in the literature as a function of a few constructs and is generally referred as the social and public visibility surrounding the consumption of a certain product or service. When merging the notions of “conspicuousness” and “consumption” together, consumers often think of expensive brands, conspicuous luxury and spectacular extravaganza. Consequently, scholars recognize conspicuous consumption as “obtaining extravagance goods at higher prices to demonstrate their status and wealth to the public” (Page, 1992; Heaney *et.al.*, 2005; Mason, 1983; Sofia, 2008; Sundie *et.al.*, 2010). A very similar but more colloquial term is “*keeping up with the Joneses*”.

The literature on conspicuous consumption originates with Thorstein Veblen's work on 'conspicuous consumption' and Duesenberry's 'relative income hypothesis' (Veblen, 1994 [1899]; Duesenberry, 1949). Veblen (1899) used the term conspicuous consumption, for the first time his seminal work titled as "*The Theory of the Leisure Class*," to explain the lavish spending on goods and services that are acquired mainly for the purpose of displaying buyer's social status of a new upper class of Americans that emerged in the 19th century. Accordingly, Veblen (1899) provides a comprehensive and broader definition on conspicuous consumption as:

"lavish spending on goods and services acquired mainly for the purpose of displaying income or wealth...and people purchase these goods with motives of 'invidious comparison' (a higher class consumes conspicuously to distinguish himself from members of a lower class) and 'pecuniary emulation' (occurs a lower class consumes conspicuously so that he will be thought of as a member of a higher class)".

Besides the cheerful consumer behaviors in capitalistic culture, Veblen observed the flaunting of luxury possessions had occurred across societies and epochs. Egyptian pharaohs, for example, displayed their wealth with golden thrones, elaborate artworks, and giant pyramids; Incan potentates dwelled in immense palaces surrounded by gold; and Indian maharajahs built extravagant and ostentatious palaces and kept collections of rare and exotic animals on their expansive estates (Sundie *at el*, 2010). To Veblen, these lavish spending was symptomatic of the superfluous life-style of the rich. He argued that:

"wealthy individuals often consume highly conspicuous goods and services in order to publicize their wealth, thereby achieving greater social status. In their striving for status, individuals purchase some commodities, such as jewelry, that serve no other purpose than to demonstrate wealth" (p.53)

Veblen identifies two main ways in which an individual can display wealth: through extensive leisure activities and through lavish expenditure on consumption and services. Hence, he proposed that wealthy individuals often consume highly conspicuous goods and services in order to advertise their wealth, thereby achieving greater social status. Such consumption goods must be both 'wasteful' and visible in order to please 'the observers whose good opinion is sought' (Veblen, 1994, p. 69).

Based on the modernized work of Veblen, Duesenburry (1949) claims that there is a dichotomy of absolute versus relative income and/or consumption, and argues that consumption and savings behavior are affected by concerns of social standing. He says that human well-being is a function of both the amount and types of goods affordable in

comparison to others. Accordingly, Duesenberry developed his own theory which is labeled as "*demonstration*" or '*bandwagon*' effect. He confirmed that the less well-off are consuming the same goods as the rich, and therefore have low or dis-savings which then lowers the average national savings rate. Researchers called this effect as the "*relative income hypothesis*" or the "Duesenberry effect". Alongside with Duesenberry's (1949) contribution, Leibenstein (1950) extended the general category of conspicuous consumption into three specific sub-classifications depending on the consumer's signaling intent and identified three principal external effects; (a) "Veblen" effect (where quantity demanded for a good may increase with price), (b) "Snob" effect (other's demand reduces own demand), and (c) "Bandwagon" effect (other's demand increases own demand).

Motives for Conspicuous Consumption

Motives for conspicuous consumption can be categorized into four different motives, such as: (1) Conformity motive; (2), Uniqueness motive; (3), Hedonic motive, and (4) Status motive, and are briefly described, in turn:

a). Conformist Motives

The conspicuous goods that people consume may signify the social class that they belong to. For this reason, consumers usually attempt to eradicate the confusion between what they consume and what it indicates to the others. Supporting this argument, Jaramillo & Moizeau's (2003) stated that:

"in high-standing classes, parents spend a significant amount of money on social events in order to ensure that their child meets someone from the same social class" (p.2).

b). Uniqueness Motives

Affluent people buy expensive products to show their richness to the public by which they "distinguish themselves from the poor". Christine (1992) says that the very rich refuse to purchase mass promoted and merchandised products, and instead only buy products for which they are the exclusive market. This phenomenon was theoretically explained by Veblen in 1899. He used the word '*invidious comparison*' which refers to situation in which a member of a higher class consumes conspicuously to distinguish himself from members of a lower class.

c). Status Motives

There are two values of consumers, i.e. self-directed values, and social affiliation values. Social affiliation values are largely fulfilled by consumers through publicizing their fashionable consumption to society. O'Cass & McEwen, (2004) believe that the socially oriented motive is an important aspect in explaining the whole picture of conspicuous consumption, and they argue that:

“.., consumers’ interpersonal influence and social status demonstration are the two main variables in the context of conspicuous consumption” (p.28).

d). Hedonic Motives

Some scholars accept that conspicuous consumption is used by consumers to reflect their household’s economic position relative to a reference group to exchange friendship, and to strengthen their social interactions. For instance, Katja & Stuart (2012) argue that:

“as a result of peer pressure and the importance of conformity among adolescents, consuming conspicuously is essential for social acceptance, gaining and maintaining friendships and thus self-esteem” (p 1).

Cultural Value Orientations

People from different countries and different regions within the same country may differ in culture. Cultures too differ along major value dimensions which provide ways to understand how people make their consumption choice, how people behave across different cultures, how they develop social relationships and what perceptions they develop of others (Solomon, 1994).

Geert Hofstede (1980), the most recognized researcher in cultural studies, has identified five value dimensions on which cultures can be classified and compared that facilitates to understand the basic value differences: individualism-collectivism (*the relationship between the self and groups*), high-low uncertainty avoidance (*the tolerance for uncertainty*), large-small power distance (*the acceptance of power inequality*), masculinity-femininity (*the distribution of gender roles*), and long-term versus short-term orientation (*or Confucianism dimension*).

- a) **Power Distance** - Small vs. large power distance (**PDI**) - Power Distance means the extent to which less powerful members of society accept and expect that power is distributed unequally. Therefore, this refers to the degree of inequality that exists – and is accepted – among people with and without power. A high PDI score indicates that society accepts an unequal distribution of power and people understand "their place" in the system. Low PDI means that power is shared and well dispersed. It also means that society members view themselves as equals.
- b) **Individualism** - Individualism vs. collectivism (**IDV**) - This refers to the strength of the ties people have to others within the community. A high IDV score indicates a loose connection with people. In individualist cultures, people are expected to develop and display their individual personalities and to choose their own affiliations. In collectivist cultures, people are defined and act mostly as a member

of a long-term group, such as the family, a religious group, an age cohort, a town, or a profession, among others.

- c) **Masculinity** - Masculinity vs. femininity (**MAS**) - This refers to how much a society sticks with, and values, traditional male and female roles. High MAS scores are found in countries where men are expected to be tough, to be the provider, to be assertive and to be strong. If women work outside the home, they have separate professions from men. Low MAS scores do not reverse the gender roles. In a low MAS society, the roles are simply blurred. This dimension is often renamed by users of Hofstede's work, e.g. to *Quantity of Life vs. Quality of Life*.
- d) **Uncertainty Avoidance Index** - Weak vs. strong uncertainty avoidance (**UAI**) - This relates to the degree of anxiety society members feel when in uncertain or unknown situations. In cultures with strong uncertainty avoidance, people prefer explicit rules (e.g. about religion and food) and formally structured activities, and employees tend to remain longer with their present employer. Hence, high UAI-scoring nations try to avoid ambiguous situations whenever possible. They are governed by rules and order and they seek a collective "truth". In cultures with weak uncertainty avoidance, people prefer implicit or flexible rules or guidelines and informal activities. Low UAI scores indicate the society enjoys novel events and values differences.
- e) **Long Term Orientation** - Long vs. short term orientation (**LTO**) - This refers to how much society values long-standing - as opposed to short term - traditions and values. This is the fifth dimension that Hofstede added in the 1990s after finding that Asian countries with a strong link to Confucian philosophy acted differently from western cultures. In long term oriented societies, people value actions and attitudes that affect the future: persistence/perseverance, thrift, and shame. In short-term oriented societies, people value actions and attitudes that are affected by the past or the present: normative statements, immediate stability, protecting one's own face, respect for tradition, and reciprocation of greetings, favors, and gifts.

However, support is not universal for Hofstede's conceptualization, with a number of scholars critical of the reliance on Hofstede's dimensions of culture in cross-cultural research. These criticisms are largely focused on the representativeness of the sample, the validity of the claims made by the application of the dimensions, and the ethnocentrism of the items used to measure the dimensions. The most troubling criticism arises from Hofstede himself who states that:

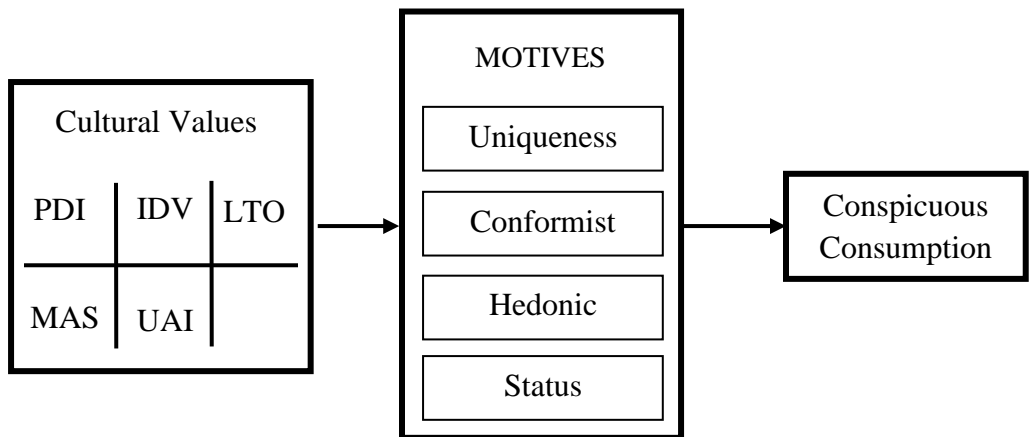
"Obviously, these items from the IBM questionnaire do not totally cover the distinction between...in society. They only represent the issues in the IBM research that relate to this distinction", (Hofstede 1991 p. 52).

Despite the problems associated with, researchers do recognize the usefulness of a set of culture measures proposed by Hofstede for the comparison of cultures. Therefore, most of the subsequent studies in marketing rely on Hofstede's cultural value dimensions and differences in behaviour, beliefs, and preferences are then recognized.

METHODOLOGY

The research philosophy depends on the way a researcher conceptualizes the study. This research is conceptualized in both induction and deduction approaches. Accordingly, the research hypotheses were advanced based on the literature and were tested to check whether they are capable of explaining the facts. Based on this comprehensive review of literature, the conceptual model was developed.

Figure 1: Proposed Model of Cultural Value Influence the Consumption of Conspicuous Products



Based on the model proposed for this study, following hypotheses are developed.

- H₁:** There will be a significant relationship between an individual's status motive for conspicuous consumption and his/her PDI, IDV, and MAS
- H₂:** There will be an insignificant relationship between an individual's status motive for conspicuous consumption and his/her UAI and LTO
- H₃:** There will be a significant relationship between an individual's uniqueness motive for conspicuous consumption and his/her PDI, MAS, IDV, and LTO
- H₄:** There will be a significant and positive relationship between an individual's hedonic motive for conspicuous consumption and his/her PDI and IDV
- H₅:** There will be an insignificant relationship between an individual's hedonic motive for conspicuous consumption and his/her MAS, UAI and LTO
- H₆:** There will be a positive and significant relationship between an individual's conformist motive for conspicuous consumption and his/her IDV, and MAS
- H₇:** There will be an insignificant relationship between an individual's conformist motive for conspicuous consumption and his/her UAI and LTO

DATA COLLECTION

Both primary and secondary data sources were utilized for eliciting information on the issues investigated. A questionnaire-based survey was executed to gather primary data from the selected sample. Before developing the research questionnaire, a few Focus Group Discussions were carried out to conceptualize the conspicuous consumption behaviour among different ethnic groups in Sri Lanka. The semi-structured questionnaire used to collect data for this study consists of three sections, which were developed independently. While Section “A” measured a number of demographic variables of the respondents, Section B was designed to measure consumer motives for the consumption of conspicuous products. The purpose of the items contained in Section C was to assess cultural value orientation of the respondents. The reliability and construct validity of questions was also measured. The Cronbach’s Alphas of the dimensions were all above 0.6, which indicated high reliability.

Data were collected from 225 respondents selected from four districts in Sri Lanka, including: Hambantota, Nuwara Eliya, Puttlam, and Vavuniya. These five districts were selected to accommodate the main four ethnic groups living in Sri Lanka, namely Sinhalese (N=100), Muslims (N=50), Indian Tamils (N=25), and Sri Lankan Tamils (N=50). Accordingly, the sample designing process contained several steps. Based on the 2001 census, initially, all the districts were ranked in descending order according to the composition of different ethnic groups. Five districts were then selected from each list. Out of these five districts, one district from each list was selected randomly.

The semi-structured questionnaire used to collect data for this study consisted of three sections; Section A (*demographic characteristics of the respondents*), B (*motives for conspicuous consumption*), and C (*cultural value dimensions*). The development of each section was done independently. The overall size of the survey instrument and time that potential respondents would spend completing the instrument was a concern at all stages of the development process.

The analysis of data was guided by the broad propositions of the conceptual framework presented in above. Few statistical techniques, such as one sample *T* test, ANOVA, correlation analysis and regression analysis, were used with respect to the analysis of the motives for consuming conspicuous products items, and cultural orientation items measured by Section B and Section C of the survey. Further, a range of descriptive statistics were also employed for exploring the demographic characteristic data contained in Section A, of the survey questionnaire.

RESULTS AND DISCUSSIONS

It was observed that the male respondents were dominant in the sample (56%). A considerable unequal distribution of gender can be seen among Muslim respondents,

where 72 % were male. 41% of the total sample represents the 25 to 34 age group and just over 22% falls in the range of 15 to 24 years old.

The respondents’ attractiveness towards conspicuous consumption was measured in four aspects: conformist, hedonic, status and uniqueness motives, based on the 5-point Likert scale (*where 1= least attractive and 5 = most attractive*). The results, given in Table 2, indicate that the means of conspicuous consumptions among different ethnicities are statistically and significantly different ($p = <.001$). Therefore, it can be concluded that the average perceptions towards conspicuous consumption amongst these ethnic groups are considerably different.

Table 1: Conspicuous Consumption in different ethnicities

	SN	INT	SLT	MS	F	Sig
Mean	3.603	2.746	3.358	3.110	401.05	.000
SD	.405	.536	.400	.493		

Motives of Conspicuous Consumption

The significant differences found amongst the different ethnic groups for conspicuous consumption stresses the importance of exploring the motives of these groups to consume conspicuously.

Twenty-item scale (20 statements) was included in the questionnaire reflecting conspicuous consumption motives on which the respondents were asked to indicate their preferences on a Likert scale ranging from 1 (*totally disagree*) to 5 (*totally agree*). Factor analysis performed on the responses indicated that the responses clearly loaded on to four factors. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett’s test of sphericity for testing the adequacy of the sample were performed accordingly. Table 3 provides a summary of KMO measures and Bartlett’s Test.

As per the results, the KMO measure of sampling adequacy was 0.841, well in excess of the minimum of 0.5 recommended by Hair *et.al*, (2006). Bartlett’s test of sphericity resulted in a Chi-Square of 14,106.38 indicating this is statistically significant at 0.001 level. The Goodness-of-Fit test resulted in a Chi-Square of 1,192.23, also statistically significant at the 0.001 level demonstrating that it was appropriate to perform a factor analysis. The Maximum Likelihood Method with Varimax Rotation was conducted to measure the interpretability of factors. A cut-off of 0.40 was applied for the Factor Loadings, as this is generally seen as signalling a high enough correlation coefficient of the item with the factor.

Table 2: Kaiser-Meyer-Olkin Measure (KMO) and Bartlett's Test

KMO Measure of Sampling Adequacy		.841
Bartlett's Test of Sphericity	Chi-Square	14,106.38
	df	190
	Sig.	.000
Goodness-of-fit Test	Chi-Square	1,192.23
	df	100
	Sig.	.000

When the un-interpretable factors and the offending items were removed from analysis only four factors remained that possess at least three items with significant factor loadings. Consequently, a four-factor solution was used for subsequent refinement of the factor solution.

The one-way analysis of variance (ANOVA) is used to determine whether there are any significant differences between the means of different motives after the Factor Analysis. Table 4 provides some very useful descriptive statistics, including the mean, standard deviation for each ethnic group and the overall sample. A positive *t*-statistic represents a relatively high orientation towards the construct and a large *t*-statistic implies that the coefficients of UM, SM, HM, & CM were able to be estimated with a fair amount of accuracy. Moreover, there was a statistically significant difference between ethnicities in conspicuous consumption as shown in one-way ANOVA ($F= 401.053, p = .000$).

Cultural Orientation of Respondents

Section C of the questionnaire consists of a 20 item scale developed by Oliver *et al.* (2000) to measure the consumers' cultural orientation, based on Hofstede's (1980) cultural value dimensions. To measure the respondents' cross cultural values, a 'four factor solution' was used for subsequent refinement of the factor solution. Two regression analyses were conducted using conspicuous consumption (CC) as the dependent variable and the four cultural value dimensions as explanatory variables (PDI, IDV, MAS, UAV, and LTO), which were reconstructed based on the findings contained in final rotated factor matrix.

The derived factors presented in Table 5 appear to be clearly distinct from one another. The change in R^2 from the stepwise method to the enter method is only 0.05. This confirms that multicollinearity is not present between the derived luxury consumption motivation factors.

Table 3: Means, T-Test and ANOVA for the Motives

Nationality		Conspicuous Motives			
		Uniqueness Motive	Status Motive	Hedonic Motive	Conformist Motive
Sinhalese	Mean	3.28	2.89	3.48	2.78
	Std. Deviation	.789	.943	.692	.794
	<i>T</i>	132.59	97.81	160.80	103.74
	sig. (2-tailed)	.000	.000	.000	.000
Muslims	Mean	2.98	2.82	3.27	2.65
	Std. Deviation	.896	.729	.634	.434
	<i>t</i>	78.68	88.02	126.38	138.50
	sig. (2-tailed)	.000	.000	.000	.000
Tamils (SL)	Mean	3.48	3.31	3.38	3.51
	Std. Deviation	.621	.651	.590	.607
	<i>t</i>	102.64	93.06	104.90	105.65
	sig. (2-tailed)	.000	.000	.000	.000
Tamils (IN)	Mean	3.33	3.10	3.53	3.08
	Std. Deviation	.760	.848	.787	.786
	<i>t</i>	90.59	75.49	92.63	81.10
	sig. (2-tailed)	.000	.000	.000	.000
Total	Mean	3.21	3.02	3.42	2.87
	Std. Deviation	.817	.867	.689	.783
	<i>t</i>	191.90	164.11	242.36	172.45
	sig. (2-tailed)	.000	.000	.000	.000
ANOVA	F	53.93	56.94	16.47	222.02
	sig. (2-tailed)	.000	.000	.000	.000

The mean scores on the four motivational factors were also calculated along with *t*-tests based on the whole sample and for each nationality separately. A positive *t*-statistic represents a relatively high orientation towards the construct. The results indicate that there was a statistically significant difference between Sinhalese, Muslims, Indian Tamils, and Sri Lankan Tamils in terms of their cultural value orientations ($F = 36.40, p = 0.000$). The **Multivariate Tests** shows that there was a statistically significant

difference in cultural value orientations based on respondents ethnicity ($F = 70.06$, $p < .0005$; Wilk's $\Lambda = 0.663$, partial $\eta^2 = .128$). Therefore, it can be concluded that these respondents' cultural value orientations were significantly dependent on respondents nationality ($p = .000$).

Table 4: Regression Analysis – Multicollinearity Test for Cultural Value

Dependent Variable	Predictor Variable	β	Std. β	t	Sig	R ² (Model)
Conspicuous Consumption ^a	(Constant)	2.794		36.640	.000	.134
	Long-Term Orientation (LTO)	.122	.134	6.595	.000	
Conspicuous Consumption ^b	(Constant)	2.964		28.649	.000	.184
	Power Distance (PDI)	-.031	-.053	-2.471	.014	
	Individualism (IDV)	.021	.040	1.863	.063	
	Masculinity (MAS)	-.063	-.107	-5.103	.000	
	Uncertainty Avoidance (UAV)	.032	.039	1.641	.101	
	Long-Term Orientation (LTO)	.093	.103	4.387	.000	

^aMethod: Stepwise

^bMethod: Enter

Combined results from the correlation analysis and the multiple regressions were used to test hypotheses relating to anticipated effects of cultural orientation on motives for conspicuous consumption. A correlation analysis investigated whether there were statistically significant relationships between derived cultural value factors and the derived conspicuous motives. The results of the Pearson product moment correlation are presented in Table 6, in which r -value indicates strength and direction (\pm) of the correlation. Results reveal that, sixteen of the twenty relationships were significantly correlated at the 0.01 level.

Since all r values are in the range of small to medium, it implies that there are other main influences on motives for consuming conspicuous products, other than cultural orientation. It is also implied that a causality relationship among CVDs and conspicuous motives cannot be understood from this correlation analysis. Overall, these results suggest that an individual's cultural orientation may influence the motivation for consuming conspicuous products.

Table 5: Correlation Analysis of CVDs and Conspicuous Motives Factors

		Cultural Value Dimensions (CVDs)				
		PDI	IDV	MAS	UAI	LTO
Status Motive	(<i>r</i>)	.080**	.182**	.192**	-.136**	-.030
	Sig.	.000	.000	.000	.000	.143
Uniqueness Motive	(<i>r</i>)	-.193**	.107**	.054**	.018	.105**
	Sig.	.000	.000	.000	.372	.000
Hedonic Motive	(<i>r</i>)	-.068**	.007	-.137**	.132**	.167**
	Sig.	.001	.720	.000	.000	.000
Conformist Motive	(<i>r</i>)	.003	.256**	.137**	-.241**	-.138**
	Sig.	.878	.000	.000	.000	.000

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

Cohen (1992) proposes that when causality cannot be implied from a correlation analysis, it is necessary to perform subsequent analyses in order to investigate the influence of independent predictors on dependent variable. Hence, a series of multiple regressions which employ the CVDs as explanatory variables and the conspicuous motives as the dependent variable were conducted in order to investigate the influence of an individual's cultural orientation on their motives for consuming conspicuous products. Linear multiple regression was conducted to assess the relative strength of cultural values on motives for consuming conspicuous products. The derived factor scores were used for conducting the analysis. The resulting beta values and *t*-statistic for this analysis are presented in Table 7 to 10.

Table 6: Results of the impact of CVDs on Status Motives

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	2.355	.158		14.896	.000
Power Distance [PDI]	.055	.019	.060	2.824	.000
Individualism [IDV]	.109	.018	.129	6.185	.000
Masculinity [MAS]	.139	.019	.152	7.418	.000
Uncertainty Avoidance [UAI]	-.173	.029	-.136	-5.856	.000
Long-term Orientation [LTO]	.120	.033	.085	3.676	.017

(*F* Statistic = 37.644, *p* = 0.000, *r*² = 0.123, Adjusted *r*² = 0.121)

Table 7 shows that the four explanatory variables; PDI, IDV, MAS and UAV, contribute significantly to the prediction of status motive for consuming conspicuous products. This confirms the results of the Pearson correlation in Table 06. These results were in favor of the first hypothesis (**H₁**), which states: a significant relationship between an individual's SM for conspicuous consumption and his/her PDI, IDV, and MAS, and therefore it is accepted. However, since a significant relationship was found between SM and UAI ($p < .001$), **H₂**, which proposed an insignificant relationship between an individual's SM for conspicuous consumption and his/her UAI and LTO, was not fully supported.

Table 7: The Regression of Uniqueness Motive with CVDs

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	2.514	.149		16.867	.000
Power Distance [PDI]	-.192	.018	-.222	-10.521	.000
Individualism [IDV]	.119	.017	.150	7.203	.000
Masculinity [MAS]	.073	.018	.084	4.108	.000
Uncertainty Avoidance [UAI]	.056	.028	.047	2.011	.044
Long-term Orientation [LTO]	.112	.031	.084	3.649	.000

(*F* Statistic = 37.436, $p = 0.000$, $r^2 = 0.073$, Adjusted $r^2 = 0.071$)

Results of the Multiple Regression analysis indicates that PDI, IDV, MAS and LTO contribute significantly to the prediction of uniqueness motive for consuming conspicuous products. This also confirms the results of the Pearson correlation in Table 06. **H₃**: hypothesised that there would be a significant relationship between an individual's UM for conspicuous consumption and his/her PDI, IDV, MAS, UAI and LTO. This hypothesis is also supported.

The results from the Multiple Regression analysis presented in Table 9 indicates that IDV, MAS, UAI and LTO contribute significantly to the prediction of hedonic motive for consuming conspicuous products. This confirms several results of the Pearson correlation presented in Table 6.

