

Human Development

Use of Stochastic Production Frontiers for Measuring Learning Efficiency: Evidence from a State University in Sri Lanka

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Key words: *Education production, Learning efficiency, State university education, Stochastic frontier analysis*

Introduction

Efficiency of State education is a significant research issue since it consumes a substantial amount of public money in developing countries. Therefore, investigating the efficiency of State higher education systems is essential in the context of accountability of State funds and Sri Lanka is no exception. Recently, the performance of Sri Lankan State university education has been the subject of considerable scrutiny. The system has undergone significant changes over the years, in the process of improving undergraduates' performance. However, undergraduates' performance in social sciences stream is still lagging behind the accepted standards (World Bank, 2009). One explanation is that students and educational institutions are not utilising resources efficiently. There may be productive or technical inefficiencies in teaching or in the learning processes. The emphasis of this study is the latter since no such studies has been carried out for Sri Lankan.

Farrell (1957) provided the definition and conceptual framework for technical efficiency (TE) which refers to failure to operate on the production frontier. Stochastic Frontier Analysis (SFA) is one of the techniques¹ widely used for the estimation of TE which is used in this study. Aigner et al (1977), Kumbhakar and Lovell (2000), and Battese and Coelli (1988, 1995) demonstrated the development of SFA and its uses in estimating TE. The basic idea behind the SFA is that the error term is composed of two parts: (i) systematic component that captures the effect of measurement error, statistical noise, and (ii) one-sided error component that captures the effects of inefficiency (Knox and Lovell, 2000). This study utilises Battese and Coelli's (1995) approach which estimate the stochastic frontier and inefficiency effect model simultaneously. Chakraborty (2009) is a significant application of this model for the education sector.

¹ DEA (Data Envelopment Analysis) is also widely used technique for measuring educational efficiency.

Objectives

Since there is an important research interest for the assessment of efficiency of university education, the broader objective of this study is to investigate the level of learning efficiency and attempt to explore possibilities of increasing study efficiency of the education (training) system in state universities in Sri Lanka. Because it is not possible to neglect the students' role in university education process since students' performance is one of the integral components of institutional performance. Efficiency studies within higher education sector focused on institutional levels and no consideration of the efficiency variation among individuals within degree programs. Such studies are crucial since individuals' educational achievements are a result of students' own effort and qualities of faculty teaching. Therefore, this study further investigates the determinants of efficiency to deepen the insights.

Methodology

The primary data used for this study were collected at a faculty of humanities and social sciences. 276 students of Special degree from all social sciences² (including Special Degree part I, II and III) were involved. Survey method was employed for data collection. Definitions and the descriptive statistics for each of these variables are reported in Table 1.

SFA was chosen since it would enable test the hypothesis that there is inefficiency in the study process. Battese and Coelli's (1995) specification was used assuming Cobb–Douglas production function with m inputs for the analysis of the learning process. The empirical model estimated was :

$$\ln y_i = \beta_0 + \sum_{j=1}^m \ln x_{ji} + v_i - u_i \quad (1)$$

Where, y_i is the output and x_i is a vector of inputs pertaining to i^{th} student. β is a vector of unknown parameters to be estimated. v_i s are assumed to be *iid* $N(0, \sigma_v^2)$ random errors, independently distributed of the u_i where the u_i s are non-negative random variables assumed to be accounted for the inefficiency effects in learning process. The u_i s are assumed to be independently distributed as truncations at zero of the $N(\mu_i, \sigma^2)$.

² Social sciences includes Economics, Social Statistics, Political Science, Geography and Sociology

Table 1: Descriptive Statistics and the Definition of Variables used in the Study

Description of the Variables	Mean	Standard Deviation	Minimum	Maximum
<u>Output (Y)</u>				
Current grade point Average (<i>CGPA</i>)	3.1395	0.2623	1.8500	3.9000
<u>Variable Inputs (Xs)</u>				
Formal lecture hours attended (<i>Formal</i>)	18.040	8.702	3.000	21.000
Hours devoted on self-study (<i>Self</i>)	12.080	10.853	1.000	35.000
Average hours on sleeping (<i>Sleep</i>)	52.801	8.597	18.000	84.000
<u>Efficiency determinants (<i>ds</i>)</u>				
Z-score reached at A/L exam (<i>Z-score</i>)	1.3937	0.2294	1.1876	3.6000
Entrance quality for a special degree – First year GPA (<i>GPAFY</i>)	3.0708	0.2795	2.3500	3.8000
Age of the respondent (<i>Age</i>)	23.496	1.495	21.000	27.000
Gender of the respondent (<i>Sex</i>)	Dummy variable: 1=Male; 0=Female			
Class size (<i>Class</i>)	22.913	7.435	3.000	35.000
Father's education (<i>Fedu</i>)	Dummy variable with 5 categories			
Mother's education (<i>Medu</i>)	Dummy variable with 5 categories			
Peer activities (<i>Group</i>)	Dummy variable 1=Yes; 0=No			
Academic level (<i>Level</i>)	Dummy variable 0=Part I; 1=Part II; 2=Part III			
Time used for leisure (<i>Leisure</i>)	19.174	13.509	0.000	18