Table 8: The Regression of Hedonic Motive with CVDs

	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	t	
(Constant)	2.685	.127		21.123	.000
Power Distance [PDI]	-.033	.016	-.045	-2.097	.000
Individualism [IDV]	.054	.014	.081	3.829	.036
Masculinity [MAS]	-.088	.015	-.121	-5.856	.000
Uncertainty Avoidance [UAI]	.089	.024	.089	3.773	.000
Long-term Orientation [LTO]	.136	.026	.121	5.206	.000

(*F* Statistic = 26.219, *p* = 0.000, *r*² = 0.052, Adjusted *r*² = 0.050)

H₄ proposed that there would be a significant and positive relationship between an individual's Hedonic Motive for conspicuous consumption and his/her PDI and IDV. This hypothesis can be rejected, as significantly negative relationship was obtained between HM and PDI ($p < .001$), and insignificantly positive relationship was obtained between HM and IDV ($p = .720$). **H₅**, that proposed an insignificant relationship between an individual's Hedonic Motive for conspicuous consumption and his/her MAS, UAI and LTO, can also be rejected.

The results from the Multiple Regression analysis summarized in Table 10 indicate that IDV, MAS and UAI are significant predictors of conformist motive for consuming conspicuous products.

Based on these results, **H₆**, which hypothesized that there would be a positive and significant relationship between an individual's Conformist Motive for conspicuous consumption and his/her IDV, and MAS, can be retained. Moreover, **H₇** which proposed an insignificant relationship between an individual's Conformist Motive for conspicuous consumption and his/her UAI and LTO, is partially supported.

Table 9: The Regression of Conformist Motive with CVDs

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	3.123	.140		22.274	.000
Power Distance [PDI]	-.022	.017	-.026	-1.262	.207
Individualism [IDV]	.151	.016	.199	9.722	.000
Masculinity [MAS]	.072	.017	.087	4.308	.000
Uncertainty Avoidance [UAI]	-.203	.026	-.177	-7.751	.000
Long-term Orientation [LTO]	-.016	.029	-.012	-.545	.586

(*F* Statistic = 26.219, *p* = 0.000, *r*² = 0.052, Adjusted *r*² = 0.050)

CONCLUSIONS

Based on the review of the literature pertaining to influence of individual's cultural values on motives for consuming conspicuous products, a number of hypotheses were proposed. Five dimensions of cultural values proposed by Hofstede (1980) were used to categorize the cultural orientation of respondents. Literature suggests that consumer motives for the consumption of conspicuous products could be accounted for by four forms of motives: status, uniqueness, conformist, and hedonic. Therefore, these four motives were used in this research.

The outcome of analysis indicates that Sri Lankans, in general, possess a high level of hedonic motives. Therefore, the demand for conspicuous products increases in line with the perceived scarcity of these products. Uniqueness motive observed to be the second most significant motive affecting conspicuous consumption of the respondents. It implies that respondents are motivated to consume conspicuous products to distinguish them from other consumers. Contrary to the greater importance placed on the pursuit of status as a reason for people choosing to consume conspicuously, status motive was highlighted as the third important motivating factor of conspicuous consumption while the conformist motive was identified to be the fourth important motive in this regard. It suggests that the respondents' conspicuous consumption might also be influenced by their motive for creating social opportunities and social interaction.

A greater variability was observed amongst the different ethnic groups in their perception towards conspicuous consumption. The one-way MANOVA confirmed that

there was a statistically significant difference between the Sinhalese, Muslims, Sri Lankan Tamils and Indian Tamils in the level of importance attached to the various motives for the consumption of conspicuous products.

The outcome of both the Pearson Correlation and Multiple Regression indicate that a significant, but weak, relationship exists between power distance, individualism, masculinity, uncertainty avoidance, and status motive for the consumption of conspicuous products. These results further suggest that the power distance, individualism, masculinity, and uncertainty avoidance dimensions of cultural values are better predictors of status motive than the long-term orientation dimension of cultural values. It was confirmed that Power distance, Individualism, Masculinity and Uncertainty avoidance values of culture contribute significantly to the prediction of status motive for consuming conspicuous products. Moreover, the results established that Power distance, Individualism, Masculinity and Long-term orientation contribute significantly to the prediction of uniqueness motive of conspicuous consumption.

Where the relationship between hedonic motive for consuming conspicuous products and the cultural values of respondents were of concern, it was found that all cultural value dimensions, other than the Power distance were significantly correlated with hedonic motive of respondents. Yet, the conformist motive of consumers' was found to be significantly correlated only with Individualism, Masculinity and Uncertainty avoidance dimensions of culture.

REFERENCES

- Schaefer, Allen D., Charles M. H., & R. Stephen Parker (2004). A cross-cultural exploration of materialism in adolescents, *International Journal of Consumer Studies* 28(4): 399-411.
- Allison, Gareth M. (2008). Mirror, mirror on the wall: culture's consequences in a value test of its own design. *The Academy of Management Review* 33(4): 885-904.
- Chao, Angela, and Schor, J. B (1998). Empirical tests of status consumption: Evidence from women's cosmetics. *Journal of Economic Psychology* 19(01): 107-131.
- Duensberry, James S (1949). *Income, saving, and the theory of consumer behavior*. Cambridge, Harvard University Press.
- Gupta, Susan F (2010). Cultural value dimensions in a strategic decision making context. Monmouth University, (<http://marketing.byu.edu>).

- Heaney, Joo-Gim, Goldsmith Ronald E, Wan Jusoh, and Wan J (2005). Status consumption among Malaysian consumers exploring its relationships with materialism and attention-to-social-comparison-information. *Journal of International Consumer Marketing* 17(04): 83-98.
- Hofstede, G. (1980). *Culture's consequences: international differences in work related values*. Beverly Hills: Sage.
- Kim, Jai-Ok, Sandra F., Qingliang G., & Sook M. (2002). Cross-cultural consumer values, needs and purchase behavior. *Journal of Consumer Marketing* 19 (06): 481-502.
- Isaksen, Katja J. and Stuart R. (2012). The commodification of self-esteem: Branding and British teenagers. *Psychology and Marketing* 29(03): 117-35.
- Kotler, P (2000/1998) *Marketing Management* 13th ed, SAGE Publication.
- Leibenstein, H., (1950). Bandwagon, Snob, and Veblen effects in the theory of consumers' demand, *Quarterly Journal of Economics*, Vol. 64, pp. 183-207
- Mason, R.S., (1983). The economic theory of conspicuous consumption, *International Journal of Social Economics*, Vol. 10(03), pp 3-17
- Miller, R. (2002). In-store impact on impulse shoppers, *Journal of Marketing*, pp. 27-28
- O'Cass, A. & McEwen, H., (2004). Exploring consumer status and conspicuous consumption, *Journal of Consumer Behaviour*, Vol. 4(01), (October), pp. 25-39
- Page, C. (1992). A History of conspicuous consumption, *Advances in Consumer Research*: pp. 82-87
- Sofia U.S. (2008). A consumer cultural exploration into ordinary status consumption of "home" and home aesthetics, *Lund Institute of Economic Research*
- Solomon, M., & Rabolt, N. (2004). *Consumer behavior: In fashion*, 1st ed. Upper saddle river, NJ: Pearson Education, Inc.
- Sundie, M., Kenrick, T., Griskevicius, V., Tybur, M., Vohs, D., & Beal, J. (2010). Peacocks, Porsches, and Thorstein Veblen: conspicuous consumption as a sexual signaling system, *Journal of Personality and Social Psychology*
- Tai Shan A.U. (2007). A study of conspicuous consumption in the Chinese automobile market. *a Dissertation presented for the degree of MA Marketing*, the University of Nottingham

Veblen, T. (1925[1899]), *The theory of the leisure class: an economic study of institutions*, New York: Macmillan

Veblen T. (1918). *The higher learning in America*, New York: The Viking Press

**APPLICATION OF THE
COUNTRY PRODUCT DUMMY METHOD TO
CONSTRUCT SPATIAL AND TEMPORAL
PRICE INDICES FOR SRI LANKA**

Sri Lanka Journal of
Economic Research
Volume 2 (1)
June 2014: 38-52
Sri Lanka Forum of
University Economists

Ramani Gunatilaka
Charith Abeyratne



Abstract

Inadequate geographic coverage, inadequate population coverage, and short length of series make existing Sri Lankan price indices less than optimal to measure long-term trends inequality and poverty. Since they are based on binary methodologies they also do not satisfy the property of transitivity. In contrast, the multilateral Country Product Dummy (CPD) method satisfies the axiom of transitivity and ensures base region invariance. This paper applies the CPD method to construct spatial and temporal price indices that can be used for inequality and poverty analysis in Sri Lanka. It uses expenditure data from the Labor Force and Socio-Economic Surveys (LFSS) of 1980/81 and 1985/86 and the Household Income and Expenditure Surveys (HIES) of 1990/91, 1995/96, 2002, 2006/07 and 2009/10 conducted by the Department of Census and Statistics, Sri Lanka, to construct the indices. The former conflict-affected regions are excluded due to lack of data. The study reveals some recently emerging differences in rural and urban prices that are significant and cause for concern. These differences merit careful investigation to find out underlying factors using more appropriate and extensive data.

Key Words: *Inequality Measurement; Poverty Measurement; Multilateral Price Indices; Country Product Dummy Method; Sri Lanka.*

JEL Codes: *C22, D63, E31, I32*

Ramani Gunatilaka

Faculty of Graduate Studies, University of Colombo, Sri Lanka.
Telephone: +94112695129, email: rsgunatilaka@yahoo.com.au

Charith Abeyratne

The British School, Colombo, Sri Lanka
Telephone: +94112835408, email: charith9614@gmail.com

INTRODUCTION

This paper applies the Country Product Dummy method to construct spatial and temporal price indices that can be used for inequality and poverty analysis in Sri Lanka over the period 1980-2010. The former conflict-affected regions are excluded from the analysis due to lack of data from these regions for most of this period.

There are several reasons why currently available indices are not appropriate for the purpose of inequality measurement. Among them are the following: inadequate geographic coverage, inadequate population coverage and short length of series. For example, almost all existing price indices (indices constructed and used by Department of Census and Statistics, 2004, Datt and Gunewardena, 1997, Gunewardena, 2007) have been computed for the specific purpose of measuring poverty, and use the consumption patterns of 40 per cent of households with the lowest consumption expenditure to construct the price indices. As a result, these price indices are not appropriate for the purpose of measuring inequality. Nor are they the most optimal to adjust consumption to measure poverty with. This is because existing indices are based on binary methodologies such as Paasche, Laspeyres and Fisher, which do not satisfy the property of transitivity. This means that the set of price comparisons that the binary methodologies yield are not inherently internally consistent between all possible direct and indirect comparisons (Kravis et al., 1982).

In contrast, multilateral methods such as the Elteto-Koves-Szulc (EKS) index, the Geary-Khamis (GK) method, and the Country-Product-Dummy (CPD) method, satisfy the property of transitivity. Nevertheless, the EKS and GK methods also require a set of region or region-wise prices and quantities of items of uniform quality specifications, which is difficult to obtain. In contrast, the CPD methodology was originally developed as a specialized regression technique to deal with representative price lists of different countries that were not identical and to ensure base country invariance (Coondoo et al., 2004).

Hence this paper applies the CPD methodology to construct price indices for the analysis of inequality and poverty trends in Sri Lanka. We believe that the length of the series, covering a period of thirty years, and the fact that it covers the urban and rural (including estates) sectors in seven provinces, will be useful for researchers conducting trend analyses with household income and expenditure data, whether in inequality measurement, or in poverty measurement. Only the Colombo Consumers' Price Index (CCPI) covers a longer period. Besides, while the CCPI is a temporal series, it is not a spatial series, as it takes into account only the consumption patterns of consumers in Colombo.

METHODOLOGY AND DATA

The CPD methodology is really a bridge-region method that links two regions together on the basis of the relationship of each to a (base) region by taking into account all price comparisons with all other regions (Kravis et al., 1982). Consequently, the method regards each price as being dependent on the region in which it is observed, and on the item to which it refers.

The standard CPD formulation regresses the logarithm of observed prices on two sets of dummy variables, one relating to the various regions and the other to the various commodities. The model has no intercept. It includes the observations of unit prices for the base region in the base year in its vector of prices representing the dependent variable but does not include a dummy to represent the base as an explanatory variable. Setting region $j = 1$ as base and introducing the dynamic of time $t (t = 1, 2, \dots, T)$, the regression version of the model is:

$$\ln p_{jit} = \eta_{21}D_{21} + \dots + \eta_{MT}D_{MT} + \pi_1D_1^* + \pi_2D_2^* + \dots + \pi_ND_N^* + u_{jit}. \quad (1)$$

In equation (1), D_{jt} refers to the j -th region dummy variable in time t , taking value equal to 1 for all observations for region j in time t and zero for all other regions and times. D_i^* is the i -th commodity dummy variable taking value equal to 1 for commodity i and zero for all other commodities. The random disturbance term u_{jit} is a normally distributed variable with mean zero and variance σ^2 . The coefficient η_{jt} of each region dummy variable denotes the differences in the log of prices between the base region in the base year and the subscripted region at the subscripted time. e^η is the purchasing power parity for that particular region relative to the base of region 1 when $t = 1$.

Rao (1995) generalised the estimation procedure of the model by making use of quantity and value data and extending the model to allow for the use of weights. The extension had its roots in weighted least squares with weights being equivalent to the square root of expenditure shares, v_{jit} , as in equation (2):

$$\sqrt{v_{jit}} \ln p_{jit} = \eta_{21}\sqrt{v_{jit}}D_{21} + \dots + \eta_{MT}\sqrt{v_{jit}}D_{MT} + \pi_1\sqrt{v_{jit}}D_1^* + \pi_2\sqrt{v_{jit}}D_2^* + \dots + \pi_N\sqrt{v_{jit}}D_N^* + u_{jit}. \quad (2)$$

The analysis in this paper uses expenditure data (value and quantity) from the Labour Force and Socio-Economic Surveys (LFSS) of 1980/81 and 1985/86 and the Household Income and Expenditure Surveys (HIES) of 1990/91, 1995/96, 2002, 2006/07 and 2009/10 conducted by the Department of Census and Statistics, Sri Lanka. The surveys are broadly comparable in design and methodology, particularly in the schedules related to household expenditure. The surveys could not be carried out in the Northern and Eastern Provinces for twenty years after 1985, although with the ending of the conflict (from most of the East in 2007 and in the North in 2009), first the Eastern Province and then the Northern Province were covered. However, since the present paper aims to construct price indices that can be used to investigate inequality and poverty trends in Sri Lanka during the post-liberalization period, we are compelled to exclude the North and the East because of the lack of data. Nevertheless, in a companion paper we intend to construct spatial and temporal price indices for the analysis of inequality and poverty for all Sri Lankan provinces including the North and the East for the years 1985/86, 2009/10 and 2012/13, in order to enable the analysis of inequality and poverty trends in the entire island.

Equation 2 was estimated over two samples. To construct the price indices for inequality analysis, we estimated the model over data on the value and quantity of all non-durable consumption expenditure of all households in all the surveys other than those households in the North and the East. In contrast, the price indices for poverty analysis were constructed by estimating equation (2) only over the non-durable consumption expenditure data of households with per capita consumption expenditure that was in the lowest four deciles. Expenditure data that was used to select the poorest 40 per cent of households in this way, excluded expenditure on durables and non-consumption expenditure such as provident fund contributions, social activities and litigation.

Household price and expenditure data from the two samples for seven survey years for seven provinces, each with urban and rural sectors, were used to construct both sets of indices. It should be noted that the rural sector includes the estates sector as well. The price index for the urban sector in region 1 (Western Province) in 1980/81, the first year for which data is available, was set as the base or numeraire. Consequently, the number of regional dummies in the basic model of equation (1) applied to seven survey years, seven provinces and two sectors amounted to a total of 97 for each estimation ($7 \text{ regions} * 7 \text{ years} * 2 \text{ sectors} - 1 \text{ [for base]} = 97$). Aggregated food and non-food commodity dummies amounted to 43, and these related to those categories for which quantity data were available. The classification system for expenditure categories was based largely on Datt and Gunewardena's (1997) method. Sample weights were not used as they were not available for the LFSS data of 1980/81.

Unit values for the price variable are defined as follows. For region j ,

$$P_{ji} = \frac{\bar{v}_{ji}}{\bar{q}_{ji}}. \quad (3)$$

In this equation, \bar{v}_{ji} denotes average expenditure on commodity i consumed in region j , while \bar{q}_{ji} denotes the average quantity of commodity i consumed in region j .

Conventionally, the poverty line is expressed in national prices. Therefore, in order to express the national poverty line in terms of price levels prevailing in different regions at different times, it becomes necessary to construct national price indices that will permit temporal and spatial analyses. In this paper we have constructed two such indices, one national, and the other sectoral, so that researchers can select the price index most appropriate for their analysis. The analysis follows Datt and Gunewardena (1997) to construct the national price indices as weighted averages of the temporal and spatial price indices, where the weights are the population shares by sector, province and year.

RESULTS

Ordinary Least Squares estimation can be used to obtain the coefficients of the explanatory variables in equation (2), so long as the least squares assumptions hold. One such assumption is that the explanatory variables are independent from each other. If, however, there are one or more exact linear relationships among the explanatory variables, then the least squares estimator cannot be defined. Tests for multicollinearity ruled out the presence of exact collinearity between explanatory variables in both estimations of equation (2), although the two commodity dummy variables for rice and cereals and food-bought-out, reported high (>10) variance inflation factors. However, the solution for this problem, either dropping the correlated variables or instrumenting for them, was not practical as the first two commodities are staples and represent an important component of household consumption, while the third commodity is heavily based on the first two. In any case, in the absence of exact collinearity, the least squares estimator still remains the best linear unbiased estimator by the Gauss-Markov theorem (Hill et al., 2011). Besides, our interest here is on the coefficients of the regional dummies from which we derive our spatial and temporal price indices, rather than the coefficients of the commodity dummies, and tests for multicollinearity ruled out the presence of exact linear relationships between our variables of interest.

We first set out the results for the estimation of price indices for inequality analysis using the CPD method in Tables 1 to 4. The results for the estimation of price indices for the analysis of poverty are set out in Tables 5 to 8. Consider the outcomes of the estimation of price indices for inequality first. Table 1 presents the regression results for the spatial dummy variables for the urban sector, while Table 2 sets out the results for

the rural sector, based on expenditure data from the full sample. Regression results for the commodity dummies are not presented as they are not required for the construction of regional price indices other than in the specification of the CPD model, but are available from the authors on request. The full set of urban and rural price indices is set out in in Table 3, which is derived from the exponentials of the coefficients of the regional dummies in Tables 1 and 2. The regression results appear sensible. For example, all proved significant at the 1 per cent or 5 per cent critical level other than for the coefficients representing first year (1980/81) variables for all regions and both sectors. With Western Province's urban sector of the first survey year, 1980/81, taken as the base, the data suggests a twelve (urban)to sixteen (rural) fold increase in prices between 1980/81 and 2009/10. This is in keeping with the movement of the Colombo Consumer's Price Index(CCPI) over the same period(Central Bank of Sri Lanka, various years). Moreover, the twelve to fifteen-fold increase in urban prices since 1980/81 is broadly consistent across regions.

However, rural prices have been generally lower than urban prices until 2002. They appear to have caught up in 2006/07, and by 2009/10, rural prices in Western and Southern Provinces appear to exceed urban prices in the same provinces. To test whether the coefficients for the regional dummies both urban and rural, were equal to each other, we conducted Wald tests and Table 4 sets out the results. It can be seen that other than for rural prices of 2006/07 and 2009/10, the hypothesis that regional prices are different from each other in any year was rejected at the 5 per cent level of significance. It is likely that variations in commodity prices across regions averaged out to produce regional price indices that are close to each other during most of this period. The relatively higher rural prices of 2006/07 and 2009/10, however, merit further investigation in future research.

We turn next to the estimation of spatial and temporal price indices for poverty analysis. Table 5 presents the regression results for the spatial dummy variables for the urban sector, while Table 6 sets out the results for the rural sector, based on expenditure data from the poorest 40 per cent of the survey sample. The full set of urban and rural price indices is set out in in Table 7, which is derived from the exponentials of the coefficients of the regional dummies in Tables 5 and 6. The series for Sri Lanka as a whole, and for urban and rural Sri Lanka are the provincial and sectoral averages weighted with relevant population shares. The regression results in Tables 5 and 6 also appear sensible and the price index for Sri Lanka as a whole has recorded a 13-fold increase during the reference period. However, while the price index for urban Sri Lanka records an 11-fold increase, that for rural Sri Lanka records a 14-fold increase. Here, rural price indices for Western, North Western and Uva in 2009/10 exceeding urban prices in the same provinces have caused rural prices to exceed urban prices. Table 8 reports the results of the Wald tests of whether the coefficients for the regional dummies, both urban and rural, were equal to each other. Other than for rural prices of

2006/07, the hypothesis that regional prices are different from each other in any year was rejected at the 5 per cent level of significance. Again, underlying reasons merit further investigation in future research.

We can compare the price indices for poverty analysis for 1985/86 and 1990/91 generated by this study, with those derived by Datt and Gunewardena (1997). While their study configured some of the regions somewhat differently, they also reported price indices for the combined urban and rural sectors. Their results show that rural prices were 5 per cent and 6.25 per cent less than urban prices for 1985/86 and 1990/91 respectively. In contrast, as Table 7 shows, the price indices for the rural sector generated by the CPD method were 12 per cent and 9.7 per cent less than the urban sector's price indices in 1985/86 and 1990/91. The larger rural-urban price differentials in the present series clearly arise from the CPD methodology used to generate the price indices. We are unable to carry out a similar comparison between the price indices for later years in this study with the series generated by the Department of Census and Statistics, as their series is constructed at district level and does not differentiate between the urban and rural sectors (see Department of Census and Statistics 2004).

CONCLUSION

This study constructed spatial and regional price indices for the years 1980/81, 1985/86, 1990/91, 1995/96, 2002, 2006/07 and 2009/10 for the admittedly limited purpose of measuring trends in consumption inequality and poverty.

The empirical research revealed some recently emerging differences in rural and urban prices that are significant and cause for concern. These differences merit careful investigation to find out underlying factors, using more appropriate and extensive data. For example, multivariate time series analysis using the spatial consumer and producer price data series maintained by the Central Bank of Sri Lanka, may throw further light on the extent to which commodity markets are spatially integrated, and help identify the commodities and district markets that are lagging behind. As importantly, such an analysis will show whether differentials between the prices that consumers pay for products, and the prices that producers receive, have decreased over the years with better transport and connectivity, or whether these differentials have remained the same, or even increased, due to other reasons such as anti-market practices. Research on these lines can better inform policies aimed at controlling inflation even while making sure that producers get better prices for their products.

A major limitation of the present study is that the price indices produced cannot be used to analyze the progress of inequality and poverty in the North and the East, and, in fact, in the country as a whole. However, in a companion paper, we intend constructing a spatial and temporal price index for all Sri Lankan provinces including the North and

the East for the years 1985/86, 2009/10 and 2012/13 that will enable the analysis of poverty and inequality in those regions as well.

Table 1: CPD Price Indices for Inequality Analysis: Regression Results for Regional Dummies, Urban Sector

	1980/81	1985/86	1990/91	1995/96	2002	2006/07	2009/10
Western		0.5789*** (-0.1172)	1.1504*** (-0.1185)	1.6035*** (-0.1181)	2.0977*** (-0.1187)	2.3256*** (-0.1179)	2.7347*** (-0.1205)
Central	-0.1406 (-0.1104)	0.5436*** (-0.1166)	1.1356*** (-0.1157)	1.5594*** (-0.1207)	2.0046*** (-0.1194)	2.2703*** (-0.1159)	2.6982*** (-0.1157)
Southern	-0.0613 (-0.1122)	0.4216*** (-0.1126)	1.0348*** (-0.1133)	1.4318*** (-0.1184)	2.0779*** (-0.1074)	2.2703*** (-0.1144)	2.7151*** (-0.1197)
North Western	0.0044 (-0.1117)	0.3785*** (-0.1087)	1.0401*** (-0.1141)	1.4774*** (-0.1155)	2.0662*** (-0.1174)	2.1268*** (-0.1191)	2.5971*** (-0.1223)
North Central	-0.1209 (-0.1045)	0.3911*** (-0.1178)	1.0691*** (-0.1154)	1.5784*** (-0.1124)	2.0838*** (-0.1143)	2.3348*** (-0.1106)	2.6563*** (-0.1176)
Uva	0.0596 (-0.1127)	0.4874*** (-0.1149)	1.0723*** (-0.1149)	1.4448*** (-0.1172)	2.0583*** (-0.1138)	2.2976*** (-0.1147)	2.6604*** (-0.1128)
Sabaragamuwa	-0.0195 (-0.1100)	0.4762*** (-0.1137)	1.0676*** (-0.1159)	1.4448*** (-0.1184)	2.1167*** (-0.1168)	2.2272*** (-0.1169)	2.6673*** (-0.1208)

Notes: Standard errors in parentheses. * significant at 5%; ** significant at 1%.

Table 2: CPD Price Indices for Inequality Analysis: Regression Results for Regional Dummies, Rural Sector

	1980/81	1985/86	1990/91	1995/96	2002	2006/07	2009/10
Western	-0.0439 (-0.1193)	0.4645*** (-0.1236)	1.0363*** (-0.1224)	1.4859*** (-0.1251)	2.0604*** (-0.1242)	2.3314*** (-0.1235)	2.7987*** (-0.1209)
Central	-0.0380 (-0.1150)	0.4032*** (-0.1191)	1.0071*** (-0.1239)	1.3836*** (-0.1253)	1.9928*** (-0.1223)	2.1968*** (-0.1247)	2.6137*** (-0.1270)
Southern	-0.0571 (-0.1124)	0.3129** (-0.1217)	0.9490*** (-0.1190)	1.3770*** (-0.1209)	1.9328*** (-0.1251)	2.2034*** (-0.1219)	2.8757*** (-0.1063)
North Western	-0.0813 (-0.1056)	0.3226** (-0.1277)	0.9380*** (-0.1187)	1.3479*** (-0.1261)	1.9182*** (-0.1255)	2.2464*** (-0.1232)	2.6504*** (-0.1177)
North Central	-0.0463 (-0.1079)	0.3050*** (-0.1157)	0.9572*** (-0.1169)	1.3253*** (-0.1192)	1.8428*** (-0.1196)	2.1183*** (-0.1244)	2.6099*** (-0.1144)
Uva	-0.0052 (-0.1029)	0.3270*** (-0.1180)	0.9684*** (-0.1168)	1.3009*** (-0.1205)	1.8709*** (-0.1222)	2.2413*** (-0.1161)	2.5401*** (-0.1186)
Sabaragamuwa	-0.0970 (-0.1143)	0.3729*** (-0.1173)	0.9860*** (-0.1195)	1.3821*** (-0.1217)	1.9646*** (-0.1217)	2.2424*** (-0.1192)	2.6067*** (-0.1152)

Notes: Standard errors in parentheses. * significant at 5%; ** significant at 1%

Table 3: Spatial and Temporal Price Indices for Inequality Analysis, Sri Lanka 1980/81-2009/10.

Region	1980/81	1985/86	1990/91	1995/96	2002	2006/07	2009/10
<i>Urban sector</i>							
Western	1.000	1.784	3.159	4.970	8.148	10.233	9.416
Central	0.869	1.722	3.113	4.756	7.423	9.682	15.405
Southern	0.941	1.524	2.815	4.186	7.988	9.683	14.852
North Western	1.004	1.460	2.829	4.382	7.895	8.388	15.105
North Central	0.886	1.479	2.913	4.847	8.035	10.328	13.425
Sabaragamuwa	1.061	1.628	2.922	4.241	7.832	9.950	14.243
Uva	0.981	1.610	2.908	4.241	8.303	9.274	14.303
<i>Rural sector</i>							
Western	0.957	1.591	2.819	4.419	7.849	10.292	16.423
Central	0.963	1.497	2.738	3.989	7.336	8.996	13.650
Southern	0.944	1.367	2.583	3.963	6.909	9.055	17.739
North Western	0.922	1.381	2.555	3.849	6.808	9.454	14.159
North Central	0.955	1.357	2.604	3.763	6.314	8.317	13.598
Sabaragamuwa	0.995	1.387	2.634	3.673	6.494	9.405	12.682
Uva	0.908	1.452	2.681	3.983	7.132	9.416	13.554

Table 4: Results for Significant Differences in Regional Prices for Inequality Analysis in Each Year 1980/81-2009/10.

Year	Urban Sector		Rural Sector	
	F^*	Prob> F	F^*	Prob> F
1980	0.95	0.4599	0.19	0.9809
1985	0.89	0.5401	0.42	0.8645
1990	0.29	0.9407	0.15	0.9888
1995	0.74	0.6169	0.41	0.8728
2002	0.17	0.9841	0.65	0.6864
2007	0.72	0.6361	2.37	0.0277
2010	0.26	0.9550	2.47	0.0218

Table 5: CPD Price Indices for Poverty Analysis: Regression Results for Regional Dummies, Urban Sector

	1980/81	1985/86	1990/91	1995/96	2002	2006/07	2009/10
Western		0.4775*** (-0.1231)	1.0571*** (-0.12570)	1.4730*** (-0.1206)	1.9832*** (-0.1238)	2.2144*** (-0.1277)	2.6335*** (-0.1297)
Central	0.0270 (-0.1154)	0.3585*** (-0.1218)	1.1026*** (-0.1218)	1.4316*** (-0.1277)	1.8932*** (-0.1255)	2.2816*** (-0.1141)	2.5758*** (-0.1263)
Southern	0.0555 (-0.1120)	0.3477*** (-0.1225)	0.9730*** (-0.1197)	1.3469*** (-0.1270)	2.0446*** (-0.1155)	2.1534*** (-0.1232)	2.6624*** (-0.1233)
North Western	-0.0405 (-0.1055)	0.2748** (-0.1234)	0.9036*** (-0.1168)	1.2605*** (-0.1270)	1.8922*** (-0.1277)	2.1457*** (-0.1290)	2.6116*** (-0.1313)
North Central	0.0766 (-0.1006)	0.3599*** (-0.1187)	1.0016*** (-0.1274)	1.3464*** (-0.1208)	2.1709*** (-0.1303)	2.2795*** (-0.12740)	2.5533*** (-0.1296)
Uva	0.1154 (-0.1177)	0.3294*** (-0.1160)	0.9956*** (-0.1211)	1.4479*** (-0.1274)	1.9274*** (-0.1198)	2.2618*** (-0.1094)	2.5671*** (-0.1270)
Sabaragamuwa	0.0988 (-0.1089)	0.2370** (-0.1159)	0.9665*** (-0.1191)	1.3577*** (-0.1265)	2.1207*** (-0.1291)	2.1797*** (-0.1355)	2.4929*** (-0.1365)

Notes: Standard errors in parentheses. * significant at 5%; ** significant at 1%. The analysis is based only on the consumption expenditure data of the poorest 40 per cent of the full survey sample.

Table 6: CPD Price Indices for Poverty Analysis: Regression Results for Regional Dummies, Rural Sector

	1980/81	1985/86	1990/91	1995/96	2002	2006/07	2009/10
Western	-0.0317 (-0.1189)	0.2810** (-0.1261)	0.9755*** (-0.1260)	1.3905*** (-0.1361)	1.9672*** (-0.1347)	2.1595*** (-0.1347)	2.7232*** (-0.1324)
Central	0.0434 (-0.1171)	0.2971** (-0.1198)	0.9475*** (-0.1284)	1.2839*** (-0.1309)	1.8562*** (-0.13270)	2.1384*** (-0.1381)	2.6045*** (-0.1306)
Southern	0.0045 (-0.1090)	0.3466*** (-0.1197)	0.9412*** (-0.1241)	1.3571*** (-0.1238)	1.8889*** (-0.1287)	2.1006*** (-0.13150)	2.5835*** (-0.1308)
North Western	-0.0813 (-0.1056)	0.3226** (-0.1277)	0.9380*** (-0.1187)	1.3479*** (-0.1261)	1.9182*** (-0.12550)	2.2464*** (-0.12320)	2.7943*** (-0.11770)
North Central	0.0703 (-0.1018)	0.2680** (-0.1155)	0.9584*** (-0.1139)	1.2672*** (-0.11580)	1.8293*** (-0.1208)	2.0415*** (-0.12560)	2.5620*** (-0.1175)
Uva	0.0362 (-0.1062)	0.2709** (-0.1141)	0.9297*** (-0.1133)	1.2897*** (-0.1210)	1.8320*** (-0.1189)	2.0113*** (-0.1345)	2.4920*** (-0.1228)
Sabaragamuwa	-0.0134 (-0.1130)	0.2778** (-0.1250)	0.9302*** (-0.1230)	1.3218*** (-0.12180)	1.9238*** (-0.11790)	2.1222*** (-0.1233)	2.6131*** (-0.1202)

Notes: Standard errors in parentheses. * significant at 5%; ** significant at 1%. The analysis is based only on the consumption expenditure data of the poorest 40 per cent of the full survey sample.

Table 7: Spatial and Temporal Price Indices for Poverty Analysis, Sri Lanka 1980/81-2009/10.

Region	1980/81	1985/86	1990/91	1995/96	2002	2006/07	2009/10
National	1.006	1.393	2.662	3.839	6.787	8.480	13.247
<i>Urban sector</i>							
Western	1.000	1.612	2.878	4.362	7.266	9.156	8.350
Central	1.027	1.431	3.012	4.185	6.641	9.793	13.922
Southern	1.057	1.416	2.646	3.845	7.726	8.614	13.141
North Western	1.087	1.327	2.623	4.254	6.796	7.825	14.331
North Central	1.080	1.433	2.723	3.844	8.766	9.772	13.621
Sabaragamuwa	1.122	1.390	2.706	4.254	6.872	9.600	12.849
Uva	1.104	1.267	2.629	3.887	8.337	8.844	13.028
Urban Sri Lanka	1.020	1.501	2.821	4.249	7.288	9.016	10.820
<i>Rural sector</i>							
Western	0.969	1.324	2.652	4.017	7.151	8.667	15.230
Central	1.044	1.346	2.579	3.611	6.399	8.486	13.525
Southern	1.005	1.414	2.563	3.885	6.612	8.171	13.243
North Western	0.960	1.316	2.468	3.527	6.634	8.548	16.352
North Central	1.073	1.307	2.607	3.551	6.230	7.702	12.962
Sabaragamuwa	1.037	1.311	2.534	3.632	6.246	7.473	12.086
Uva	0.987	1.320	2.535	3.750	6.847	8.350	13.641
Rural Sri Lanka	1.002	1.338	2.569	3.734	6.660	8.303	14.071

Table 8: Test Results for Significant Differences in Regional Prices for Poverty Analysis in Each Year 1980/81-2009/10.

Year	Urban Sector		Rural Sector	
	F^*	Prob> F	F^*	Prob> F
1980	0.26	0.9565	0.40	0.8794
1985	0.76	0.5998	0.11	0.9958
1990	0.35	0.9089	0.07	0.9985
1995	0.36	0.9022	0.25	0.9581
2002	1.27	0.2677	0.29	0.9435
2007	0.75	0.6079	2.96	0.0069
2010	0.32	0.9266	1.35	0.2308

REFERENCES

- Central Bank of Sri Lanka (1995-2012) *Annual Reports*. Colombo: Central Bank of Sri Lanka.
- Coondoo, D., Majumder, A. & Ray, R. (2004). On a Method of Calculating Regional Price Differentials with Illustrative Evidence from India. *Review of Income and Wealth*, 50, 51-68.
- Department Of Census And Statistics. 2004. Official Poverty Line for Sri Lanka. [Accessed 22 August 2009].
- Datt, G. & Gunewardena, D. (1997). *Some Aspects of Poverty in Sri Lanka: 1985-90*, Washington D.C., World Bank.
- Gunewardena, D. (2007). *Consumption Poverty in Sri Lanka 1985-2002*, Colombo, Centre for Poverty Analysis.
- Hill, C. R., Griffiths, W. E. & Lim, G. (2011). *Principles of Econometrics*, New York, Wiley and Sons.
- Kravis, I. B., Heston, A. & Summers, R. (1982). *World Product and Income: International comparisons of real gross product*, Baltimore, World Bank, John Hopkins University Press.
- Rao, D. S. P. (1995). *On the Equivalence of the Generalised Country-Product-Dummy (CPD) Method and the Rao-system of Multilateral Comparisons*, Philadelphia, Center for International Comparisons, University of Pennsylvania.

**SUBSTITUTABILITY OF AUTOMATED
TELLER MACHINES FOR TELLERS:
WITH SPECIAL REFERENCE TO
BANK OF CEYLON**

Thilini Saparamadu

Sri Lanka Journal of
Economic Research
Volume 2 (1)
June 2014: 53-66
Sri Lanka Forum of
University Economists



Abstract

Surrogating technology for human beings is a widely discussed topic in today's turbulent environment that has its own advantages and disadvantages. This study empirically explores the impact of Automated Teller Machines on the employment of the Bank of Ceylon, Sri Lanka. The research has been conducted using annual secondary data from 1990 to 2011, gathered from the Bank of Ceylon. The study employs the Constant Elasticity of Substitution production function in identifying the degree of substitutability between tellers and Automated Teller Machines. The results of the study confirmed that there is a negative relationship between cost per Automated Teller Machine to the cost per teller and number of automated teller machines to the number of tellers. Further it is indicated that there is a substitutability of 26 percent between Automated Teller Machines and tellers. The research findings indicate that replacing human tellers by Automated Teller Machines has led to a reduction of job opportunities at the Bank of Ceylon and suggest policy recommendations regarding the efficient re-allocation of employees in the bank.

Key Words: *Automated Teller Machines, Tellers, Constant Elasticity of Substitution.*

JEL Codes : *G20, G21*

Thilini Saparamadu

Department of Business Economics, University of Sri Jayewardenepura, Sri Lanka
Telephone: +94718506082, email: thilini@sjp.ac.lk

INTRODUCTION

Focusing on convenience and productivity, banks have transformed their traditional banking processes into technology intensive models that clearly depict the automation of the banking process by Information Technology (IT). Through technology based systems, banks have made an effort to maintain customer friendly services and to thrive amidst competition.

The concept of automated systems based on IT is expanding with the concept of ‘e-finance’.¹⁴ E-banking is coming under the e-financial model of Business to Consumer and includes Automated Teller Machines,¹⁵ telephone banking, electronic fund transfers and credit cards. Gains from e-finance model include the reduction in the cost of transaction processing and improvement in the quality of services.

In the context of Sri Lanka, there are three major technology based systems that have been applied by the banking industry. They are ATMs, Internet Banking and Mobile Banking.

ATM has replaced the traditional branch model of paper based verification systems like cheques with the use of plastic cards and its special features. They have also simplified the individual work load. Information of the customer account could be accessed through the ATM itself and ATMs also have played a major role in electronic fund transfers. Internet banking facilitates a customer through virtual banking functions while mobile banking has also facilitated inter-bank and intra-bank fund transfers between bank accounts.

The major advantage of the ATM is the twenty four hour service offered during three hundred and sixty five days of the year. For the convenience of the customers, nowadays, ATMs are located by banks at convenient places such as at supermarkets, airports, railway stations etc. and not necessarily at the bank’s premises. Reduction of the work pressure of bank staff is one of the other advantages of ATMs.

Sampath Bank was the first bank in Sri Lanka to operate a fully computerized database and ATM technology. Sampath Bank introduced their Automated Teller Machines to Sri Lanka, branded as “SET”.

¹⁴ The ‘e-finance model’ could be explained using three broad categories, which provide the platform to the model of e-commerce; namely, business to business, business to consumer, and consumer to consumer models. The business to business sector includes services in corporate finance sector while business to consumer sector includes services such as online banking, online transactions, electronic bill payments and mortgages. The consumer to consumer sector includes payments for online transactions and electronic money transfers.

¹⁵ ATMs are operated by a customer himself to deposit or withdraw cash from a bank. When the Automated Teller Machine Card (magnetically coded plastic card) is inserted into the machine and keyed the password, the machine permits a customer to make entries for withdrawal or for deposit, and provided a proof document at the end of the transaction.

ATM facility was introduced by the Bank of Ceylon in 1990. The first ATM was established in the ground floor of the bank of Ceylon head office (Colombo 01). Bank of Ceylon has contacted all citizens of the country via its network over 600 branches connected online while operating ATM networks over 490, in all 25 districts of the country. Apart from that Bank of Ceylon operates in 02 overseas locations as well. They are Maldives and Chennai and 2 ATMs are located in the Maldives.

Bank of Ceylon issues automated teller cards¹⁶ to private, current and savings accounts holders and to the wholesale business enterprises under the name of the owner but not for partnerships and societies like welfare societies.

SIGNIFICANCE OF THE STUDY

Automated Teller Machines were created with the expectation of delivering efficient operations to its users. The ATM phenomenon needs to be understood in terms of productivity, quality and customer services in the banking sector. In the introductory period of ATM, customers used ATMs primarily for cash withdrawal; over time, this trend has changed and customers expect new services from ATMs.

Vendor productivity analysis and banker productivity analysis are used to examine how investments in ATMs influence the performance of the organization, overall customer satisfaction and labour replacement. Summer (1990) illustrated that the creation of ATMs has both marketing and operations implications. Marketers want to demonstrate convenient banking in order to increase deposits through service. In the case of operations, bankers tried to reduce cost by substituting ATMs for human tellers and limit the growth of paper check transactions. Banks gain more with e-banking services including ATMs. Gains are the results of lower cost, fewer physical branches and fewer employees.

As a result of the technology revolution there is a trend of replacing human beings with machines or devices in virtually every sector and the industry in the global economy. This is evident through the increasing trend of the cost of tellers when compared to the cost of ATMs (figure 01), and the increasing trend of number of ATMs with respect to the number of tellers (figure 02). This led researchers to investigate the degree of substitutability between ATM and bank tellers.

¹⁶ Savings or current account with the completed application form is the major requirement to request for a teller card. Bank charges five rupees commission per transaction done through ATM. Usually card holders could withdraw up to Rs 40,000 per day and could extend this limit through a discussion with a bank. Customers who have both a current and a savings account are issued with one Automated Teller card for both accounts. A special unit called Electronic Banking Unit is located at the head office of the Bank of Ceylon to handle all of the issues regarding automated teller machines and teller cards.

LITERATURE SURVEY

Over the past few decades, researches have been conducted to examine the effect of ATM and technology based systems on customer, employee and institutional point of view.

Kumar et.al (2011) have identified Automated Teller Machines (ATMs) as an important IT investment in the banking sector of India. Ramsay and Smith (1999) showed that customers act differently when they deal with human beings and technology and suggested that bank customers prefer to deal with ATMs than with the human tellers. Rugambina (1994) too confirmed the results of Ramsay and Smith (1999). Parasuraman and Grewal (2000) have explained technology as a major component of the success of a firm. However, the introduction of ATMs has posed a major threat to the employee as well. (Rifkin, 2009).

From the customers' point of view, introduction of technology based systems could be illustrated from different perspectives such as (a) the extent to which customers are satisfied with the system or the technology, (b) expectations of the customer with respect to new features, and (c) convenience for the customer in using the new and modern technology.

For instance, Ramsay and Smith (1999) investigated the channel preferences of customers and the results confirmed that customers prefer to use direct channels rather than indirect channels. This indicated that customers are satisfied when they deal with technological interventions rather than with human interventions. Rugambina (1994) has investigated perceptual and demographic variables to unearth factors that are relevant to the usage of ATMs. Rugambina (1994)'s results have shown that convenience is the most important perceptual variable of customers in engaging with automated systems. It is also evident in the literature that expectations of the customers differ with their states and type. Katono (2009) has researched to find the important qualities that are expected by university students and concluded that reliability and location are the most important qualities that are expected by students from their banks. Many studies have found that customers are more satisfied with technological interventions than human interventions [Goode and Mountinho (1995), Rugambina (1994) and Ramsay and Smith (1999)]. Service technology (including ATMs) applications are changing according to the way that the service provider serves their customers. Empirical investigation was carried out by Prooenca and Rodrigues (2011) examined the way the customer was dealing with those services. The results explained that self-service technologies have a major role in firms dealings with their customers. E-banking services have rapidly expanded in all over the world.

Apart from that, researches have been conducted to analyse the influence of IT based system from the perspective of institutions. This could be expanded in different aspects,

namely, (a) effect to the workload of tellers, (b) performance to the bank, (c) productive capacity, (d) cost effectiveness and (e) overall performance.

From the bankers' point of view, ATMs are important to reduce the workload at the bank counter and it is a good tool to provide better customer service (Rugambina 1994). Moreover, from an organizational point of view, investments in automated systems based on IT generate a positive impact on the performance of the organization (Dunne et. al., 1996 and Kumar et.al., 2011). The productive contribution of automated systems based on IT have been also examined (Wilson, 1995 as cited by Kumar et.al, 2011) and it has been found that the productive contribution of IT is insufficiently small. Dunne et. al. (1996) have examined the relationship between technology and secular changes and cyclical dynamics concluding that technology could be used for unproductive labour share or technology could be substituted for labour.

IT based systems have influenced the cost effectiveness of automated systems with a positive impact (Goode and Mouninho 1995). Kwan (2003) reported that banks employed their workers more productively in banking industry. On the other hand Hao et.al (2001) reported that contents of branch jobs were routine and time consuming tasks. Most tellers performed relatively simple services such as cash depositing and issuing process. When salary cost is a part of operating cost, higher salary cost leads to cost inefficiency. As far as overall effectiveness is concerned financial and service industries are engaging as large investors in Information Technology (IT). Productivity of those investments is very important in the modern economy. Empirical studies tried to find the relationship between increasing inputs of IT and measured output. This is called as "IT Productivity Paradox". Haynes and Thompson (2000) examined the impact of a single IT application, the ATM on productivity and found that the ATM has a strong productivity consequence. Floros and Giordani (2008) suggested that banks with large number of ATMs are more efficient than the banks that have lower number of ATMs.

However, Rifkin (2009) carried out a survey from the point of view of employees and identified their preferences towards technology based systems and found that job opportunities have been eliminated by technology. Findings suggested that technology can easily be substituted for people, thus demonstrating, systems based on IT assist people to do their work more effectively. Self-service technologies are considered as option for service delivery. Customers can fulfil their own needs using automated system that are provided by the service provider. Bitner et.al (2000) reported that self-service technologies provided by the service firm could either complement or completely replace the employee involvement. As far as the banking industry is concerned, expansion of the ATMs has generated a threat on the job opportunities (Kumar et.al. 2005).

There is strong empirical evidence showing that a significance lag exists between the launch of a new technology in the market and its adoption by industry (Parasuraman

and Grewal 2000). Hannan and Mcdowell (1984) examined the relationship between the decisions of new IT adoption and its determinants. Their analysis found that wage rate and firm size had positive effects on deciding ATM adoption. That is in regions of higher wage rates, bank tends to install more ATM to replace expensive labour. In addition, larger banks tends to introduce more ATM than small banks owing to economies of scale. According to them, the reduction of operating cost is a key factor in the decision to invest in innovations such as ATMs.

However, apart from Kumar et.al (2011), few researchers explored the research area of the substitutability of the teller and ATMs. This present study poses the research question as “How much is the degree of substitution between ATMs and Tellers?” and follows Kumar et.al (2011). The specific objective of the study was to measure the degree of substitution of ATMs for number of tellers by the Bank of Ceylon (BOC), Sri Lanka.

METHODOLOGY

The study uses annual secondary time series data from 1990 to 2011.

There are several ways of specifying a production function. In general mathematical form, a production function can be expressed as,

$$Q = f(X_1, X_2, X_3, \dots, X_n) \tag{1}$$

Where Q is the quantity of output and $X_1, X_2, X_3, \dots, X_n$ are factor inputs (such as capital, labour, land or raw materials). One formula is as a linear function,

$$Q = a + bX_1 + cX_2 + dX_3 \tag{2}$$

Where, a, b, c and d are parameters that are determine empirically.

In many fields of economics, a particular class of function called constant elasticity of substitution (CES) function is privileged because of its invariant characteristics, namely, that the elasticity of substitution between parameters is constant on their domains. This functional relationship is assumed in identifying the relationship between ATMs and Tellers.

The Cobb-Douglas production function is derived in the following manner. Consider a two input cases and one output case. Let the inputs be tellers (labour) and ATMs (capital). The profit functions could be formulated as follows;

$$\pi = p * f(A, T) - (P_A A + P_T T) \tag{3}$$

Where p is the price of the banking service, $f(A, T)$ is the production function with respect to ATMs and Tellers, A is the number of ATMs, T is the number of Tellers, P_A is the cost per ATM, and P_T is the wage bill per teller.

The constant elasticity of substitution (CES) production form is the most general case, where the degree of substitutability between two input resources is represented by ρ which will be estimated through the data.

The CES production function is defined as,

$$F = f(A, T) = \{\alpha A^\rho + (1 - \alpha)T^\rho\}^{(1/\rho)} \quad 4$$

Where α is the share parameter (Amount invest in number of tellers or number of ATMs) and ρ is the degree of substitutability between the inputs.

Partially differentiating $f(A, T)$ with respect to A , obtains the following.

$$\partial F / \partial A = (1/\rho) \{\alpha A^\rho + (1 - \alpha)T^\rho\}^{1-\rho/\rho} * (\alpha \rho A^{(\rho-1)}) \quad 5$$

Similarly partially differentiating $f(A, T)$ with respect to T , obtain the following.

$$\partial F / \partial T = (1/\rho) \{\alpha A^\rho + (1 - \alpha)T^\rho\}^{1-\rho/\rho} * (1 - \alpha) \rho T^{(\rho-1)} \quad 6$$

In order to maximize profit π , one could choose A and T such that

For ATMs:

$$p \frac{\partial F}{\partial A} = P_A \quad 7$$

For teller:

$$p \frac{\partial F}{\partial T} = P_T \quad 8$$

Dividing equation (7) by (8) we get

$$\frac{\left(\frac{\partial F}{\partial A}\right)}{\left(\frac{\partial F}{\partial T}\right)} = \frac{P_A}{P_T} \tag{9}$$

It implies that

$$\frac{\alpha A^{(\rho-1)}}{(1-\alpha)T^{(\rho-1)}} = \frac{P_A}{P_T} \tag{10}$$

$$\left(\frac{A}{T}\right)^{(\rho-1)} = \frac{1-\alpha}{\alpha} * \frac{P_A}{P_T} \tag{11}$$

Taking logs,

$$(\rho-1)\log\left(\frac{A}{T}\right) = \log\left(\frac{1-\alpha}{\alpha}\right) + \log\left(\frac{P_A}{P_T}\right) \tag{12}$$

Or

$$\log\left(\frac{A}{T}\right) = \frac{1}{(\rho-1)} * \log\left(\frac{1-\alpha}{\alpha}\right) + \frac{1}{\rho-1} * \log\left(\frac{P_A}{P_T}\right) \tag{13}$$

The above is the standard double log linear that can be estimated using ordinary least square regression this equation enables modelling $\frac{A}{T}$ in terms of $\frac{P_A}{P_T}$.

In order to estimate the above double log linear function, the following model has been used.

$$\log NR = \beta_1 + \beta_2 \log CR \tag{14}$$

where NR is the number of ATMs to number of tellers, CR is the cost per ATM to cost per teller, β_1 is the constant term and β_2 is the extent to which a change in the cost per ATM to cost per teller changes the number of ATMs to number of tellers.

Time series data related to ATMs are available from 1990. Researcher has adopted 22 observations from 1990 to 2011. A large number of observations would provide a robust result, but we are limited by the availability of only annual data.

RESULTS

According to the results of the Augmented Dickey –Fuller test, both Log *CR* and Log *NR* are stationary at the level, and therefore they are used for analysis (Table 01).

Regression results indicated that all variables are significant at 5 percent level of significance. One percent increase in the cost per ATM to cost per teller, have decreased the number of ATM to number of tellers by 1.36 percent. 81.31 percent of variation of the dependent variable is explained by the model. For 22 observations and one explanatory variable, $d_L = 1.24$ and $d_U = 1.43$ at the 5 percent significance level. Thus, no autocorrelation is present in this model (Table 2).

COMPARISON OF CES PRODUCTION FUNCTION WITH OTHER CASES

Case 1: Cobb–Douglas production function

CES production function could be converted into a Cobb-Douglas production function, in the limit when $\rho \rightarrow 0$. As this expresses the linear substitution, setting $\rho = 0$ in the limits, the derived function is,

$$F = f(A,T) = ZA^{\alpha}T^{(1-\alpha)} \tag{15}$$

The calculated Cobb–Douglas production function received sum squared residual of 1.470454. The obtained sum squared residual in the CES function is 1.2694. Therefore we infer that the CES production function is a better representation of the functional form than the Cobb-Douglas production function.

Case 2: No substitution

CES production function could be used to depict the situation of no substitution, in the limit when $\rho \rightarrow -\alpha$. Setting $\rho = -\alpha$ in the limits, obtained the constant term of the Leontief production function. The obtained sum squared residual in CES function is 1.2694 while in the case of no substitution it is 9.51, which depicts that CES production function is more appropriate to conduct the analysis

Figure 3 is the graphical presentation of the data with other cases.

Estimation of the degree of substitutability between ATM and Teller (ρ)

Considering equation 13, one can derive, the elasticity of substitution as

$$\beta_2 = \frac{1}{(\rho - 1)} \tag{16}$$

Solving equation 5 for ρ ,

$$\rho = \frac{1}{\beta_2} + 1$$

17

According to regression result, $\beta_2 = -1.36$ and therefore, the value of ρ is 0.26. Thus, the degree of substitutability between ATM and teller is 0.26.

CONCLUSION AND POLICY RECOMMENDATION

The study has investigated the substitutability of ATMs and tellers in the context of Sri Lankan bank (Bank of Ceylon). The purpose of the current study was to determine the degree of substitutability of ATMs and tellers. The study has found that generally there exists a degree of substitutability, however, ATMs were not perfectly substitute for tellers because the degree of substitutability is less than one.

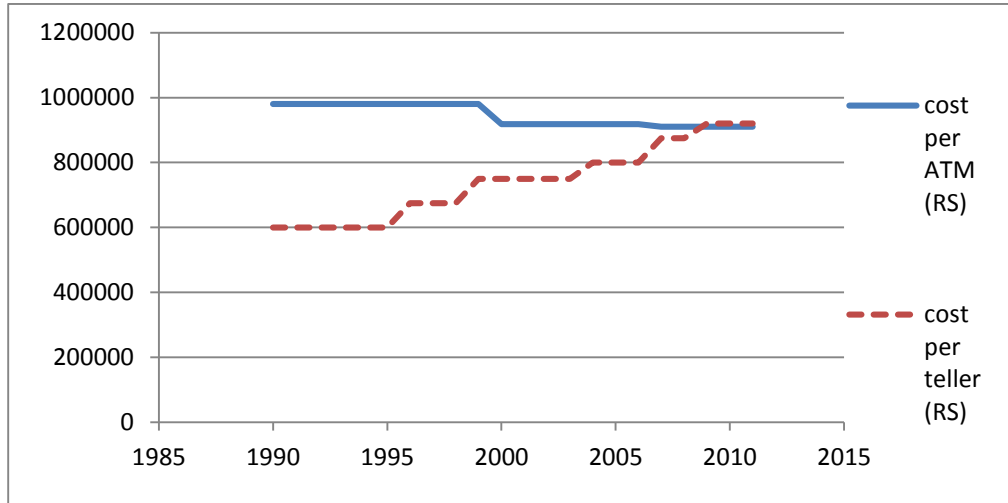
Results of the study indicate that one automated teller machine has replaced 0.26 tellers. According to the findings of the Kumar et.al (2011) degree of substitutability between teller and ATM is 0.56. Chang and Schorfheide (2003) as cited by Kumar et.al (2011) have reported 0.4 substitutability of technology in the household sector. Differences in these results are likely to arise from the differences in context and sectors under study.

This study provides an original contribution to the literature in terms of data and application with regard to the selected bank and country, and to the best of the researcher's knowledge is the first of its kind in relation to any Sri Lankan bank. Although the current study is based on a small sample of participants, the findings suggest that the decreasing cost per ATM against cost per teller was one of the major reasons for the expansion of ATMs. This requires identifying new or enhancing policies regarding employment and investment in ATMs. As any increase in ATMs cause a threat to employment opportunities in the bank, there is a need for the bank to consider re- training facilities to redundant staff and expanding activities in the bank, so that they can be relocated to new areas. Apart from that, technological innovations would help increasing productivity of the bank, thereby contributing to economic growth in Sri Lanka.

Findings of the study could be generalized to a similar bank that has similar characteristics to Bank of Ceylon but further investigations need to be done in order to generalize the scenario into different contexts. Thus, there is scope for further research be undertaken in different sectors and with respect to banks with different characteristics to the Bank of Ceylon.

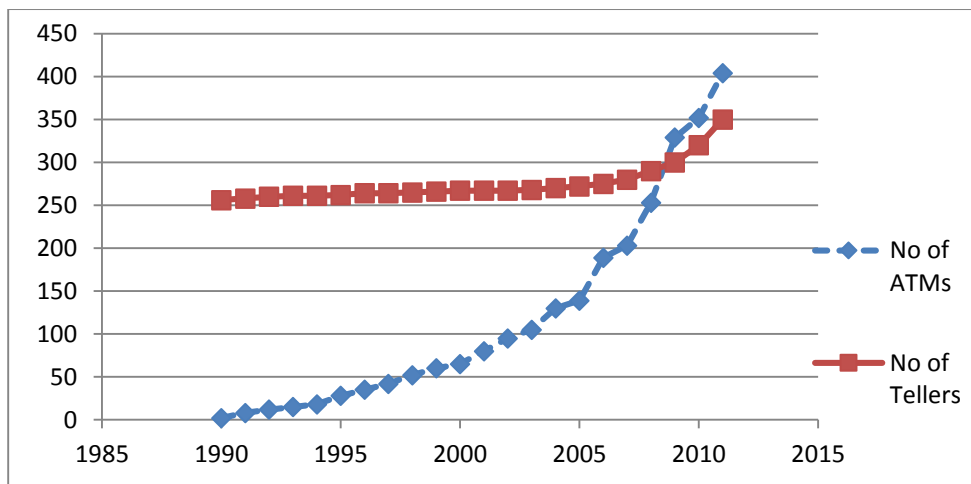
Annexure

Figure 1: Recent Trends on Cost Per ATM and Cost Per Teller in Bank of Ceylon Sri Lanka



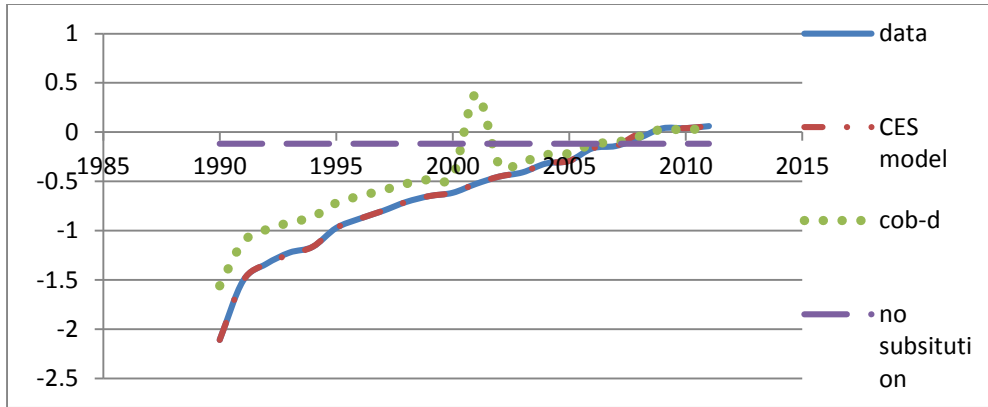
Source – Authors preparation using data from Electronic Banking unit, Bank of Ceylon Sri Lanka

Figure 2: Recent Trends on Number of ATM and Number of Tellers from 1990 to 2011 in Bank of Ceylon



Source – Authors preparation using data from Electronic Banking unit, Bank of Ceylon Sri Lanka

Figure 3: Log NR (Number of ATMs/ Number of Tellers): Data, CES Production Function, Cobb-Douglas Production Function and No Substitutability



Source – Authors preparation

Table 1: Results of the Unit root Test

Variable	t - statistic	Prob.
<i>log NR</i>	-4.720298	0.0013**
<i>log CR</i>	-6.084946	0.0392*

Notes

** and * indicate significant levels at 1% and 5% respectively

Source: Authors calculation using E-views 7.

Table 2: Results of the Log Linear Regression Model

Variable	Coefficient	SE	t-statistic	Prob.
Intercept	-0.115758	0.097532	-1.18687	0.0492*
Cost per ATM/Cost per teller	-1.361964	0.143446	-9.32914	0.0230*
R-squared	0.813141			
Adjusted R-squared	0.803799			
Sum Squared Resid	1.269394			
Prob. (F-Statistic)	0.021000			
Durbin - Watson stat.	1.473309			

Notes

* indicates the significant level at 5%.

Source: Authors calculation using E-views 7.

REFERENCES

Bitner, M. J., Brown, S. W., and Meuter, M. L. (2000). Technology infusion in service encounters. *Journal of the Academy of Marketing Science*, 28 (1),138-49.

Dunne, M. Haltiwanger, J. and Troske, K. (1996). Technology and Jobs: Secular and Cyclical dynamics, *NBER working paper* 5656.

- Floros, C., & Giordani, G. (2008). ATM and banking efficiency: the case of Greece. *Banks and Bank Systems*, 3(4), 55-65.
- Goode, M. and Mountinho, L. (1995). The effects of free banking on overall satisfaction: the use of automated teller machine. *International Journal of Bank Marketing*, 13(4), 33-40
- Hannan ,T.H and MC Dowel ,J.M. (1984). The determination of Technology adoption: The case of the banking firm. *Rand Journal of Economics*, 15(3), 328-35.
- Hao, J., Hunter, W. C., & Yang, W. K. (2001). Deregulation and efficiency: the case of private Korean banks. *Journal of Economics and Business*, 53(2), 237-254.
- Haynes, M. and Thompson, S. (2000). The Productivity Impact of IT Deployment: An Empirical Evaluation of ATM Introduction. *Oxford Bulletin of Economics and Statics*, 607-19
- Katono , G.(2009). Survey data on Household finance and Consumption, *ECB occasional paper* (100)
- Kumar, L. Malathy,D. and Ganesh , L. S. (2011). The diffusion of ATM technology in Indian banking , *Journal of Economic Studies*, 38(4) , 483-500
- Kwan, S.H (2003). Operating Performance of banks among Asian economics an international and firm series comparison, *Journal of Banking and Financial*, Vol 27,471-89.
- Parasuraman. Grewal L.M. (2000). The impact of technology on the quality-value-loyalty chain: a research agenda. *Journal of the Academy of Marketing Science*, 28(1), 168-174
- Proenca, F.J . and Rodrigues, M.A (2011). Comparison of users and nonusers of banking self service technology in Portugal. *Managing Service Quality*, Vol. 21(2), 192-210
- Ramsey Smith.S (1999). Factors affecting ATM usage in India: An empirical analysis, *UTMS Journal of Economics* 3 (1), 1-7
- Rifkin, J. (2009). Leading The way to third industrial revolution a new social vision for the world, *Discussion Paper*
- Rugambina, R. (1994). Predicting automated teller machine usage: the relative importance of perceptual and demographic factors, *International Journal of Bank Marketing*. 13(4)
- Summer. S (1990). Compatibility and pricing with indirect network effects: Evidence from ATMs, *National Bureau of Economic research*. 226-234

**FIRMS' RESPONSIVENESS TOWARDS
QUALITY MANAGEMENT IN
BOTTLED DRINKING WATER
MANUFACTURING INDUSTRY IN SRI LANKA**

Sri Lanka Journal of
Economic Research
Volume 2 (1)
June 2014: 67-78
Sri Lanka Forum of
University Economists

N D K Weerasekara
U K Jayasinghe-Mudalige
S M M Ikram
J M M Udugama
J C Edirisinghe
H M L K Herath



Abstract

Economic incentives that motivate, and the constraints and negative perceptions that impede, firms operating in a bottled drinking water manufacturing industry in Sri Lanka to adopt an enhanced food safety and quality meta system such as Hazard Analysis and Critical Control Points (HACCP), are examined using Discriminant Analysis. The outcome suggests that firms' response towards adoption of the HACCP is influenced by both market-based (sales, reputation, efficiency) and regulatory (existing, anticipated, judicial) incentives; yet, prevailing constraints at the level of firm (financial, technical) and negative perceptions of decision makers (awareness, hard work) hinder their propensity to adopt such systems.

Key Words: *Adoption, Bottled drinking water, Economic incentives, Food safety and quality management*

JEL Codes : *B21, L15, M11, Q12*

N D K Weerasekara

Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka
Telephone: +94717679305, email: ndkweerasekara@gmail.com

U K Jayasinghe-Mudalige

Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka
Telephone: +94 (71/77) 3628911, email: *E-mail:* udith@hotmail.com

S M M Ikram

Nielsen Lanka Company (Pvt.) Ltd., Colombo , Sri Lanka
Telephone: +94779575949, email: ikram_mohideen@yahoo.co.uk

J M M Udugama

Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka
Telephone: +9471 832 9556, email: menukaudugama@gmail.com

J C Edirisinghe

Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka
Telephone: +9471 292 0578, email: jagathed@yahoo.com

H M L K Herath

Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka
Telephone: +9477 476 0962, email: lakminikem@yahoo.com

INTRODUCTION

Accessibility to safe drinking water in right quantities is considered an important topics in economic literature and scientific forums as well as in the political circles worldwide. Provision of drinking water in various forms, for example “pipe-borne water”, to society has long been a part of the government-based utility provision in most countries, regardless of the state of the economy, i.e. developed or developing. Food markets too have responded to the persistent consumer demand for safe water by supplying it in various forms, including the manufacture of “bottled drinking water”, which by standard definition is ‘drinking water packaged in bottles for individual consumption and retail sale’. In fact, this ever increasing demand for drinking water is interconnected, to a larger extent, with changing consumer lifestyles and rapid urbanization. In this connection, consumer faith on enhanced product safety and quality attributes has also been played a major role (Veeman, 1999).

Water, though one of the most precious gifts of nature, or in economic terms a ‘pure public good’, has, in light of this paradigm shift in consumer life, overtime, been transformed to a money-making private good. Further, like in many other food items, food marketers tend to charge a premium for its improved safety and quality attributes. The global bottled water market has grown by 5.2 percent in 2011 to reach a value of US\$ 135,064 million, while the market volume grew by 5.3 percent to reach 205,902.8 million liters. In the context of Asia-Pacific region, it has grown much faster, where the value and volume grew by 10.0 and 8.9 percent to reach the total of US\$ 25,075 and 43,156.2 million liters, respectively (Market Line, 2013). Parallel to many other food products that are susceptible to food-borne hazards, if adequate measures were not taken along the food value chain to minimize the issues linked with safety and quality (e.g. meat, seafood, eggs, processed fruits and vegetables), the safety and quality of drinking water available in the marketplace is also subject to suspicion by consumers. Whereas those unsafe sources of water that are freely available for drinking form a growing demand for “purified” bottled water in the market, a firm that manufactures this product may also face a greater threat, if the product does not conform to stringent food safety and quality standards. The case may be further aggravated by the fact that many attributes of quality associated with bottled water, similar to other products mentioned above, are ‘credence’ in nature. As a result, the firm concerned may automatically face the problem of ‘signaling’ the quality of its product. As such, the safety and quality of bottled water needs to be assessed like any other food categories showing ‘credence’ characteristics (Nelson, 1970; Shapiro, 1982).

In the light of this, the registration of bottled drinking water with the Ministry of Health has become a ‘mandatory’ requirement for the sale of imported as well as locally manufactured bottled water in the local market. In the Gazette No. 1420/4 of 21st November 2005, connected to the Food Act No. 26 of 1980, it is stated that ‘no person is allowed to: (a) bottle or package natural mineral water or drinking water or, (b) import and distribute bottled or packaged natural mineral water or drinking water without obtaining a certificate of registration from the Chief Food Authority of the Ministry of Health’. This registration has to be renewed annually after conducting special audits of the water source, its environment, and water samples. Brands which fail to continue this annual renewal process of registration are, in turn, considered as “unofficial” and they are not included to the ‘list of registered firms’ published by the Food Control Administration Unit (Wijesekara, 2007). Moreover, the unofficial sources imply that there are over 100 brands of bottled drinking water currently available in the Sri Lankan markets, and deterioration of safety and quality of one or few such products can pose a threat all other firms in the market, since consumers may not be in position to identify quality products due to asymmetry in the provision of information.

Like many food processing firms in Sri Lanka, bottled water manufacturers also tend to obtain the product certification mark issued by the Sri Lanka Standard Institution (SLSI), which is commonly known as the “SLS”. However, for the said industry this is “voluntary”, and is independent from the mandate to get registration from the Ministry of Health. In fact, this voluntary scheme for obtaining the “SLS” from the SLSI is based on the primary requirement that the particular product complies with the relevant Sri Lanka standard specifications for the product; SLS 894:2003 - specification for bottled (packaged) drinking water, and SLS 1038:2003 - specification for natural mineral water (Wijesekara, 2007).

If not a mandate, now it has become an industry norm that in certain sensitive food markets, especially those in the developed countries such as Australia, Canada, Japan, the UK, and the US, that food manufacturing firms have progressively been moved towards adoption of enhanced food safety meta systems such as Hazard Analysis Critical Control Point (HACCP) and ISO 22000 in the firm (Mortimore and Wallace, 1994). In many economies where there is no such a mandate, firms adopt such systems in light of the economic incentives that they are faced with, along with market-based, regulatory and legal (Henson *et al.*, 2000; Henson and Heasman, 1998) considerations.

Although there is an enormous literature published in this area, especially in the context of economics of food industry certification, that which is particularly focused on adoption of a meta system like HACCP in the context of Sri Lankan food markets is thinner (e.g. Jayasinghe-Mudalige *et al.*, 2014 in the context of agri-food processing sector; Gajanayake *et al.*, 2006 on tea sector). To the best knowledge of the authors, there is none in the context of bottled water manufacturing industry.

In this study, we specifically examine the relative importance of various economic incentives as well as the constraints faced by bottled water manufacturing firms with a higher propensity to adopt an enhanced food safety and quality meta system like HACCP and those that have the least propensity to do so.

METHODOLOGY

Theoretical Framework

For the purpose of this analysis, HACCP has been considered as the enhanced food safety and quality Meta system that a firm which operates in the bottled drinking water manufacturing industry adopts to show its responsiveness to food safety and quality. Therefore, to facilitate analyzing the discriminating factors of “adopters of HACCP” [named: *Embracers* (EMB)] and “non-adopters of HACCP” [named: *Deferrers* (DEF)] the following criteria were applied.

Following Jayasinghe-Mudalige and Henson (2006) as well as a number of subsequent studies by the same authors and others (e.g. Herath and Henson, 2010), nine individual economic incentives that prevail at the level of a firm that motivates firms’ private action on adoption of food safety and quality meta system like HACCP were selected for the purpose of this study, including: (1) Cost/financial implications (CST); (2) Efficiency of human resources (HRE); (3) Efficiency in technical procedures (TCH); (4) Sales and revenue (SLR); (5) Reputation (REP); (6) Commercial pressure (CPR); (7) Existing government regulation (EGR); (8) Anticipated government regulations (AGR), and (9) Liability laws (LBL).

Further, a number of potential constraints that a food processing firm may face in its attempt to adopt HACCP were taken into account, including: (1) To retrain the staff in new practices; (2) Negative attitudes of the employees; (3) Inflexibilities associated with the production process; (4) To renovate the plant with new equipment; (5) Lack of reliable information about food safety/ quality controls; (6) Lack of financial support from external sources; and (7) Lack of space to accommodate new practices. Moreover, it was considered that several firm and market-specific characteristics that are likely to influence in differentiating HACCP Embracers from Deferrers, include: (1) Vintage; (2) Firm size; (3) Water source; (4) Major markets, and (5) Sales strategy (Herath *et al.*, 2007). In addition to the screening of firm characteristics, incentives and constraints to differentiate EMB and DEF of HACCP, several different negative perceptions that distract a quality assurance manager from adopting an enhanced food safety and quality Meta system were also considered to evaluate the relative importance of each on the firms to act on adoption of HACCP.

DATA COLLECTION AND ANALYSIS

Based on the list of bottled drinking water manufacturing firms in Sri Lanka, which was updated by 01st February 2013 by the Food Control Administration Unit, the 61 firms

that produce 77 different brands with a valid registration were selected as the sampling framework. A structured questionnaire was developed utilizing the first hand information gathered through a series of face-to-face discussions held with quality assurance managers of certain firms and through inspection of manufacturing facilities, which was administered with the quality assurance managers during January to March 2013 to collect data.

After several attempts to obtain an appointment for a personal interview to participate in the study, the consent to get a full information on their practices could be obtained from 30 firms, which represent nearly 50 percent of firms in full-scale operation. The quality assurance managers were asked to respond to the underlying phenomenon explaining each individual incentive and constraint in the list forwarded to them using a five-point Likert scale ranging from “very important” (5) to “very unimportant” (1), and also to each statement regarding negative perceptions on a five point Likert scale ranging from " very true" (5) to “not at all true" (1).

Discriminant Analysis (DA) was carried out to differentiate HACCP Embracers and Deferrers based on firm characteristics, economic incentives, and constraints. DA involves deriving a variate. The discriminant variate is the linear combination of the two (or more) independent variables that will discriminate best between the objects in the groups defined *a priori*. There are several purposes of DA, one of the most common and rational for application here is to investigate differences between groups on the basis of the attributes of the cases, indicating which attributes contribute most to group separation (Hair *et al.*, 1998).

The percentage of variance accounted for by each discriminant function was shown by Eigen values. The significance of Wilk’s Lambda was used to interpret the statistical significance of the discriminatory power of the discriminant function. The Wilks' Lambda and Univariate ANOVA were used to assess the significance between means of each predictor variable for the two groups. The 0.05 significance level with the lowest Wilks' Lambda value was used to enter variables into the discriminant function. The variables which could not satisfy these criteria have not been included (denoted NI in Tables 3 and 4) to the discriminant function.

Discriminant Loadings (DL) which assess the relative contribution of each predictor variable to the discriminant function were considered the most appropriate measure of discriminatory power, but the discriminant weights were also considered. Variables exhibiting a loading of ± 0.40 or higher were considered substantive. Generally, 0.40 is seen as the cut-off between important and less important variables. The cross validation approach was used to test the validity of the discriminant results as the original sample was relatively small to divide into analysis and holdout samples (Hair *et al.*, 1998).

RESULTS AND DISCUSSION

Descriptive Statistics of the Sample

Table 1 summarizes descriptive statistics of the sample. Sixty seven percent of firms in the sample were classified as “small”. The majority of firms supply their products to domestic markets only. Further, nearly 23 percent of firms supply their products to special customers, including designated hotels, restaurants, and organizations. With regard to the status of adoption of HACCP, nearly 30 percent of firms were able to be classified as “HACCP embracers”.

Table 1. Characteristics of Firms in Sample

Firm character	Description	% of firms
Vintage	< 10 years	53%
	> 10 years	47%
Employees	< 30 (small)	67%
	> 30 (large)	33%
Water source	Public water supply	0%
	Dug well	27%
	Tube well	53%
	Spring	20%
Major markets	Domestic only	80%
	Domestic + Export	20%
Sales strategy	Own brand	77%
	Own brand + Customer brands	23%

The results, overall, show that firms’ potential investments towards enhanced food safety and quality meta systems such as HACCP is triggered by both market-based and regulatory incentives side-by-side. However, prevailing constraints at the level of firm block such efforts to a greater extent. More importantly, firms’ further investments on enhanced quality management systems can largely be motivated by the “existing” and “anticipated” government regulation.

Top two box reporting, i.e. the two most favorable response options on a scale that has been used by respondents to indicate their answers (“*Very True*” and “*Somewhat True*”), was used to examine the relative importance of those negative perceptions of managers in the firms towards HACCP. The percentages of respondents who have given top two box scores for each statement are shown in Figure 1.

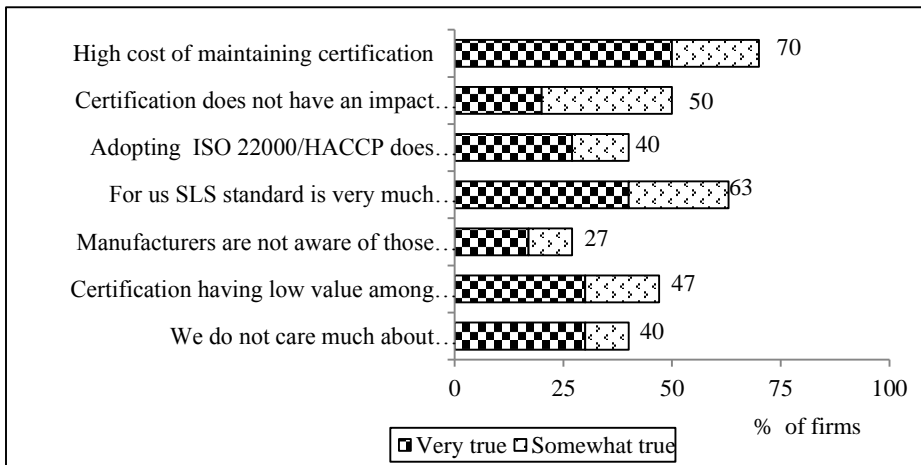
Effect of Economic Incentives, Constraints and Negative Perceptions

The Mean likert scale value of each statement representing individual incentives and constraints faced by firms are reported in Table 2.

Table 2. Mean values of economic incentives and constraints

Factor Item	Mean
<i>Incentives</i>	
I1: Cost/financial implications	4.1
I2: Efficiency of human resources	4.4
I3: Efficiency in technical procedures	4.0
I4: Sales and revenue	4.2
I5: Reputation	4.0
I6: Commercial pressure	4.1
I7: Existing government regulation	4.6
I8: Anticipated government regulations	4.6
I9: Liability laws	4.1
<i>Constraints</i>	
C1: To retrain the staff in new practices	3.9
C2: Negative attitudes	3.7
C3: Inflexibilities associated with the production process	4.0
C4: To renovate the plant with new equipment	3.6
C5: Lack of reliable information about food safety/quality controls	4.3
C6: Lack of financial support from external sources	4.3
C7: Lack of space to accommodate new practices.	3.6

Figure 1. Top Two Box Scores for Negative Perceptions about HACCP



The statement namely: ‘High cost of maintaini

ng certification’; ‘For us, SLS standard is very much enough’; ‘Certification does not

have an impact on profitability’, and ‘Certification having low value among customers’ had a high level of top two box scores, and HACCP deferrers were the majority who

have given the highest top two box scores for all attitudinal statements. Essentially, the outcome of analysis state that it is of paramount importance to raise the awareness of managers towards possible weakness of already established food safety controls in the firms.

Outcome of Discriminant Analysis

Firm Characteristics

In the DA for firm characteristics, the canonical correlation of 0.67 indicates that $(0.67)^2 = 0.45$ or 45% of variance in the dependent variable can be explained by the independent variables. The Wilk’s Lambda test was also significant with p-value 0.000 proves that there is a statistical significance of the discriminatory power of the discriminant function. Univariate ANOVA indicated that rank mean of firm size displays a significant difference between group means, while vintage, water source, major markets, and sales strategy showed an insignificant difference (Table 3).

Based on the outcome of this analysis, vintage, water source, major markets, and sales strategy cannot be used to differentiate among EMB and DEF. The DL for the firm size exceeded ± 0.40 threshold. As a result, firm size can be used in the discriminant function and be used to discriminate among EMB and DEF. According to the discriminant coefficient, there was a positive relationship between firm size and the level of HACCP adoption, i.e. large firms were more likely to embrace HACCP.

Table 3. Summary of Interpretive Measures of DA for Firm Characters

Firm Characters	Wilks' Lambda Value	Univariate F Ratio		Discriminant Coefficients		DL
		F value	Sig.	UNST	STAD	
Vintage	0.969	0.884	0.355	NI	NI	-0.270
Firm size	0.786	7.636	0.010	2.237	0.968	0.792
Water source	0.971	0.845	0.366	NI	NI	0.264
Major markets	0.952	1.400	0.247	NI	NI	0.339
Sales strategy	0.976	0.687	0.414	NI	NI	0.238

UNST – Unstandardized; STAD – Standardized; NI = Not included in estimated discriminant function

Economic Incentives

Table 5. Summary of Interpretive Measures of DA for Constraints

Constraints	Wilks' Lambda Value	Univariate F Ratio		Discriminant Coefficients		DL
		F value	Sig.	UNST	STAD	
To retain staff	0.987	0.362	0.552	NI	NI	-0.100
Negative attitudes	0.788	7.553	0.010	-1.272	-1.420	-0.456
Inflexibilities with process	0.998	0.062	0.805	NI	NI	-0.041
To renovate plant	0.942	1.721	0.200	NI	NI	-0.218
Lack of information	0.997	0.083	0.775	NI	NI	0.048
Lack of financial support	0.804	6.830	0.014	-1.387	-0.909	-0.434
Lack of space	0.999	0.015	0.904	NI	NI	-0.020

UNST – Unstandardized; STAD – Standardized; NI = Not included in estimated discriminant function

In the DA for nine incentives, the canonical correlation of 0.66 indicates that $(0.66)^2 = 0.43$ or 43% of variance in the dependent variable can be explained by the independent variables. The Wilk's Lambda test was also significant with p-value 0.000 proves that there is a statistical significance of the discriminatory

power of the discriminant

function. Univariate ANOVA indicated that rank mean of SLR displayed a significant difference between group means (Table 4).

Table 4. Summary of Interpretive Measures of DA for Economic Incentives

Economic Incentives	Wilks' Lambda Value	Univariate F Ratio		Discriminant Coefficients		DL
		F value	Sig.	UNST	STAD	
CST	0.938	1.843	0.185	NI	NI	0.503
REP	0.940	1.792	0.191	NI	NI	0.496
TCE	0.890	3.470	0.073	NI	NI	0.691
SLR	0.859	4.586	0.041	0.545	0.466	0.794
HRE	0.897	3.211	0.084	NI	NI	0.665
CPR	0.955	1.312	0.262	NI	NI	0.425
EGR	0.958	1.222	0.278	NI	NI	-0.410
AGR	0.958	1.222	0.278	NI	NI	-0.410
LBL	0.971	0.847	0.365	NI	NI	0.341

UNST – Unstandardized; STAD – Standardized; NI = Not included in estimated discriminant function

As the outcome of analysis highlights that the CST, HRE, TCH, REP, CPR, EGR, AGR and LBL showed an insignificant difference between two groups, they cannot be used to differentiate EMB from DEF. Since DL for the SLR exceeded ± 0.40 threshold, it was the most important incentive that differentiate EMB from DEF.

According to the discriminant coefficient for SLR, there was a positive relationship between SLR and the level of HACCP adoption, i.e. major motivation factor to embrace HACCP was increase in sales and revenue.

Constraints

In the DA for seven constraints used in the analysis, the canonical correlation of 0.75 indicates that $(0.75)^2 = 0.56$ or 56% of variance in the dependent variable can be explained by the independent variables. The Wilk's Lambda test was also significant with p-value 0.005 proves that there is a statistical significance of the discriminatory power of the discriminant function. Univariate ANOVA indicated that rank mean for 'Negative attitudes' and 'Lack of financial support' displayed a significant difference between group means (Table 5).

Since other five constraints showed an insignificant difference between two groups, they cannot be used to differentiate EMB from DEF. The DL for 'Negative attitudes' and 'Lack of financial support' exceeded ± 0.40 threshold; thus, they can be taken as the most important constraints that differentiate EMB from DEF.

As the discriminant coefficients of 'Negative attitudes' and 'Lack of financial support' possess a negative relationship with the level of adoption of HACCP, it is vital for firms to take remedial action to make sure that the entire process of adoption of HACCP is transparent and each and every employer in the firm needs to be educated in order to increase their awareness on it, and allocate sufficient resources to guarantee an uninterrupted adoption at every critical point to make it an effective food safety and quality management mechanism.

CONCLUSIONS

The outcome of analysis implies that large firms were more likely to adopt the meta system and sales and revenue was the major incentive for a firm to adopt HACCP in compared to a non-adopter. The major barriers faced by the firms in this process include lack of finance and negative attitudes of the employees. Further, according to the two top box scores for the negative perceptions of HACCP, the low demand for food safety standards and lack of customer awareness about the HACCP played a significant role as the reason for slow uptake of adoption of HACCP by the industry.

The implementation of HACCP might be facilitated and enhanced through cooperation and coordination between policy makers and industry organizations. First, there is a fundamental need to raise awareness of the weakness of established food safety controls. Here, information dissemination and training can play a key role. Second, finance is obviously a critical issue. Many firms, especially small and medium-sized enterprises, have difficulty accessing the required capital to fund investments. This failure of existing sources of finance may require action on the part of government. Finally, there is clearly a need to make the process of HACCP implementation and the

firm-level impacts visible to firms that are contemplating implementation. This could take the form of firm-level case studies or demonstration plants.

ACKNOWLEDGEMENT

Authors express their gratitude to the National Science Foundation of Sri Lanka for its financial assistance under its 'Competitive Research Grant Scheme' (Grant no: RG/2011/AG/01), and to Mr. T. G. G. Dharmawardana – Director, Systems Certification Division, SLSI for his continuous assistance to carry out the study.

REFERENCES

- Gajanayake, K. G. M. C. P. B., Jayasinghe-Mudalige, U. K. and Ariyaratne, G. S. D. P. C. (2006). Benefits, Costs and Constraints Associated with Adoption of a HACCP Metasystem: Experiences of First Movers in the Tea Processing Sector in Sri Lanka. *Sri Lankan Journal of Agricultural Sciences*, 43, 108 - 123.
- Government Gazette No. 1420/4 of 21st November 2005.
- Hair, J.F., Anderson, R.E., Thatham, R.L. and Black, W.C. (1998). *Multivariate Data Analysis*. 5th ed. New Jersey: Prentice-Hall.
- Henson, S., Holt, G. and Northen, J. (2000). Costs and Benefits of Implementing HACCP in the UK Dairy Processing Sector. In *The Economics of HACCP: Costs and Benefits*. Laurian J. Unnevehr (Eds.) Eagen Press. Minnesota. USA, 347-364.
- Henson, S.J. and Heasman, M. (1998). Food Safety Regulation: An Overview of Contemporary Issues. *Food policy*, 23, 9-23.
- Herath, D., Hassan, Z. and Henson, S. (2007). Adoption of food safety and quality controls: Do firm characteristics matter? Evidence from the Canadian food processing sector. *Canadian journal of Agricultural Economics*, 55, 299-314.
- Herath, D. and Henson, S. (2010). Barriers to HACCP implementation: Evidence from the food processing sector in Ontario, Canada. *Agribusiness*, 26(2), 265-279.
- Jayasinghe-Mudalige, U. K. and Henson, S. (2006). Economic Incentives for Firms to Implement Enhanced Food Safety Controls: Case of the Canadian Red Meat and Poultry Processing Sector. *Review of Agricultural Economics*, 28(4), 494-514.
- Jayasinghe-Mudalige, U. K., Ikram, S. M. M., Udugama, J. M. M., Edirisinghe, J. C. and Herath, H. M. T. K. (2014). Firms' Realization on the Intended Benefits of Adoption of Food Quality Metasystems: Case of Adoption of HACCP in the Agri-Food Processing Sector in Sri Lanka. *Journal of Agricultural Sciences*,

9(1), 12 - 23.

Market Line (2013). Market Line Industry Profile: Bottled Water in Asia-Pacific February 2013. London: Market Line.

Mortimore, S., and Wallace, C. (1994). *HACCP: A Practice Approach*. Chapman & Hall. London.

Nelson, P. 1970. Information and Consumer Behavior. *Journal of Political Economics*, 78, 311-329.

Shapiro, C. (1982). Consumer Information, Product Quality, and Seller Reputation. *Bell Journal of Economics*, 13, 20-35.

Veeman, M. (1999). Changing Consumer Demand for Food Regulations. *Canadian Journal of Agricultural Economics*, 47, 401-409.

Wijesekara, A. R. L. (2007). *Bottled drinking water- facts the consumer should know*. Available from: <http://www.dailynews.lk/2007/02/26/fea05.as> p. (Accessed 28 March 2013).

**ESTIMATION OF DEMAND AND SUPPLY
OF PULPWOOD BY ARTIFICIAL
NEURAL NETWORK:
A CASE STUDY IN TAMIL NADU**

Sri Lanka Journal of
Economic Research
Volume 2 (1)
June 2014: 79-86
Sri Lanka Forum of
University Economists



S Varadha Raj
N Narmadha
T Alagumani
M Chinnaduri
K R Ashok

Abstract

The annual demand of paper and paperboard, including newsprint is at 11.15 Million Tones (MT) in India. The per-capita consumption is nearly 10.5 kg. The growth in the number of paper mills was from 17 units in 1950 to 759 units in 2010 with the production of 10.11 MT per annum. In Tamil Nadu, Tamil Nadu News prints and Papers Limited (TNPL) and Seshasayee Paper and Board Limited (SPB) are the major pulpwood based paper industries, which require 0.8 to 0.9 MT of pulpwood per year, whereas the availability of pulpwood is nearly 0.6 to 0.65 MT per year. This short supply will affect their performance in the market. Hence, this paper is to assess the factual demand and supply gap of industrial raw materials with different forecasting methods viz., trend analysis, moving average, single exponential smoothing model and Artificial Neural Network (ANN). Based on forecast accuracy, ANN is observed as a reliable method which measures that the demand-supply gap of raw materials will be 0.01 MT and 0.24 MT in 2015 and 2020 respectively. In order to bridge the gap, industries must additionally produce raw materials by promoting resourceful captive plantation and the farm forestry area with profitable business model.

Key Words: Paper industry, Demand supply gap, Pulpwood, Forecasted value and Artificial Neural Network

JEL Codes : C13, C80, L60, L66

S Varadha-Raj

Department of Agricultural Economics, TNAU, Coimbatore, Tamil Nadu, India
Telephone: +919865021569, email: varadharajs@rediffmail.com

N Narmadha

Vanavarayar Institute of Agriculture, Pollachi, Tamil Nadu, India
Telephone: +919095043072, email: varadharajs@rediffmail.com

T Alagumani

Department of Agricultural Economics, TNAU, Coimbatore, Tamil Nadu, India
Telephone: +919942390078, email: talagumani@yahoo.co.in

M Chinnaduri

Centre for Agricultural and Rural Development Studies, TNAU, Coimbatore, Tamil Nadu, India

Telephone: +919443080887, email: mcdurai@hotmail.com

K R Ashok

Department of Agricultural Economics, TNAU, Coimbatore, Tamil Nadu, India

Telephone: +919443001852, email: ashok10tnau@yahoo.com

INTRODUCTION

The current global paper and paperboard demand is 402 million tonnes (MT) per annum and there are more than 7,745 mills producing 192 MT of pulp. The paper demand has nearly doubled in 20 years from 242.79 MT in 1990 to 402 MT in 2011-12. Paper production is projected at 521 MT per annum in 2021 (Kulkarni, 2008). Asia produces nearly 177 MT (44%) and the rest of the world produces 225 MT (56%). The per capita consumption of paper in India was only 9.3 kg in 2011 as against 42 kg in China, 22 kg in Indonesia, 25 kg in Malaysia, 250 kg in Japan and 325 kg in the USA. The demand of paper is strongly linked with GDP growth (Mohammad Aslam Khan, 2012). In 2012, there were nearly 800 paper mills in India, out of which 26 were wood-based and face challenges of short supply. The annual pulp production of 1.9 MT consumes 6.8 MT of raw wood, of which nearly 20 per cent are supplied from natural forests through government sources, and the remaining 80 per cent is supplied from Trees Outside Forest (TOF) area, especially from farmers' lands (Kulkarni, 2012).

The growth of pulpwood based industries was 5 per cent per annum in 1990s and 10 per cent in 2010. Many paper industries are not able to gain access to land where they can establish plantations and get the raw materials from natural forests. Eucalyptus, casuarina and *Melia dubia* are the important tree species used as raw material for the manufacture of pulp and paper products in Southern India (Prasad *et al.*, 2010). One tonne of paper production requires approximately 4.5 tonnes of freshly harvested pulpwood. The pulpwood demand for pulpwood based industries had increased to 21.92 million m³ in 2010 from 8.76 million m³ in 2000. This will increase to 34.67 million m³ in 2015 and 45.80 million m³ in 2020 (FAO Report, 2009).

In Tamil Nadu, Tamil Nadu Newsprint and Papers Ltd (TNPL) at Karur and Seshasayee Paper Board (SPB) at Erode are major pulpwood based paper industries that use predominantly hardwoods like eucalyptus, casuarina and miscellaneous wood as raw material. Due to the stringent forest policy, low productivity of forest cover, higher demand for pulpwood and higher installation capacity of industries, the supply (0.5 MT to 0.6MT) is not keeping up with the spiraling demand for raw material (8 lakh tonnes).

There is a huge demand for pulpwood from the paper industries and inconsistent supply of raw materials from the natural forest, together with low productivity and stringent forests acts and policies paves the way for generating adequate raw materials from the

Tree outside Forest (TOF) area especially from farmer's fields. The agricultural area is continuously shrinking over the decades due to several factors. Prime factors like climatic change and labor problems in agriculture, force farmers to make the technological and economic shift to pulpwood based agroforestry models to increase net farm income. The pulpwood based agro forestry models appear to be the only solution to meet the current spiraling requirement of raw material requirement. Scientific information on demand, supply and the gap for pulpwood would benefit all the stake holders in their decision making. This study aims at assessing the demand and supply of pulpwood to formulate strategic plans.

Review of Literature

Demand refers to wants for specific products that are backed up by an ability and willingness to buy them (Philip Kotler and Kevin Lane Keller, 2005). Subba Reddy *et al.* (2008) defined demand as a schedule that shows the amounts of a product or service the consumers are willing and able to purchase at each price in a set of possible prices during some specified time in a specified market. Acharya and Agarwal (2012) referred to demand as the quantity of a product or service which the buyers are likely to purchase at different prices in a given market at a given time. In this study, demand refers to the quantity of pulpwood required from the paper industries at a given price and time.

According to Katila and Paivo Rithinen (1990), the supply of primary forest products would be conditioned by actual forest cover, investment in forest management, the input of labor and the market prices of the products under consideration. The supply of secondary products would be governed by the availability of processing chemicals, machines, skilled labor, capital investment, market prices and their management. Supply is the quantities of product that will be offered for sale at different prices at a given time and in a given market (Acharya and Agarwal, 2012). In this study, supply refers to the quantity of pulpwood sold to the paper industries for a specific price and time by farmers, forest department and in open markets. The main source of supply is from forest department, industries owned captive plantations and contract farmers of the industry and other farm forestry plantations.

Ivaneevich *et al.* (1991) stated that forecasting is the process of using past and current information to predict future events. According to Arunkumar and Rachana Sharma (2000), forecasting refers to the statistical analysis of the past and current movements in the given time series so as to obtain clues about the future of those movements. Sakthimurugan (2004) defined that forecasting is a systematic attempt to probe the future by inference from the known facts. Time series analysis consists of breaking down past time series into four components (trend, cycle, seasonal and erratic) and projecting these components into the future. Saxena (2009) stated that forecasting is a technique to plan the future activities and is based on a past data, systematically

arranged in a predetermined way to prepare estimates for the future. He also defined forecasting as a quantitative technique to project the demand for a product or service.

METHODOLOGY

The list of tree growing farmers at selected villages was obtained from TNPL. The data from the sample farms were collected with the help of a well-structured and pre-tested interview schedule through personal interview. The demand, supply of raw materials, installing capacity, area of captive plantation, paper productions from two industries were collected for a period of 10 years from 2003 to 2012. The quantity of an input demanded is a function of the price of the input, price of other inputs, and price of output for a profit maximizing industry. The quantity of pulpwood supply is a function of output price, input prices and technology.

a) Compound Growth Rate Analysis (CGR)

In order to estimate the demand and supply of pulpwood in Tamil Nadu, compound growth rate was computed using the method of ordinary least squares by fitting the semi – logarithmic function (equation 1).

$$Y_t = ab^t \quad (1)$$

Where,

Y_t = dependent variable (demand / supply), t = time element which takes the value 1, 2, 3, n

a = intercept term , $b = (1+r)$ and r is the compound growth rate and e_t = error term. In the logarithmic form the function is expressed in equation 2.

$$\log Y_t = \log a + t \log b \quad (2)$$

$\log a$ and $\log b$ were obtained using ordinary least squares procedures and the R^2 was computed to test the goodness of fit. $(\text{Antilog } b - 1) \times 100$ gave the per cent growth rate. The future value of pulpwood was estimated as in equation 3.

$$\text{Future year} = \text{Present year} * (1 + r)^n \quad (3)$$

Where, r = Growth rate, n = Number of Years

b) Trend Analysis

Trend analysis fits a particular type of trend line or curve to a time series data. Minitab also displays the fitted trend equation and three measures to help in determining the accuracy of the fitted values by Mean Absolute Percentage Error (MAPE). The equations adopted for this purpose are specified in equations 4-6.

$$\text{Linear trend} \quad : Y_t = a + bt \quad (4)$$

$$\text{Quadratic trend} \quad : Y_t = a + bt + ct^2 \quad (5)$$

$$\text{Exponential growth trend} : Y_t = ae^{bt} \quad (6)$$

where, Y_t = trend values at time t , a = intercept parameter, b and c = slope parameters, e = exponential term and t = time period. After subjecting the original data to time series analysis in MINITAB package variations in auctioned values is notified. By the option of regression form, seasonal trend is computed and compared based on the goodness of fit by R^2 and standard error. From the best performing trend curve demand and supply were forecasted up to 2020 and evaluated for accuracy. The performances of these approaches were justified by considering their error measurement, Mean Absolute Percentage Error (MAPE).

c) Artificial Neural Network

The neural architecture consists of three or more layers, i.e. input layer, output layer and hidden layer shown in Figure.1. The functional form of this network is represented in equation 7.

$$Y_j = f(w_{ij}, X_{ij}) \quad (7)$$

where Y_j is the output of node j , $f(w_{ij}, X_{ij})$ is the transfer function, W_{ij} the connection weight between node j and node i in the lower layer and X_{ij} is the input signal from the node i in the lower layer to node j . Alyuda forecaster XL 2.4 was used for development of ANN models based on relationship of input variables and output variables.

The annual compound growth rate (CGR) of pulpwood demand was 15.41 per cent and future demand of pulpwood would be 1.18 MT in 2015-16 and 2.42 MT in 2020-21. The future pulpwood supply would be 1.12 MT in 2015-16 and 2.29 MT in 2020-21. Quadratic model was the best fit among CGR, linear and exponential models, because it had the lower MAPE value. Based on the quadratic model, the estimated demand is 1.19 MT and supply is 1.05 MT and the supply- demand gap is 0.15 MT in 2015-16. The estimated demand of pulpwood in 2020 -21 is 2.01 MT and supply is 1.68 MT and supply – demand gap is and 0.33 MT.

Figure 1: The Architecture of ANN

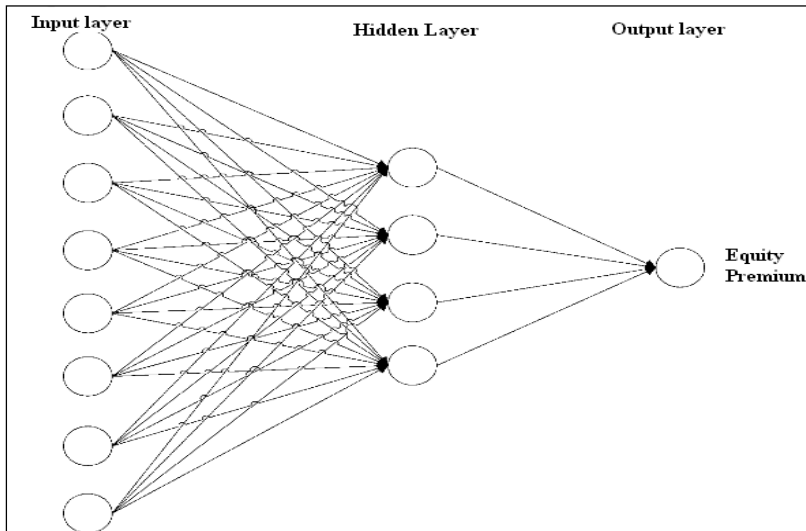
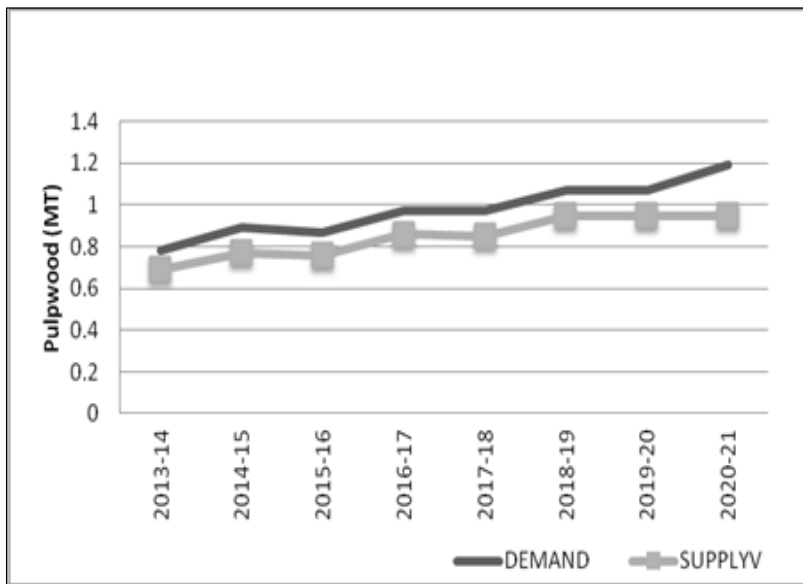


Figure 2: Forecasted Demand and Supply of Pulpwood by ANN



RESULTS

Table.1: Forecasted Demand and Supply of Pulpwood for Paper Industries in Tamil Nadu

Year	CGR			Linear			Quadratic			Exponential			ANN		
	D	S	G	D	S	G	D	S	G	D	S	G	D	S	G
2013 -14	0. 89	0. 84	0. 05	0. 83	0. 77	0. 06	0. 94	0. 84	0. 10	0. 94	0. 88	0. 06	0. 78	0. 69	0. 09
2014 -15	1. 03	0. 97	0. 06	0. 89	0. 83	0. 07	1. 06	0. 94	0. 12	1. 08	1. 02	0. 06	0. 89	0. 77	0. 12
2015 -16	1. 18	1. 12	0. 07	0. 96	0. 89	0. 07	1. 19	1. 05	0. 15	1. 25	1. 18	0. 07	0. 87	0. 76	0. 11
2016 -17	1. 37	1. 29	0. 08	1. 03	0. 95	0. 08	1. 34	1. 16	0. 18	1. 44	1. 36	0. 09	0. 97	0. 86	0. 11
2017 -18	1. 58	1. 49	0. 09	1. 09	1. 01	0. 08	1. 49	1. 28	0. 21	1. 67	1. 57	0. 10	0. 97	0. 85	0. 11
2018 -19	1. 82	1. 72	0. 10	1. 16	1. 07	0. 09	1. 65	1. 41	0. 25	1. 92	1. 81	0. 11	1. 07	0. 95	0. 12
2019 -20	2. 10	1. 98	0. 12	1. 22	1. 13	0. 09	1. 83	1. 54	0. 28	2. 22	2. 09	0. 13	1. 07	0. 95	0. 12
2020 -21	2. 42	2. 29	0. 13	1. 29	1. 19	0. 10	2. 01	1. 68	0. 33	2. 56	2. 41	0. 15	1. 19	0. 95	0. 24

D-Demand; S-Supply; G-Demand and Supply Gap

Based on the outcome of the Artificial Neural Network (ANN) model, forecast value of pulpwood demand is 0.87 MT in 2015-16 and 1.19 MT in 2020-21. The supply of pulpwood will be 0.76 MT and 0.95 MT in 2015-16 and 2020-21 respectively. The demand and supply gap of raw materials would be 0.11 MT and 0.24 MT in 2015-16 and 2020-21. Among all above methods, ANN was the best method, because it had higher R^2 and the lowest error than the quadratic model.

CONCLUSION AND POLICY RECOMMENDATION

The forecasted demand and supply gap of pulpwood for pulpwood based paper industries during 2015-16 and 2020-21 would be nearly 0.24- 0.33 MT. This short supply will affect the performance of paper industries and paper production in the country. In order to bridge the gap, the industries must additionally produce the raw material by promoting the captive plantations and the farm forestry area with eucalyptus and casuarina in TOF of 1000 – 1200 hectares per year. Tree crops of 3 to 4 year rotation are to be raised to meet out the demand and supply gap of pulpwood.

REFERENCES

- Acharya, S.S. and N.L. Agarwal. (2012). *Agricultural Marketing in India*. 5th ed. Oxford & IBH Publishing Co. Private Limited, New Delhi.
- Arunkumar and Rachana Sharma. (2000). *Principles of Business Management*: Atlantic Publishers and Distributors, New Delhi.
- FAO Report. (2009). Asia Pacific Forestry sector outlook study II. *Indian Forestry Outlook (IFO)*, Ministry of Environment and Forests, Government of India.
- Ivaneevich, Donnely and Gibson. (1991). *Principles and Functions of Business Management*, Richard D. Irwin USA: Home Wood, Illinois Inc, pp:81.
- Katila, M and Paivo Rithinen. (1990). Modeling Newsprint Consumption: A Finnish case study for the period 1960-1986. *Acta Forestalia*. pp: 217.
- Kulkarni, H. D. (2008). Private Farmer and Private Industry Partnerships for Industrial Wood Production: A case study. *International Forestry Review*. 10. p. 147–155.
- Kulkarni, H.D. (2012). Indian Paper Mills Wood Requirement and Generation. *ITC limited Paper Boards and Speciality Paper Division*, Andhra Pradesh, India.
- Mohammad A.K. (2012). Management of Paper Industries in India: Prospects and Problems. *International Journal of Business Management and Research*. 2 (3): p. 54-62.
- Philip K. and Kevin L.K. (2005). *Marketing Management: Prentice-Hall of India Private Limited*. New Delhi.
- Sakthimurugan. (2004) *Management Principles and Practices: New age International publishers*. New Delhi.
- Saxena, J.P. (2009). *Production and Operation Management*, Tata McGraw Hills Education Private Limited, New Delhi.
- Subba R., Ram R. S,P, Sastry N.T.V., and I.B. Devi. (2008). *Agricultural Economics*: Oxford & IBH Publishing Co. Private Limited, New Delhi.

PERSPECTIVES

PERSPECTIVES

Sri Lanka Journal of
Economic Research
Volume 2 (1)
June 2014: 89-106
Sri Lanka Forum of
University Economists

**VALUING ECOLOGICAL GOODS
AND SERVICES:
AN ANALYTICAL FRAMEWORK FOR
POLICY MAKERS**

Chatura Rodrigo

Institute of Policy Studies, Colombo, Sri Lanka



Abstract

Organic farming is a significant source of producing Ecosystem Goods and Services (EGSs). They are capable of producing many environmental benefits as well as health benefits. These benefits are utilized by consumers as well as the organic farmers. Recently with the growing concern over environmental and health issues and the fiscal burden of continuing fertilizer subsidy for paddy, the government of Sri Lanka encouraged paddy farmers to engage in organic farming. However, governments' efforts were not successful and they had to increase the chemical fertilizer subsidy again. This suggests that successful policy needs to be evidenced based and needs to move out of traditional and conventional frameworks. This paper argues that organic paddy farming policies needs to be conceptualized in the perspective of EGSs. Further understanding ways to look at it from demand as well as supply side is quite essential. This paper provides an analytical frame work for evidenced based policy making, looking at promoting organic paddy farming from a EGSs perspective.

Key Words: *Ecosystem goods and services, Organic paddy farming, Opportunity cost of supply, Willingness to pay*

INTRODUCTION

Rice is the staple food of Sri Lanka. Ensuring the continuous production and establishing self-sufficiency in rice is a top priority of the government of Sri Lanka (Government of Sri Lanka, 2010). Therefore, even today, most agriculture policies in the country are thoroughly focused on increasing the output and productivity of farming systems. This was predominately done by providing input subsidies such as the fertilizer subsidy to increase the production. However with growing concerns over the environmental and social negative externalities, many argued the environmental, social and financial sustainability of chemical based paddy production. Recently strong suggestions emerged over promoting organic rice farming to address the mentioned negative externalities and heavy financial burdens.

Organic rice farming was not seen favourably as a potential way of increasing output/productivity (Somasiri, 2007). Over the years, farmers have either converted to or started organic rice farming in a very slow pace. (Rosairo, 2006). Generally, organic rice products are tagged with higher prices, hence they do not attract a broad consumer base in the country. Most organic products produced were consumed at the same farm households without even entering the market place. While there were organic markets established in the outskirts of cities it attracted a very limited number of consumers (Small Organic Farmers Association, 2013, Ceylon Today 2013). However, with a growing middle class, the country's rise to middle income status, increased health and environmental consciousness, concerns over budgetary and financial commitments towards the fertilizer subsidy and the government commitment towards sustainable agriculture; an interest has developed among policy makers, farmers as well as consumers on the possibilities of increasing the output and consumption of organic farming in Sri Lanka. Yet, looking at organic produce simply as another consumer good would not help much for its development. One possible and a promising way to argue whether organic rice in Sri Lanka has a potential future is to look at it from a perspective of Ecosystems Goods and Services (EGSs).

Organic rice farming is one of the significant ways of producing EGSs (Gerowitt et al, 2003)¹⁷. In addition to offering healthy products for human/animal consumption, organic farming systems are capable of providing EGS's such as clean water, clean air, good health, aesthetic/amenity benefits, bio-diversity and ecological conservation and soil improvements (EFTEC, 2005). Realizing some of these important attributes of organic rice farming, the government of Sri Lanka, through its 2013 budget imposed a fertilizer subsidy cut of 25% asking farmers to adopt more organic agriculture. However, it did not materialize as expected, hence the government increased the fertilizer subsidy again in the budget of 2014 imposing only a 10% fertilizer subsidy

¹⁷ Ecosystem goods and services (EGS) are products and benefits arising to humans from healthy productive ecological systems (Millennium Ecosystem Assessment, 2005). Agriculture is both a provider and beneficiary of EGS (Mann and Wüstemann, 2008).

cut.¹⁸ This shows the lack of information with the policy makers on the different profit and cost structures and demand and supply characteristics among organic and inorganic rice farmers of Sri Lanka. For example, opportunity cost supply will be a main deciding factor for a farmer to give up inorganic agriculture and convert to organic farming. At the same time a farmer would be conscious about the consumers' willingness to pay for (WTP) organic rice at a price premium. Therefore a successful policy intervention must carefully evaluate the profit structure between organic and inorganic farming, opportunity cost of supply in organic farming and the compensation level offered by the price premium or the WTP.

It is not that researchers have not looked at the potentials of organic rice farming in Sri Lanka (Siriwardane and Gunaratne, 2010, Ratnayake, 2010). The failure is that they did not look at it from an EGS point of view. Therefore, this review study is focused on providing an analytical framework for policy makers to look at the demand and supply of organic rice in Sri Lanka. The next section of this paper is focused on providing a broader background on the concept of EGS. It will also include several international studies that looked at formulating policies for agricultural produce and systems that produce EGS. Then this paper will provide an analytical frame work for policy makers. Finally, a comprehensive research plan for an evidence based policy decision on promoting organic paddy farming is provided as annexes.

Background to Ecosystem Goods and Services (EGS)

Why is Organic Agriculture Important? : Ecosystem Services from Agriculture Farming Systems

EGS are the benefits people derive from functioning ecosystems, ecological characteristics, functions, or processes that directly or indirectly contribute to human well-being (Costanza et al, 1997). Many ecosystems that generate EGSs hold the property of "multifunctionality" (Abler, 2004). Ecosystem processes and functions, while contributing to ecosystem services, however, are not synonymous with EGS as they exist regardless of whether or not humans benefit (Boyd and Banzhaf, 2007, Granek et al, 2010). Hence, EGS exist if they contribute to human well-being only and cannot be defined independently (de Groot, 2002).

Many ecosystem services are public goods. This means that multiple users can simultaneously benefit from using them and it is difficult to exclude people from benefiting from them. Being public goods, EGS are generally not traded in markets. We need to develop other methods to assess their value. There are a number of methods that can be used to estimate or measure benefits from ecosystems. Valuation can be expressed in several ways, including money, physical units, or indices. Economists have developed a number of valuation methods that typically use monetary units (Freeman,

¹⁸ This information are published on the president's budget speeches for 2013 and 2014.
<http://www.treasury.gov.lk>

2003) whereas ecologists and others have developed measures expressed in a variety of nonmonetary units such as biophysical trade-offs and qualitative analyses (Costanza et al, 2004).

The agriculture sector is increasingly gaining its reputation as a means of providing valuable outputs in addition to the traditional commodities that generate income (Randall, 2003). A number of studies that examined EGS produced from agricultural systems have appeared recently (Sandhu et al, 2010 and Power, 2010). Being an ecosystem that generates EGSs, the agricultural systems are also multifunctional (Abler, 2004). As mentioned before, they are capable of producing environmental, economic and social functions. These EGSs are produced not separately but as a system, hence it is a “joint production”. Many EGSs produced through agricultural systems are externalities. For example, generating a health food is a direct positive externality while improving biodiversity is an indirect positive externality. Kallas et al (2006, 2007, 2008) highlight the point that in order to design operative public policies, multifunctionality of agricultural systems need to be carefully understood in terms of social demand for them. Kallas et al (2006) employed a contingent valuation method and an analytical hierarchy method for their analysis and found that there is a significant demand for different attributes of agricultural systems. They further identified that demand is heterogeneous but is based on the socio-economic characteristics of the individual person. Ecosystem services with agriculture can be categorized into four groups: provisioning, supporting, regulating and cultural services) as explained by (Reid et al 2005, Cullen et al, 2004, Sandhu et al, 2007, Zhang et al, 2007, UN 2008).

Provisioning goods and services: These are foods and services for direct human consumption. They range from food, forage, biofuels, and fuel woods to the conservation of species and agro-biodiversity (de Groot et al, 2002, Reid et al, 2005). These goods and services are produced in agricultural landscapes.

Supporting services: These services will help the production of other ecosystem goods and services. They will support the production of the grains, wool, fruits, and vegetables etc. Key supporting ecosystem services associated with agricultural systems are biological control of pests (natural enemies of insect pests control the pest populations), biological control of diseases and weeds (natural suppression by soil microbes of soil-borne diseases and weed seed removal by predators), pollination (for seed production), nutrient supply (availability of nutrients by soil microbial activity), carbon sequestration (storage of carbon in soils and vegetation), soil formation (soil turnover by earthworms) etc. The global economic value of these ecosystem services was estimated to be \$100, \$80, \$100, \$90, \$135 and \$25 billion annually, respectively (Pimentel et al, 1997).

Regulating services: Ecosystems regulate essential ecological processes that maintain temperature and precipitation (Costanza et al 1997, Daily, 1997).

Regulating services associated with agriculture regulate fluctuations in water provisions and temperature.

Cultural services: Cultural services contribute to the maintenance of human health and well-being by providing recreation, aesthetics and educational opportunities (Costanza et al, 1997, de Groot et al, 2002 , Reid et al 2005)

This study is focused on organic rice farming systems, with the use of traditional paddy varieties. Organic agriculture is defined as “a holistic production management system (whose) primary goal is to optimize the health and productivity of independent communities of soil, life, plants animals and people” (UNCTAD, 2006). Therefore it aims to utilize and maintain ecosystem services by improving the natural environment, increased water retention, reduced soil erosion and increased agro-biodiversity (UN, 2008). At present organic farming, including organic rice is practiced on over 31 million hectares of land with a global market estimated at more than US 26.8 billion which is increasing at a 20% a year (Willer and Yussefi, 2006). Organic rice farming is a major component of organic agriculture, especially in the Asian region. Rice is the staple food of Sri Lanka and around 37% of the cultivatable land is allocated for rice farming. Among that, close to 10% is employed for commercial organic rice farming.

Why is Organic Rice Farming Important to Sri Lanka?

There are some specific ecosystem services to a rice production system and those are: production of a toxic free produce, soil quality improvement, increasing the biodiversity and water quality improvement. However these benefits are interconnected. Enhance in the one aspect would have a ripple effect on the other factors and will ultimately boost the productivity of the farming environment. Most of the time benefits of EGSs are not limited to the onsite farm land. Rather they will be felt strongly in the downstream. For example, use of less pesticides will result in less run off of nitrates to water which will be beneficial to onsite farmers as well as downstream farmers (OFRF 2011).

Health benefits from organic rice come through organic produce. It is free of toxic materials since cultivation does not use chemicals such as pesticides, herbicides, insecticides and inorganic fertilizers. As a result, incidences of pesticide availability are extremely low in organic produce and this is common to organic rice also. Again these benefits are materialized by farmers only if they consume what they produce, otherwise it is a benefit to the consumers of organic rice. (Pompratansombt et al, 2011). On average organic farming reduces the chances of having pesticide residuals in the produce by 70% while having more inorganic practices are only capable of doing this at >30%. A mixed cultivation has the potential to bring this close to 50% (Baker et al, 2002).

Application of organic fertilizer increases the soil water holding capacity, improve the bonds between the root system and soil, improve the soil aeration and prevent soil

erosion. Application of the chemical fertilizer and cultivation of improved commercial rice varieties have over the years degraded the soil quality, and most paddy lands could become barren (Colombo et al, 2003). On average, organic agriculture will cause about 25% less erosion than conventional agriculture under otherwise identical site conditions. The inorganic dominant farming is capable of producing only 5% less erosion while a mixed method would yield somewhere close to 15%. (Auerswald et al, 2003).

Biodiversity is protected by organic farming systems since it does not use any chemicals that could harm the fauna and flora of the paddy field environment. The organic farming systems are capable of preserving the soil micro and macro organisms in the field itself, which in turn improve the soil quality. Chemical free environment can boost the natural pollination process, which helps the spread of the local flora (Milon et al, 2006). A comprehensive analysis of 66 scientific studies shows that organically farmed areas have on average 30 percent more species and 50 percent more individuals than non-organic areas. Inorganic dominant farming is capable of increasing species percentages only close to 5% and a mixed method would have an increased of species diversity close to 15% (RIOA, 2011).

Rainfall and irrigation water normally wash chemicals and inorganic fertilizer away to the water streams. This damages the water quality, harms the water fauna and flora and also create health hazards such as kidney diseases for human. However, organic farming does not yield heavy metal and other chemicals that could drain in to nearby water streams, hence the possibility of controlling the water pollution is high (Weligamage, 2013). There are many aspects of water quality improvements by organic farming. Organic farming reduces the nutrient runoff and thereby reducing the nitrate-nitrogen levels in the water by 60%. Adapting more inorganic farming will reduce this level close only to 10% and a mixed method will result somewhere close to 30% (OFRF 2011).

An Analytical Framework

There are many ways to value the EGSs produced by different ecosystems. These approaches can be either representing stated preference methods or revealed preference methods concentrating both the consumer and the producer side of organic rice. Among stated preference methods, choice experiments have earned a significant reputation. Stated preference methods are used in hypothetical scenarios. In order to apply the stated preference method the context where the valuation is applied has to be hypothetical, but in the case of organic rice farming, it is a reality, products are available in the market place where consumers pay a price premium, hence it does not necessarily fit in to the application criteria of a stated preference method. This does not mean that employing stated preference methods are incorrect, it simply means that the stated method application can be simple since much information is available through the price signals. However, identification of different components of the price premium and

what would consumers pay for improvements of those components is quite important to study in evidence-based policy formulation.

How Can We Look at This From a Supply Side Perspective?

Ideally, it is best to use a “production function approach” in valuing the EGSs produced by the organic rice farming systems in Sri Lanka. There are many revealed preference methods such as travel cost method, hedonic pricing method and replacement cost techniques. However, using EGSs as a productive approach requires plot level data on EGSs produced. For example, if using organic fertilizer improves the soil quality then ideally, the research needs to estimate the soil quality parameters for all the plots that it surveys. This is a tedious task which requires more budgets and time hence falls outside the scope of the research. Rather it is possible to compare the profits and cost of cultivation of organic and inorganic rice by estimating a production function. Further it is also possible to estimate the opportunity cost of supplying organic rice by estimating output supply and input demand functions. These approaches will allow policy makers to look at the production system of organic rice in a more detailed manner while capturing the economics of supplying the total EGSs from an organic rice farming system. Several studies in literature that have used similar kind of approach in valuing EGSs from different ecosystems are Barbier (2000), Subhrendu, (2004), Subhrendu and Mercer (1998), Subhrendu and Karmer (2001) and Subhrendu and Butry, (2001). A detailed theoretical and empirical framework for analysis is provided in the Annex 1 and Annex 2.

How Can We Look at This From a Demand Side Perspective?

Compared to non-organic produce, the organic produce which comes out of organic farming represents many EGS that have both use and non-use values (Sandhu et al, 2010). Organic produce attracts higher prices in the market place (Dettmann, 2008). Here the premium for organic produce over non-organic produce can be assumed as payments to EGS associated with organic produce.

$$P = P_o - P_N$$

Where P = Payment for EGS, P_O= price of organic produce and P_N= price of non-organic produce. Therefore, the higher price of organic produce represents the demand for the EGS that are associated with organic produce. Hence by estimating demand for organic produce relative to non-organic produce, it could be expected to capture consumers demand for EGS. Payments for EGS could be a result of two major attributes—source of value origin and trust. As far as source of value origin is concerned, payments could be originated from use values and non-use values placed by individual consumers upon organic produce. The use values that generated by organic farming may include both direct and indirect values. Direct values may be generated from perceptions about health benefits and absence of toxic materials etc. Indirect uses

values may represent perceived eco-system services such as soil preservation, bio-diversity conservation, generating esthetic appeal and water pollution control. Payments could also be originated from consumers' expectations about non-use values. Two of such non-use values are existence values¹⁹ and bequest values²⁰. Hence, the payment to EGS (P) captured in price of organic produce can be disaggregated as follows:

$$P = p_d + p_i + p_n$$

Where, p_d = payments for direct use values (e.g. perceived health benefits), p_i = payments for indirect use values (e.g. perceived eco-system services) and p_n = payments for non-use values (e.g. existence value). Consumers could have variations in values placed upon a given organic produce based on their individual preferences over different sources of origin of value. In addition, consumers' demand (payments) for EGS could be expected to vary according to trust on the product source. Consumers build a trust towards organic produce that carry labeling and certifications (Dimitri and Greene, 2002). For instance consumers may be willing to pay more for certified product than non-certified product. Hence for the same organic produce:

$$P_{co} \geq P_{no}$$

where P_{co} = payments to produce from certified producer and P_{no} = payments to produce from non-certified producer. The above analysis of price of organic products as a carrier and indicator of demand for EGSs helps to provide useful insights with important policy implications. It suggests that demand for EGSs from consumers are influenced by two major attributes—source of value origin and trust.

CONCLUSIONS

It is important to think outside the conventional paradigm if organic rice farming is to be a success in Sri Lanka. Evidence-based policy making calls for looking at policy formulation from an innovative lens. Therefore, understanding and exploring organic paddy farming through the provision of Ecosystem Goods and Services is important. How much would farmers forgo in producing EGSs by organic paddy farming as oppose to inorganic farming with the available fertilizer subsidy is important to understand in order to provide necessary incentives for promotion of organic paddy farming. At the same time, it is important how much consumers would be willing to pay for the EGSs produced by organic paddy farming, which is visible through the prices for organic rice. A better evidence based policy needs to look at both of these aspects of demand and supply.

¹⁹ Consumers might not be utilizing and direct or indirect benefits of organic farming yet they would like to know that it exists

²⁰ Even though consumers might not utilize any benefits now, they would prefer it to be available for future generations

Annex 1

Theoretical Idea

The organic rice production system is focused on the production process of an agricultural household. Here, the supply of EGSs that are associated with the organic rice farming systems are measured by differences in the profits and cost structures of organic and inorganic farmers and the opportunity cost of supplying organic rice compared to inorganic rice. In neoclassical economic theory, welfare is identified within a utility maximization framework; therefore, the theoretical model needs to capture cost of supplying EGSs, production process of organic rice, profits generated from organic rice production and the utility of the farming households. Agricultural households maximizes their utility, and this utility is a function of the agricultural commodity they produce (in this case it is the organic rice), and inputs they use to produce the agricultural commodity. However, this function is subjected to household characteristics. Furthermore, the utility of organic rice farming household is subjected to four constraints, and those are:

- a. Input constraint: Sum of the “own” input supply and “own” input consumption cannot exceed the household input endowment which depends on the household characteristics.
- b. Agricultural production function assumes that EGSs of organic rice farming system is a fixed input to the farming system itself and it helps to increase the farming environment better (through improved soil quality, improved water quality, increased biodiversity and pesticide free environment and a product). These EGSs are hard to measure at farm level, but they all create a favorable environment for farming, which inorganic farming systems does not create. There is no such thing as EGS to an inorganic farmer.
- c. Household budget constraint establishes that all the expenditures are equal to the sum of the monetary equivalent of the household input endowment, agricultural profits, and the exogenous income (Strauss, 1986).
- d. Market environment constraints: if a perfect market exists for a given output or an input, then they can be freely traded and the market constraint is not binding.

Based on this information it is possible to write a profit maximization problem,

For both organic and inorganic farmers;

Here, EGSs or the environment is not taken as an independent variable since this research would not be measuring it at plot levels:

Maximize, x, y, q, v, μ, β

$$L = u(X, Y, H) + \beta [p_v \cdot T(H) + (p_q \cdot Q - p_v \cdot V) + E - p_v \cdot Y - P_q \cdot X] - \beta [F(Q, V, Z)] + \mu_q [M_Q - Q + X] + \mu_v [M_V - V + T(H) - Y] \quad (1)$$

where, X= Agricultural commodity (Organic/inorganic rice), Y= production Inputs, H= Household characteristics, T= input endowment, V= Production inputs, Z= Biophysical and socioeconomic inputs, Q= outputs, E= exogenous income, P= price (P_v = Price of inputs, P_q = price of outputs) (Subhrendu and Karmer, 2001). Using the first equation, it is possible to see the differences in profits and costs of organic farmers and inorganic farmers, which is the first objective of this study. In order to achieve the second objective, the opportunity cost of supplying organic rice, this function needs to be transformed in to an output supply/input demand function.

Input Demand Function

Assume a production Cobb Douglas production function (flexible function form) for the moment. In this scenario only static conditions are looked at, dynamic conditions that include fixed inputs and risks are not considered. For explanatory purposes, variables inputs are also taken as two separate variable sets. One is representing fertilizers (organic/inorganic) and pesticides (inorganic/bio-pesticides) and other representing all the other variables inputs, for example, labour.

$$Q = aX^\beta W^\alpha \quad (2)$$

where, Q= Quantity of rice produced, X= Variable inputs other than fertilizers and pesticides, Z= Variable inputs: fertilizers and pesticides (for explanation purposes fertilizers and pesticides are taken together, but in analysis they will be separated). For an inorganic farmer these inputs are the organic fertilizers and the bio-pesticides.

We can substitute this production function in to the profit function as the first step in obtaining an input demand function:

$$\Pi = p(aX^\beta Z^\alpha) - W(X, Z) \quad (3)$$

Where, Π = Farm profits, W= Price of variable inputs and P= price of output.

Profit maximizing uses of inputs occur where the first derivation of this equation is equal to zero.

$$d\pi/dx = p(a\beta X^{\beta-1} Z^\alpha) - W \quad (4)$$

We can solve this equation for W

$$W = p a\beta X^{\beta-1} Z^\alpha \quad (5)$$

This is the inverse input demand function. In this equation, the right hand side gives the marginal value product of the variable input X. it shows the farmers' willingness to pay for the variable input X. Similarly it is possible to calculate the farmers' willingness to pay for variable input Z (either inorganic fertilizers and pesticides or organic fertilizers and bio-pesticides).

It is also possible to solve the equation for X or Z. Then it becomes the standard (non-inverse) input demand function.

$$X = [\{p\alpha\beta Z^\alpha\} / W]^{(1/1-\beta)} \quad (6)$$

This does not include the physical quantities of output and it is the profit maximizing variable input to be used by the farmer.

Output Supply Function

Output supply function is obtained by substituting the equation (6) back in to the equation (2). Then,

$$Q = a [p\alpha\beta Z^\alpha]^{(1/1-\beta)} * Z^\alpha \quad (7)$$

The output supply function is the similar version of the marginal cost function that describes the same supply relationship.

Profit Function

Using profit maximizing input demand function and output supply function it is possible to construct the profit function for an organic/inorganic farmer. Consider the equation (3) again and substitute equation (5) and (6) to that.

$$\Pi = p[a[p\alpha\beta Z^\alpha/Z]^{(1/1-\beta)} Z^\alpha] - W(p\alpha\beta Z^\alpha/W)^{(1/1-\beta)} \quad (8)$$

With Shepherd's Lemma it is possible to go back to the input demand and output supply function from the above profit function which is the analogous to the Hotelling's Lemma associated with the cost function.

(Vincent, 2008)

Annex 2

An Empirical Model

The empirical model is centered on a profit function. The function form of the profit function will be specifically catered to the production technology of the organic/inorganic rice. However it can be a functional form such as a normalized quadratic, a second order flexible approximation of the profit function or the Cobb-Douglas profit function. Thompson (1998) talks about 14 different flexible functional forms and this research will explore all the possibilities and will select the best functional form of the profit function to carry out the empirical estimations to establish the relationship between the EGSs and the household organic rice production. An agricultural household maximises its profits subject to a production function. (Subhrendu and Karner, 2001).

$$\pi = TR \text{ (Total Revenue)} - TC \text{ (Total cost)}$$

$$TR = P (Y)$$

where, P is the price of output and Y is the agricultural produce in this case it is the organic/inorganic rice.

$$TC = P. Q$$

where, P is the price of the input and Q is the amount of particular input.

This is where there is a single output with a single input, but in reality there are multiple outputs with multiple inputs. For this research there is only a single output, which is the organic/inorganic rice but there will be multiple inputs, hence the production function of the organic rice producing household will take the most general form of (without considering any particular production form):

$$Q = F (Z, H, B)$$

where, Q = quantity of organic rice production, Z = the fixed inputs, H = Socio economic and demographic characteristics and B = farm land specific characteristics (Biophysical characteristics of the farming environment)

For example a Cobb-Douglas profit function will take the form of (Subhrendu and Mercer, 1998):

$$\ln \pi = \alpha_y \ln P_y + \alpha_x \ln P_x + \alpha_{fx} \ln Z_{fx} + \alpha_{hc} \ln H_{hc} + \alpha_{bc} \ln B_{bc} + \varepsilon \quad (9)$$

where,

Π = Farm household profits, P_y = output prices, P_x = Input prices, Z_{fx} = Fixed inputs, H_{hc} = Socio economic and demographic characteristics and B_{bc} = farm land specific characteristics (Biophysical characteristics of the farming environment)

Maximization of the profit function with respect to the production function (production technology), will enable to derive a factor demand function for respective factors of production. Substituting them in the production function will allow deriving output supply functions or input demand function. Basically these equations are derived by taking the first derivatives of the profit function with respect to the price (applying Hotelling's Lemma). Therefore, there are cross-equation restrictions on all coefficients. Therefore on the EGS-price interactions terms in the profit equation are equal to the coefficients on the EGS term in the output supply or input demand equation. The estimation of these functions could be done individually and also as a system of equations. The proper method to employ will be selected based on the characteristics of data (Subhrendu and Karmer, 2001, Vincent, 2008).

REFERENCES

- Abler, D. (2004). Multifunctionality, Agricultural Policy, and Environmental Policy. *Agricultural and Resource Economics Review*, 33(1), 8-17
- Auerswald, K., Kainz, M., Fiener, P. (2003). Soil Erosion Potential of organic Verses Conventional Farming Evaluated by USLE Modelling of Cropping Statistics for Agricultural Districts in Bavaria. *Soil Use and Management*, 19,305-311.
- Gerowitt, B., Isselstein, J., and Marggraf, R. (2003). Rewarding for Ecological Goods-Requirements and Perspectives for Agricultural Land Use. *Agriculture Ecosystems and Environment*, 98 541-547
- Baker, B. P., Benbrook, C. M., Groth III E. and Lutz K. (2002). Pesticide residues in Conventional, Integrated Pest Management (IPM)-Grown and Organic Foods: Insights form Three US Data Sets. *Food Additives and Contaminants*, 19(5), 427-446.
- Barbier, E. B. (2006). Valuing Ecosystem Services as Productive Inputs. *Journal of Economic Policy*, 22, 49, 77-229.
- Boyd J., and Banzhaf, S., (2007). What are Ecosystem Services? The need for Standardized Environmental Accounting Units. *Journal fo Ecological Economics*, 63, 616-626
- Cincotta, R.P. and Engleman, R. (2000). Nature's Place: Human Population and the Future of Biological Diversity. *Population Action International*, Washington, D.C.
- Colombo, S, Hanley, N, and Calatrava-Requena J. (2003). Designing Policy for Reducing the Off-Farm Effects of Soil Erosion Using Choice Experiments. *Journal of Agricultural Economics*, 56(1), 81-95
- Costanza, R. and Folke, C. (1997). Valuing ecosystem services with efficiency, fairness and sustainability as goals. *Island Press*, Washington
- Costanza, R. d'Arge, R., de Groot., Farber, Hannon, S. G., M, Limburg, B., Naeem K., S., O'Neill, R.V., Paruelo, J., Raskin, R.G., Sutton, P., van den Belt, M. (1997). The Value of the World's Ecosystem Services and Natural Capital. *Nature* 387, 253-260.
- Costanza, R., Stern, D., I, Fisger, B. P., He L., and Ma C. (2004), Influential Publications in Ecological Economics: A Citation Analysis. *Rensselaer, Working papers in economics*.

- Costanza, R., d'Arge, R., de Groot, R., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem S., O'Neill R. V., Paruelo J., Raskin R., Sutton P. and van den Belt M. (1997). The Value of the World's Ecosystem Services and Natural Capital, *Nature*, 387,253-260
- De Groot, R.S, Wilson, M.A, Boumans R.M.J. (2002) A typology for the classification, description and valuation of ecosystem functions, goods and services. *Ecol Econ.*;41, 393–408.
- de Groot, R., van der Perk, J., Chiesura A., & Margulies S. (2000). Ecological functions and socioeconomic values of critical natural capital as a measure for ecological integrity and environmental health. In *Implementing ecological integrity* (pp. 191-214). Springer Netherlands.
- Ryszkowski, and Westra, L. (eds.), *Implementing Ecological Integrity: restoring regional and global environmental and Human Health. NATO-Science Series, IV. Earth and Environmental Sciences Vol. 1*, Kluwer Academic Publications, London. pp. 191-214.
- De Groot, R.S., Wilson, M.A., Boumans R.M.J. (2002). A typology for Classification, description and Valuation of Ecosystem Functions, Goods and Services, *Ecological Economics*, 41, 393-408.
- Mahinda Chinthana*. (2010). Department of National Planning, Government of Sri Lanka.
- Dettmann, L., R., (2008). *Organic Produce: Who's Eating it?, A Demographic Profile of Organic Produce Consumers*. Economic Research Service, USDA
- The Economic, Social and Ecological Value of Ecosystem Services, A Literature Review, (2005). *EFTEC*. Department of Environment, Food and Rural Affairs, UK,
- Freeman, M., A., 2003. *The Measurement of Environmental and Resource Values: Theory and Methods*, 2nd Edition, RFF Press
- Granek, E. F., Polasky, S., Kappel, C. V., Reed, J. D., Stoms, D. M., Koch, E., W., Aswani, S., Barbier, E. B. Ceamer, L. A., Hacker, S. D., Kennedy, J. C., Ruckelshaus, M., Perillo, G. M. E., Silliman, B. R., Muthiga, N., Bael, D., and Wolanski, E. (2009). Ecosystem Services as a Common Language for Coastal Ecosystem-Based Management. *Conservation Biology*, 24(1), 204-216
- Somasiri, H.P.S., *Sustainability of Paddy Fields and Ecosystems Towards Society*, 4th ed. INWEPF Steering Meeting and Symposium, Bangkok, Thailand

- Rosairo, H.S.R., (2006). Are Organic Vegetables a Marketing Failure in Sri Lanka, *The Journal of Agricultural Science*, Vol 1(3),
- Hoyas, D. (2010). The State of the Art of Environmental Valuation with Discrete Choice Experiments, *Ecological Economics*, 69, 1695-1603
- Siriwardana, K.S.D. and Gunaratne, L.H.P., Analysis of Public Choice on Environmental Health Management: The Case of Dengue Fever Control in Kandy District, *Sri Lanka Journal of Agriculture Economics*, 2010.
- Kallas, Z, Gomez-Limon, A. J. and Hurlle, B. J. (2007). Decomposing the Value of Agricultural Multifunctionality: Combining Contingent Valuation and the Analytical Hierarchy Process, *Journal of Agricultural Economics*, 58 (2), 218-241.
- Kallas, Z, Gomez-Limon, J.A. and Arriaza, M. (2007). Are Citizens Willing to Pay for Agricultural Multifunctionality? *Agricultural Economics*, 36 (3), 307-321
- Kallas, Z, Gomez-Limon, J. A., and Arriaza, M. (2008). Demand for Non-Commodity outputs From Extensive Agricultural Systems. *Mediterranean Journal of Economics, Agriculture and Environment*, 7 (1), 4-13.
- Lohr, L. (2009). Economic, Social and Environmental Benefits Associated with U.S Organic Agriculture.
- Mann, S. and Wüstemann, H. (2008). Multi-functionality and a new focus on externalities. *Journal of Socio-Economics*. 37(1), 293-307
- Millennium Ecosystem Assessment. (2005). *Ecosystems and Human Well-Being: Synthesis*
- Milton, W. J., and Scrogin, D.,(2006). Latent Preferences and Valuation of Wetland Ecosystem Restoration. *Ecological Economics*, 56, 162-175
- Organic Farming Research Foundation. USA (2011).Organic farming for Health and Prosperity.
- Ratnayake, P. U. (2012). A collaborative approach between tourism and coastal communities: a present-day need and opportunity for mangrove management and conservation in Sri Lanka. *Sharing Lessons on Mangrove Restoration*, 63.
- Pandey, R. (2009). Indices for Measuring Forest Ecosystem Goods and Services Contribution to the Rural Community: A Tool for Informed Decisions. HNB Garhwal University, India.
- Pattanayak, S. K., & Butry, D. T. (2002). Complementarity of Forests and Farms: A Spatial Econometric Approach to Ecosystem Valuation in Indonesia.

- Pattanayak, S., K., and Karmar, R., A. (2001). Worth of Watersheds: A Producer Surplus Approach for Valuing Drought Mitigation in Eastern Indonesia. *Journal of Environment and Development Economics*, 6, 123-146
- Pattanayak, S., P. (2004). Valuing Watershed Services: Concepts and Empirics from Southeast Asia. *Journal of Agriculture, Ecosystems and Environment*, 104, 171-184.
- Pattanayak, S., P., and Mercer, D., E. (1998). Valuing Soil Conservation Benefits of Agroforestry: Contour Hedgerows in Eastern Visayas, Philippines. *Journal of Agriculture economics*, Vol 18, pp 31-46
- Pimental, D., Wilson, C., MccULLUM s., Huang, R., Dwen P., Flack, J., Tran, Q., Saltman, T., and Cliff, B. (1997). Economic and Environmental Benefits of Biodiversity. *BioScience*, 47, pp 747-758.
- Pompratansombt, P., Bauer B., and Boland H. (2011). The Adoption of Organic Rice Framing in Northeastern Thailand. *Journal of Organic Syaytems*, 6(3), 4-12.
- Power, G.A. (2010). Ecosystem Services and Agriculture: Tradeoffs and Synergies. *Philosophical Transactions of the Royal Society*, 365(1554), 2959-2971
- Reid, W.V., Mooney, H.A., Capistrano, D., and Carpernter, S.R., Chopra, K., Dasgupta P., and Dietz T., (2005). Millennium Ecosystem Assessment Synthesis Report. *Island Press*, Washington, DC.
- Research Institute of Organic Agriculture. (2011). Organic Agriculture and Biodiversity. Fact Sheet, Germany
- Rodrigo, C, (2013). Traditional Paddy Cultivation in Providing Ecological Services: Resilience Against Climate Change and Many More. *National Conference on Livelihoods, Biodiversity and Ecosystem Services*, Colombo, Sri Lanka, pp 24-30
- Sandhu, S. H., Wratten D. S., and Cullen, R. (2010). Organic Agriculture and Ecosystem Services. *Environment Science and Policy*, Col 13, 1, 1-7.
- Small Organic Farmers Association of Sri Lanka, <http://www.sofasl.org>, visited online on 5th May 2013.
- Strauss, J. (1986). The Theory and Comparative Statistics of Agricultural Household Models: A General Approach, in I. Singh, L, Squire and J Strauss (eds.), *Agricultural Household Models: Extensions, Applications and Policy*, John Hopkins Press for the World Bank.

The Ceylon Today, Going Organic, <http://www.ceylontoday.lk>, visited online 27th may 2013.

Tjaden, B., Martinez-Cruz, A. L. Wechsler, S. and Pritzlaff, R., (2013). *Ecosystems Services on Forests and Agricultural Lands of Maryland: A Survey of Maryland Tree Farmers and Agricultural Landowners*, U.S.A.

Tkatsuka, Y., Cullen R., Wilson, M. and Wratten, S. (2005). *Values of Ecosystem Services on Arable Land and the Role of Organic Farming*. New Zealand Agricultural and Resource Economics Society Inc, NZARES Conference.

UN. (2008). *Organic Agriculture and Food Security in Africa*. United Nations Conference on Trade and Development-, United Nations Environment Programme, Capacity-building, Task Force on Trade, Environment and Development.

UNCTAD. (2006). *Trade and Environment Review*, UN, New York

Vincent, J. R. (2008). The Environment as a Production Input: A Tutorial. *SANDEE working paper* 32-08.

Weligamage, P. (2013). *Valuing National Preferences for Enhancing Ecosystem Services: The Case of the Veheragala Water Release to Yala Protected Areas*. National Conference on Livelihoods, Biodiversity and Ecosystem Services, Colombo, Sri Lanka, 3-5

REFLECTIONS ON THE EVOLUTION OF MODERN FINANCIAL SCIENCE

O G Dayaratna-Banda

*Department of Economics and Statistics
University of Peradeniya*

PERSPECTIVES

Sri Lanka Journal of
Economic Research
Volume 2 (1)
June 2014: 107-119
Sri Lanka Forum of
University Economists



Abstract

Financial science or financial economics, as a sub-discipline in economics, has recorded a remarkable progress during the past fifty years. Finance deals with allocation of various assets and liabilities in the long run within uncertain conditions. Hence, the study of finance involves inquiring, explaining and predicting a diverse and growing number of financial instruments, institutions, and markets, as well as the relationship of their behavior to other economic variables. The study of finance has, therefore, become a study of human civilizations, progress, and even crises. This essay traces the key milestones of the evolution of financial science evaluating the path-breaking contributions to economic science made during a few decades. It attempts to highlight how the study of finance is useful in understanding and predicting human behavior as financial science has generated an extremely rich and rigorous body of theoretical, methodological and empirical knowledge which has increasingly become influential on the thought process of mainstream economics.

Key Words: *Financial economics, Financial instruments and Human behavior*

INTRODUCTION

Finance has often been an elusive and highly debated thing in the affairs of human economic activities. In early human societies, money was not in any significant way linked to the performance or progress of humankind. Before the emergence of fiat money, various metals and materials were used as money which played the roles of medium of exchange and store of value. In such contexts, progress of human societies was not influenced by money, but by human efforts. However, money, banking and finance, derived/related products of money, have been thought to significantly influence human economic activity since the emergence of fiat money in different civilizations. Finance is a form of manifestation of money in relation to human economic activity involving trading of financial instruments in the context of risk and uncertainty. It deals with allocation of various assets and liabilities in the long run within the uncertain conditions. Finance, therefore, in most ways, relates to how money is used for human economic activity in future time periods under risks and uncertainty. Defining and explaining finance, one of the Nobel Laureates in Economics, Robert Shiller states that “finance and insurance are about an uncertain future . . . It is about managing it, and sharing your risks, hedging your risks... Finance is not about beating the market, necessarily. It is about managing risks in such a way that we can be a productive society and we can achieve our goals” (Shiller 2014).

From the period of classical political economy to the aftermath of the Great Depression in 1920s, financial science was not known in any significant way in the economics literature though the function of money and its various manifestations have been treated in economic theory and policy. Early economics literature integrated money and banking into the mainstream theory and policy, but very little of finance. However, in the early economic literature, the role of financial capital has been explicated. Schumpeter’s work on creative destruction and the dynamic evolutionary nature of capitalist system (Schumpeter 1934) highlights the role of finance in the process of socio-economic change. Initial efforts in financial science have focused more on analyzing and predicting the behavior of securities exchange markets. However, financial innovations resulting from the deepening and expansion of markets around the world gave space for the development of the financial science as a sub-discipline in economics. The focus on finance came to the forefront of the economic discourse beginning from the seminal work of Harry Markowitz who later won the Nobel Economics Prize for his contribution to the development of financial science.

This brief essay traces the key milestones of the evolution of modern financial science as a prominent sub-discipline in economics that has made vital contributions to the development of thought and empirical methods in economics. We will highlight the most significant contributions to the advancement of financial science during the past few decades. This brief essay is justified on the premise that most undergraduate and postgraduate study programmes in economics in Sri Lanka have paid a scant attention to

the advancement of financial science and its significant contributions to the development of mainstream economic theory and empirical methods. Though financial science has been developed by mainstream economics, the discipline has been left to the business or management schools in Sri Lanka. Economics degree programmes have rarely integrated financial science as an essential component of the skills and knowledge embodied in our graduates. It is also the case that much of the economic literature that we delivered to the undergraduate and postgraduate students through our programmes are highly dominated by theory and empirics developed in the context of certainty conditions, though theory and methods in financial science have made significant advancements in explaining markets and predicting the behavior of markets under risks and uncertainty. Teaching and promoting research in financial science in the undergraduate and postgraduate study programmes in economics would significantly enrich other sub-disciplines of economics. Financial science lends significant theoretical and methodological insights for the advancement of mainstream economics.

RAPID DEVELOPMENT OF MODERN FINANCIAL SCIENCE SINCE 1950S

The process of financial innovations has resulted in creating various financial products and markets. According to the Investopedia, finance is defined as “advances over time in the financial instruments and payment systems used in the lending and borrowing of funds. These changes - which include innovations in technology, risk transfer and credit and equity generation- have increased available credit for borrowers and given banks new and less costly ways to raise equity capital.” It can also be defined as the act of creating and then popularizing new financial instruments as well as new financial technologies, institutions and markets. It includes institutional, product and process innovation. Institutional innovations relate to the creation of new types of financial firms. Financial innovations have led to developing various financial instruments that include debt, equity and foreign exchange instruments. Long term debt securities include bonds, loans, bond futures, bond options, interest rate swaps, interest rate caps and floors, interest rate options, and exotic derivatives. Short term debt instruments include bills, commercial papers, certificate of deposits, interest rate futures, and forward rate agreements. Equity instruments include stocks, stock options, equity futures, and exotic derivatives. Foreign exchange instruments include spot foreign exchange, currency futures, foreign exchange options, outright forwards, foreign exchange swaps, and currency swaps. Development of these various financial instruments that resulted in creating new institutions and markets compelled economists to undertake rigorous research about them. The emergence of financial instruments, institutions and markets paved the way for generating a significant body of new knowledge in the area of finance creating the distinct discipline known now as financial economics or financial science.

In the 1950s, much of the research in financial science focused on analyzing and forecasting the behavior of stock markets, and how to deal with risks in stock markets.

The conventional wisdom in finance was that once one attains competency in investment decisions in stock markets, risk management and mitigation, by way of diversification, is undesirable. Therefore, one has to buy one or two, or at most three or four securities in order to maximize profits. It was thought that competent investors would never be satisfied beating the averages by a few small percentage points. In the paper entitled, *The Battle for Investment Survival*, Gerald M. Loeb (1935) analyzed securities one-by-one focusing on picking winners. It was emphasized to concentrate holdings to maximize returns. Broad diversification of securities was considered undesirable during this period. Financial science at the initial stage was, therefore, more of practical analysis of capital markets to assist investors rather than a rigorous academic discipline.

In mid 1950s, attention of researchers of capital markets moved towards bundling of various securities for diversification of risks. These bundles of securities, termed portfolios, were viewed in light of risks and returns. Harry Markowitz (1952, 1959), who won Nobel Prize in Economics in 1990 for his work on portfolio selection, emphasized that diversification of assets held by an investor tends to reduce risks by analyzing the portfolio risk versus security risk. Assets were evaluated by their effects on portfolio. Then, an optimal portfolio can be constructed to maximize return for a given level of risks measured by standard deviation. Harry Markowitz's pioneering work immensely contributed to the development of modern financial science.

James Tobin, who also won the Nobel Prize for his work, advanced Markowitz's seminal work much further by developing ideas related to the role of stocks mainly in his Separation Theorem in which he articulated that investors must form portfolio of risky assets and temper risk by lending and borrowing. His work shifted the focus from stock selection to portfolio structure. Tobin drew heavily from Keynes's work on liquidity preference in developing his own work (Tobin 1958).

Merton Miller (1986, 1991) and Franco Modigliani (1944) expanded the scope of finance research through their work on investments and capital structure. Among other things, their work is known as Modigliani-Miller Theorem (M&M Theorem). The theorem relates corporate finance to returns. They found that a firm's value is unrelated to its dividend policy. Dividend policy is an unreliable guide for stock selection. The work of M&M led to the emergence of another sub-discipline in economics, currently occupied in management/business schools, known as corporate finance. Their analysis lends much to the fact that how firm level actions and decisions affect the risks and returns of assets or portfolios of assets.

William Sharpe, who also won the Nobel Prize in Economics, focused, in his seminal work on analyzing the single factor asset pricing risk and return modeling. He developed the capital asset pricing model through which he explains the link between different types of assets, risks and returns. He defined risk as volatility relative to market. A stock's cost of capital (the investor's expected return) is proportional to the

stock's risk relative to the entire stock universe. This is a theoretical model for evaluating the risk and expected return of securities and portfolios (Sharpe 1963, 1964, 1970, 1987). Sharpe has been a pioneer in developing financial science.

Paul Samuelson (1965), who won the Nobel Prize in Economics in 1970, counts, among his numerous contributions to economics an examination of the behavior of securities prices. He emphasized that market prices are the best estimates of value. Price changes follow random patterns. According to Samuelson, future stock prices are unpredictable. The Concise Encyclopedia of Economics states that "in finance theory, which he [Samuelson] took up at age fifty, Samuelson did some of the initial work that showed that properly anticipated futures prices should fluctuate randomly. Samuelson also did path breaking work in capital theory..." These contributions made a significant contribution to the latter theoretical developments in financial science. The work of Robert Merton and William Sharpe has also significantly been influenced by the Samuelson's work.

Information efficiency is vital to the success of the capital markets as decisions have to be taken based on all available information. This particular aspect of the financial markets was seriously addressed by Eugene F. Fama (1965, 1972, 1976), who also won the Nobel Prize in Economics for his work on finance, in his seminal work on efficient market hypothesis. Fama's work has significantly been influenced by the contribution of Samuelson. He conducted extensive research on stock price patterns. Fama distinguished between three types of efficiencies, namely, weak form efficiency, semi-strong form efficiency, and strong form efficiency, under three different sets of information available to the investors. He extended earlier work on unpredictability of stock prices and finds that prices quickly incorporate information. He argued that if investors use past information to make predictions, markets are only weak form efficient. If investors do have access to past and current public information, markets become semi-strong form efficient. When investors use all available information markets become strong form efficient meaning that no single individual is able to make a different prediction about the future behavior of stock prices from what the average investor is able to foresee. He developed "Efficient Markets Hypothesis," which asserts that prices reflect values and information accurately and quickly. It is difficult, if not impossible, to capture returns in excess of market returns without taking greater than market levels of risk. Investors cannot identify superior stocks using fundamental information. In practice, however, there is no perfect information situation in any market meaning that future securities prices can be predicted by using various past and current information available (Vidanage and Dayaratna-Banda 2012 and 2013).

In the late 1960s, researchers also began inquiring into the performance of managers and how that tended to determine the risks and returns. Michael Jensen (1965) and A.G. Becker Corporation (1968) have conducted in depth research into the nexus between financial market performance and manager performance. First Jensen studied mutual

funds and A.G Corporation institutional plans indicating that active managers underperform indexes. Becker Corporation gives rise to consulting industry with creation of “Green Book” performance tables comparing results to benchmarks. First studies showing investment professionals fail to outperform market indexes. Jensen specifically analyzed the role of fund managers in managing mutual funds.

In early 1970s, Chicago University researchers began to inquire into the derivative pricing models, especially focusing on option pricing. These researchers include Fisher Black and Myron Scholes of University of Chicago and Robert Merton of Harvard University, who also won the Nobel Prize in Economics in 1997. The development of the Option Pricing Model allows new ways to segment, quantify and manage risk. It spurs the development of a market for alternative investments. Their work was mainly focused on highly risky derivative securities. Option pricing under risk and uncertainty open various new theoretical avenues for researchers to inquire into human behavior under conditions of uncertainty and risks (Black 1975, 1976, 1986, 1987; Black and Scholes 1973, 1974; Merton 1973).

The link between random prices and practical investing was inquired into by John McQuown and Rex Sinquefield (1963). This led to the birth of index funds and Wells Fargo Bank which have developed the first passive S&P 500 Index funds. Years later, Sinquefield chaired Dimensional and McQuown sat on its Board. Dimensional further develops passive and structured investment strategies. A major plan first committed to indexing of prices began in 1975. New York Telephone Company invests \$ 40 million in an S&P 500 Index fund. The first major plan to index helped launch the era of indexed investing. “Fund spokesmen are quick to point out you cannot buy the market averages, and it is time the public could” (Burton G. Malkiel 1973). In order to facilitate this process, database of securities prices were developed. In 1977 Roger Ibbotson & Rex Sinquefield in an article entitled “Stocks, Bonds, Bills and Inflation”, an extensive returns database for multiple asset classes was first developed which would become one of the most widely used investment databases. This is the first extensive, empirical basis for making asset allocation decisions changes the way investors build portfolios.

The effect of the size on risks and returns was also examined by Rolf Banz (1981). He analyzed New York Stock Exchange stocks from 1926 to 1975 and found that, in the long term, smallest companies had largest expected returns. Small companies behave differently from large companies and deserve stronger than market representation. International size effects were incorporated since 1986. This led to structured investing versus indexing. Dimensional Fund Advisors Inc. created a structured product in an undiscovered asset class. Dimensional product returns become the index used in Ibbotson Associates’ database. Structured investing is innovative. It is based on a rational risk dimension, and does not slavishly follow indexes or investing conventions.

Eugene Fama and Kenneth French (1992) developed the multi-factor asset pricing model to explain the value effects. They improved on the single factor asset pricing model (CAPM) developed earlier by William Sharpe. They identified market, size and value factors in determining returns for securities. Fama and French further developed the three-factor asset pricing model, an invaluable asset allocation and portfolio analysis tool. They revolutionized the way we construct and analyzed portfolios by identifying independent sources of risk and return. They also introduced the first concentrated, empirical value strategies, which led to similar findings internationally.

Financial science over the last fifty years has brought us to a powerful understanding of the risks that are worth taking and the risks that are not. Three equity factors market included: stocks which have higher expected returns than fixed income, size which means that small company stocks have higher expected returns than large company stocks, price which means that lower-priced “value stocks” have higher expected returns than higher-priced “growth stocks”.

Everything about expected returns in the equity markets can be summarized in three dimensions. The first is that stocks are riskier than bonds and have greater expected returns. Relative performance among stocks is largely driven by the two other dimensions: small/large and value/growth. Many economists believe small cap and value stocks outperform because the market rationally discounts their prices to reflect underlying risk. The lower prices give investors greater upside as compensation for bearing this risk. Applied core equity dimensional portfolio construction methodology weights securities by size and value characteristics instead of market capitalization. Total market strategies launched to provide efficient, diversified risk factor exposure while limiting turnover and transaction costs. Core equity portfolios move beyond traditional, component-based asset allocation via vast diversification and cost-efficient market coverage. Theory and policy in other sub-disciplines of economics are yet to incorporate analysis of human economic behavior under risks and uncertainty even though some advancement has taken place in recent times in macroeconomics.

The central premise that financial science as a subject holds in economics is more evident from the number of Nobel Memorial Prizes in Economics awarded to those who have been doing research on finance or on finance-related fields. Since the introduction of Nobel Memorial Prize in Economics in 1969, nearly thirty Nobel laureates have emerged from the area of finance or finance-related fields in economics (Table 1). Research on finance has contributed a great deal to the advancement of econometrics as quantitative methods widely applied in economic research. Most research developments in macroeconomics and microeconomics have also been highly influenced by the recent development of knowledge in financial science. The 2014 Nobel Prize in Economics was awarded to Jean Tirole whose theoretical and empirical work in microeconomics focusing on market power and regulating to tame big firms has heavily relied on financial markets and institutions for his analysis.

Table 1: Nobel Memorial Prize in Economics for Finance and Finance Related Research

	Year	Laureate	Nobel Citation	Field
1	1970	Paul Samuelson	"for the scientific work through which he has developed static and dynamic economic theory and actively contributed to raising the level of analysis in economic science"	Finance in microeconomics
2	1981	James Tobin	"for his analysis of financial markets and their relations to expenditure decisions, employment, production and prices"	Finance in macroeconomics
3	1985	Franco Modigliani	"for his pioneering analyses of saving and of financial economics"	Finance in macroeconomics
4	1990	Harry Markowitz Merton Miller William Sharpe	"for their pioneering work in the theory of financial economics"	Financial economics
5	1996	James Mirrlees William Vickrey	"for their fundamental contributions to the economic theory of incentives under asymmetric information"	Financial Economics
6	1997	Robert Merton Myron Scholes	"for a new method to determine the value of derivatives."	Financial Economics
7	1999	Robert Mundell	"for his analysis of monetary and fiscal policy under different exchange rate regimes and his analysis of optimum currency areas"	Finance in international macroeconomics
8	2000	Daniel McFadden	"for his development of theory and methods for analyzing discrete choice"	Banking and Finance
9	2001	George Akerlof Michael Spence Joseph E. Stiglitz	"for their analyses of markets with asymmetric information"	Banking and finance
10	2003	Robert F. Engle	"for methods of analyzing	Finance in

			economic time series with time-varying volatility (ARCH)”	econometrics
11		Clive Granger	“for methods of analyzing economic time series with common trends (cointegration)”	Finance in econometrics
12	2010	Peter A. Diamond Dale T. Mortensen Christopher Pissarides	“for their analysis of markets with search frictions”	Finance in microeconomics and macroeconomics
13	2013	Eugene F Fama Lars Peter Hansen Robert J. Shiller	“for their empirical analysis of asset prices.”	Financial economics

CONCLUDING REMARKS

The study of money, banking and finance has played varying roles, though pivotal, in shaping the theory and practice of modern economics. From the periphery of economic thought in early years of modern economics, the study of money, banking and finance has increasingly occupied a central premise in economic thought. Advancement of financial science as a distinct discipline has provided significant insights into the development of other sub-disciplines of economics. It has served as a platform for building economic theory in various sub-disciplines, staggering advancements in empirical methods in economics. Financial science has also increasingly become a vital policy tool in modern societies. Financial science is occupying a central place in mainstream economic theory and policy. Some have even suggested theoretically that finance literacy can be considered a capital serving as a vital input in production suggesting that human progress tends to depend also on, among other things, whether people are literate about finance or not. The study of finance has also gone beyond economics and has increasingly influenced the thought process of other disciplines in human sciences. However, financial science has not been given its central premise in economics study programmes and research in Sri Lanka. It is vital that we attempt to mainstream financial science in economics to provide a new leaf of valuable life to economics for analyzing human economic behavior under risks and uncertainty.

REFERENCES

Banz Rolf (1981). The relationship between return and market value of common stock, *Journal of Financial Economics*, 9: 3-18

Black, F. (1975). Fact and Fantasy in the Use of Options. *Financial Analysts Journal* 31, pp36–41, 61–72 (July/August).

Black, F. (1986). Noise. *Journal of Finance*, 41, 529–543.

Black, F. (1987). *Business Cycles and Equilibrium*, Basil Blackwell.

Black, F. and Scholes, M. (1974). The Effects of Dividend Yield and Dividend Policy on Common Stock Prices and Returns. *Journal of Financial Economics*.

Black, F. and Scholes M. (1973). The Pricing of Options and Corporate Liabilities. *Journal of Political Economy*.

Black, F. (1976). The Pricing of Commodity Contracts. *Journal of Financial Economics*.

Black, F. (1995). Interest Rates as Options. *Journal of Finance*, 50, 1371–1376

Black, F. (1995). *Exploring General Equilibrium*, MIT Press.

Black, F. Scholes M., and Jensen M., (1972). The Capital-Asset Pricing Model: Some empirical tests, in Jensen, editor, *Studies in the Theory of Capital Markets*.

Fabozzi, Frank J. and Modigliani F.(1996). *Capital Markets: Institutions and Instruments*. Upper Saddle River, NJ: Prentice Hall.

Fama, Eugene F. (1972). *The Theory of Finance*, Dryden Press.

Fama, Eugene F. (1976). *Foundations of Finance: Portfolio Decisions and Securities Prices*, Basic Books.

Fama, Eugene F. (1965). “Random Walks in Stock Market Prices”. *Financial Analysts Journal* 21 (5): 55–59.

Fama, Eugene F., Merton H. Miller (1972). *The Theory of Finance* New York: Holt, Rinehart & Winston.

Fama, Eugene F and French, Kenneth R. (1993) Common Risk Factors in the Returns on Stocks and Bonds. *Journal of Financial Economics* 33 (1): 3–56.

Ibbotson, Roger and Rex Sinquefield (1977). *Stocks, Bonds, Bills and Inflation*. Charlottesville.

Jensen, Michael, (1965). The Performance of Mutual Funds in the period 1945-1964. *Journal of Finance* December.

Gerald, L. M. (1935/1996) *The battle for Investment Survival*. John Wiley and Sons.

- Malkiel Burton G. (1973). *A Random Walk Down Wall Street* (6th ed.). W.W. Norton & Company, Inc.
- Markowitz, H.M. (1952). Portfolio Selection. *The Journal of Finance*, 7 (1): 77–91.
- Markowitz H.M. (1959). *Portfolio Selection: Efficient Diversification of Investments*. New York: John Wiley & Sons.
- Merton Robert C. (1973) “Theory of Rational Option Pricing”. *Bell Journal of Economics and Management Science* (The RAND Corporation) 4 (1): 141–183.
- Miller Merton H. (1991) *Financial Innovations and Market Volatility*. Cambridge, MA: Blackwell Publishing.
- Miller Merton H. (1991) *Merton Miller on Derivatives*. New York: John Wiley & Sons
- Miller Merton, H.Charles W. Upton (1986). *Macroeconomics: A Neoclassical Introduction*. Chicago: University of Chicago Press
- Modigliani, Franco (1944). Liquidity Preference and the Theory of Interest Rate and Money. *Econometrica*, Vol. 12, No. 1: 45-88
- Modigliani, Franco (2001). *Adventures of an Economist*. London, New York: Texere
- Modigliani, Franco; Andrew B Abel; Simon Johnson (1980). *The Collected Papers of Franco Modigliani*. Cambridge, Mass.: MIT Press
- Samuelson Paul (1965). Proof That Properly Anticipated Prices Fluctuate Randomly. *Industrial Management Review* (Spring)
- Schumpeter, Joseph A. (1934). *The theory of economic development: an inquiry into profits capital, credit, interest, and the business cycle*. New Brunswick, New Jersey
- Sharpe W (1970/2000), *Portfolio Theory and Capital Markets* McGraw-Hill
- Sharpe, W (1987). *Asset Allocation Tools*, Scientific Press.
- Sharpe, W, Gordon J. Alexander and Jeffrey Bailey (2000). *Fundamentals of Investments*, Prentice-Hall
- Sharpe, William F. (1963). A Simplified Model for Portfolio Analysis. *Management Science* 9 (2): 277–93.
- Sharpe, William F. (1964). Capital Asset Prices – A Theory of Market Equilibrium Under Conditions of Risk. *Journal of Finance* XIX (3): 425–42.

Shiller Robert (2014). This is What Finance Actually Is. <http://www.businessinsider.com/robert-shiller-explains-finance-2014-11>.
Downloaded on 25-11-2014

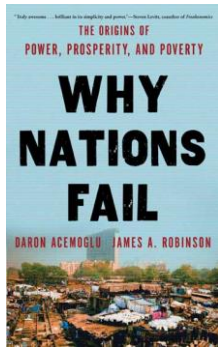
Tobin James (1958). Liquidity Preference as Behavior toward Risk. *The Review of Economic Studies*, February.

Vidanage T.N and O G Dayaratna-Banda. (2013). Factors Determining the Predictability of Stock Prices in Emerging Capital Markets: Evidence from Colombo Stock Exchange. *Modern Sri Lanka Studies*, Vol. IV, No 1

Vidanage, T. N and O G Dayaratna-Banda. (2012). Does Past Information Help Predict Future Price Movements in Emerging Capital Markets? Evidence from the Colombo stock exchange. *South Asia Economic Journal*, Vol. 13, no 2

BOOK REVIEW

BOOK REVIEW



Daron Acemoglu and James A. Robinson :
*Why Nations Fail: The origins of Power,
Prosperity, and Poverty*

United States : Crown Publishers, 2012,
546 pages; \$ 19.36
ISBN 978-0-307-71921-8

Sri Lanka Journal of
Economic Research
Volume 2(1)
June 2014:123-126
Sri Lanka Forum of
University Economists



Priyanga Dunusinghe

Senior Lecturer

University of Colombo, Sri Lanka

Telephone: +94 719998832

Email: dunusinghe@econ.cmb.ac.lk / pmdunu@yahoo.com

This book consists of fifteen chapters where the first two chapters are devoted to discuss the existing puzzle with respect to the causes of prosperity and poverty among countries and to explain why the hypotheses already developed in the literature fail to explain that difference sufficiently. The authors bring out their main hypothesis in explaining the causes of poverty and prosperity in chapter three where they argue that the difference is mainly due to different political and economic institutions under which economies operate. The authors construct their main hypothesis in chapter four through ten and discuss some case studies in the rest of the book.

In the first chapter, Acemoglu and Robinson (AR) diligently raise readers' curiosity by discussing divergent development experiences between two territories which look almost similar in culture and geography. To that end the first chapter is named as "So close, yet so different". Two cases, one refers to the North: Nogales, Arizona (USA) and South : Nogales, Sonora (Mexico) and other refers to the South and North Korea, are presented in order to point out that the difference cannot be explained by available hypotheses in the literature. Instead, the authors argue the need for a novel approach in identifying the root causes of prosperity and poverty.

In chapter three, AR reject three alternative explanations of why the experience of various countries has been so different: geography, culture, and ignorance of correct policies. The geographical school holds that tropical climates make their peoples to be lazy and lack enthusiasm or, in a more modern variant, tropical climates lead to debilitating diseases and/or soils more subject to erosion and nutrient loss, as argued by Jeffery Sach. These explanations do not hold grounds in the face of unchanged geographical conditions, formerly stagnant economies begin to grow in the same geographical areas at sharply different rates or seemingly geographically disadvantaged countries grow at faster rate than better endowed countries. The culture school

maintains that prevailing values and attitudes such as work ethics, faith in the future, trust, and sometimes the superiority of European value systems that explain why performance varies. However, theories of culture differences fail to explain why areas with the same cultures have different economic outcomes. The authors provide evidence relating to West and East Germany, North and South Korea, and the north and just south of the Mexico-USA border. Also, culture hypothesis fail to explain why countries suddenly start growing in the face of an unchanged, or slowly evolving, culture. According to ignorance hypothesis, the main reason for underdevelopment is the policy failures arising from implementing a wrong set of policies and that school argue countries could grow faster if correct policies are implemented. Markets, incentives, property rights, and fiscal discipline are what generate prosperity and countries that interfere with them will end up in stagnation or poverty. Get rid of monopolies, high tariffs, price controls, and tax disincentives, and countries will prosper.

In chapter four through ten, AR construct the main hypothesis. Accordingly, nations are poor because they do not have institutions which allow them to generate growth potential. They have political institutions in which power is heavily concentrated. Their economic institutions do not create an environment in which a large proportion of the population can share in the benefits. Societies with these characteristics, AR call “extractive.” Countries having extractive institutions do not possess environment in which sustained improvements in prosperity is possible. Sustained improvements in socio-economic condition require technological change. In other words, the society should experience creative destruction where over the years it could produces more with less or the replacement of the old by the new. AR argue that such creative destruction threatens the advantages and the political power of certain groups. Political power is based on restricted access; it is believed by the ruling elites that newcomers and increased competition could threaten the existing power arrangement system.

Against this backdrop AR emphasize the importance of ‘inclusive’ political and economic institutions and showed how such institution could ignite and sustain socio-economic development in a country. Inclusive political institutions are those in which power is widely shared and many groups could participate in the decisions which affect their prosperity and access to public services. Inclusive economic institutions are those which generate widespread opportunities to make investments, opportunities to create new or better products, or opportunities for self-improvement. This depends on secure property rights, an objective system of law, and limited monopoly privileges. According to AR, exclusiveness versus inclusiveness is the result of conscious choice.

In chapter four, AR discuss how small difference and critical junctures in the history have shaped and given birth to different institutional structures that could be seen today in different countries. The book strongly argues that England was the earliest participant in the Industrial Revolution because of its progress in creating inclusive political and economic institutions. AR discuss in details how the Glorious Revolution (1688) greatly expanded the powers which the king could exercise only with the consent of parliament and made government more responsive to a wider set of groups in society. This

revolution gave parliaments a greater say over successions to the throne, limited the right of kings to suspend laws, made monopolies and taxation subject to parliamentary approval, created a broader and more stable tax base allowing the expansion of public services, and created the Bank of England which became a great source of financing for industry. Accordingly, the opening up of England's political and economic institutions was a product of hundreds of years of struggle to limit absolutism and extend political power to a wider range of groups.

Chapter five discusses why growth under extractive institutions is not sustainable. The chapter summarizes economic history of Soviet Union, Congo, Mayan civilization and the other states to build the case that growth under extractive institution is a temporary phenomenon. It is shown that political elites in countries where extractive institutions are in place employ various brutal techniques to accelerate economic growth. However, in the long run, such techniques become boomerang and the society experience total collapse indicating that growth under extractive institution is not sustainable. In chapter six, authors discuss the process of institutional change. By discussing the economic history of Venice and Roman Empire, the book shows how moving to inclusive institutions made it possible for countries to grow and prosper. This chapter gives detailed account with respect to the formation of Venice and Rome moving from republic to empire. However, certain developments in those territories led to shift institutions towards extractive institutions there by collapsing the economic prosperity that was built over the years. The authors maintained that the historical factors shape how institutions develop, but this is not a simple, predetermined, cumulative process. According to them Rome and Venice illustrate how early steps toward inclusivity were reversed.

In the remaining chapters, authors discuss how nations with extractive institutions tend to get into a vicious circle thereby perpetuating in poverty while societies with inclusive institutions, in most cases, get into a virtuous circle. Are nations characterized by extractive institutions condemned to stagnation and poverty? Clearly not according to AR. Limited progress is possible where a strong state has been created which can establish law and order and provide the security for investments or the extraction of valuable natural resources which benefit the few. Extractive societies need something to extract. Soviet Russia was able to generate significant growth for decades by collectivizing agriculture, creating a command and control economy which controlled prices and the allocation of labor and capital, and driving resources out of agriculture into a more productive industrial sector. Years of relatively spectacular growth were created. The system collapsed because it did not offer citizens incentives to save and invest and technological change was thwarted because it threatened existing structures and bureaucrats by requiring that more be produced with fewer amounts of resources. The system could not generate long-term growth on a sustainable basis.

Among the various case studies, one that is on China provides some insights to how economic growth get accelerated when economic institutions moving from extractive ones to more inclusive one regardless of the extractive nature of political institutions.

The coming to power of the Chinese Communist Party in 1949 failed to bring about significant improvements in general prosperity. The temporary advantages of a command and control economy were offset by the economic disasters caused by political initiatives like the Great Leap Forward and the Cultural Revolution. Growth experience was poor compared with the rapid growth achieved in the Soviet Union during its first five decades. In the late 1970s, Chinese leaders came to the belief that significant economic growth could be achieved without endangering the political power of the Communist Party. Reforms began in agriculture with some loosening of compulsory marketing and the control over prices. State enterprises were given more leeway in decisions, and some cities were allowed to attract foreign investment. Labor was allowed some freedom to move into rural industries, the Township Village Enterprises. It is argued that introducing more incentives in agriculture and industry, followed by introducing more foreign investment and technology set China on a path of more rapid growth. These reforms were followed by more secure property rights, allowance for the creation of private enterprises and opening up to foreign trade. The result was that China had one of the world's fastest growth rates over the past three decades. AR's key insight is that China's success will not last. It has been based on increasing inclusiveness in economic institutions, but under continuing extractive political institutions. Rapid growth was made possible by the opportunity to reduce inefficiencies in agriculture, move resources from agriculture to industry and from rural to urban areas, introduce catch-up technologies, and export cheap labor-intensive products. The pervasiveness of favored state enterprises, the dependence of private enterprise on Party goodwill and often on partnerships with state enterprises, the pervasiveness of Party control over the mass media and over political processes mean that the openness and creative destruction that underlie sustained productivity increases will not take place. Growth will inevitably slow.

The main conclusion of the book is that inclusive institutions are essential in sustaining economic growth in an economy. This book argues that institutions shape the behavior of economic agents through incentives and this behavior determines whether the society leads to poverty or prosperity. Inclusive institutions work as pro-growth institutions since they provide incentives for technological improvement, business start-ups, investing on human capital and so on and so forth whereas incentive structure under the extractive institutions does not provide a health business climate. Hence, developing countries should attempt at making their institutions more inclusive so that they could march from poverty to prosperity. This book is an essential reader for anyone who is interested in reading development literature.



*The International Journal published by the
Sri Lanka Forum of University Economists*

**The Sri Lanka Journal of
Economic Research**

Editorial Office – 2014
Department of Economics &
Statistics
University of Peradeniya
Peradeniya, Sri Lanka
Telephone : +94 81 2 39 26 22
Email : editor.sljer@gmail.com

GUIDELINES FOR CONTRIBUTORS

THE SLJER

Sri Lanka Journal of Economic Research (SLJER) is a refereed international journal, published by the Sri Lanka Forum of University Economists (SLFUE). It is published thrice yearly, based on the papers presented at the Sri Lanka Economic Research Conference, the annual international research symposium of the SLFUE. In addition to research articles, the Journal accepts manuscripts of short essays on economic and development policy perspectives and also book reviews.

The authors assume the responsibility of the accuracy of contents in their respective articles, and neither the SLFUE, nor the Editorial Board of the SLJER will bear any responsibility in this regard.

MANUSCRIPT SUBMISSION

Articles are accepted in Sinhala, Tamil and English languages.

All submissions should be made electronically as Microsoft Word documents, to the address of the Chief Editor of the SLJER: editor.sljer@gmail.com

Manuscripts submitted will be subject to rigorous and independent double blind expert review process administered by the Journal's Editorial Board, and the authors will be contacted after the review process is complete. The process generally takes from one to two months. The Editorial Board's decision regarding publication of an article will be final.

SUBMISSION GUIDELINES

Title Page

A separate title page should be provided allowing for blind review. All identifying information should be featured only on the title page. Ensure that no information identifying the authors, their institutions, or the institutions cited in the original research are presented in the abstract, text, tables, or figures.

List names and affiliations of each author. Include full mailing addresses, phone numbers, and e-mail contact information of every author. Clearly identify the corresponding, or lead, author. This person will be responsible for ushering the manuscript through the review and publication process. The lead author is responsible for keeping contact information updated

Abstract

An Abstract not exceeding 100 words in *English* should be included in the manuscript. It should review the objectives, significance, results, and main conclusions of the paper. References should not be cited in the Abstract.

Key Words

Authors should submit a list of six unique and informative key words relating to the manuscript. Undefined abbreviations or acronyms should be avoided in the keywords. Editorial Board reserves the right to replace key words if necessary.

Text

- Submit all manuscript files as Word .doc or .docx files.
- Manuscripts may be typed in FM-Abhaya (Sinhala), Baamini (Tamil) or Times New Roman (English) fonts. For English language submissions, use British spelling, with 's' instead of 'z' in relevant words, and not American spelling.
- Use 12 pt. font size for the entire document, including tables, figures, headings, captions, and table notes (page footnotes, generated in Word, will be smaller).
- Double space the manuscript.
- Keep 1-inch margins all round.
- Place page number at the bottom centre.
- Do not use section or page breaks in the running text.
- Use footnotes wherever necessary, but never to solely cite a reference.

Equations

The author is responsible for ensuring that equations are presented properly. Use Math Type, and not the Word equation function.

Tables

All tables and figures should be professionally typeset based on a standardised style.

Number all tables (Arabic) as they appear in the text and ensure that all tables are mentioned in the text.

- Use Word table generator; do not apply styles, shading, or underlining.

- Do not merge cells for spanning headers.
- Single space all rows; do not allow lead or following spaces in the paragraph option.
- Do not center columns or rows.
- Use superscript a, b, c, and so forth sparingly for table notes.

Figures

- Number all figures (Arabic) as they appear in the text.
- Do not use color in graphics; all pages are printed in black and white. To distinguish bars or lines, use patterns or very distinct shading.
- The author is responsible for securing permission to use graphics or data from other sources.
- If re-creating a graphic from another source, secure permission to adapt the figure.
- Do not send a scan or photocopy of a graphic.

Appendices

Sometimes appendices help readers to further study the issue presented. Submit appendices separately after attaching tables and figures. If more than one appendix is featured, use capital letters to refer to them in the text: Appendix A, Appendix B, etc. Follow guidelines for tables or figures, as appropriate, when formatting appendices.

References

The detailed style of referencing is as follows:

Journal article

David, J.K. (2010). Reference style guidelines. *Journal of Guidelines*, 4, 2-7.

Book

David, J.K. (2010). *Reference style guidelines*. 2nd ed. London: Longman.

Article in an edited book

David, J.K. (2010). Do not capitalise prepositions. In R. Brown (Ed.), *Reference style guidelines*. (pp. 55-62). London: Longman.

Edited book

David, J.K. (Ed.). (2010). *Reference style guidelines*. London: Longman.

Dissertation (unpublished)

David, J.K. (2010). *Reference style guidelines*. Unpublished doctoral dissertation, London School of Economics, London.

Article presented at a symposium or annual meeting

David, J.K. (2010, January). *A citation for every reference, and a reference for every citation*. Article presented at the annual meeting of the Reference Guidelines Association, St. Tomas, London.

Online reference

David, J.K. (2010, January). Quotes of 45 or more words will be block quotes. *Reference style guidelines*. Retrieved Date, Month, Year, from <http://www.londonpub.com>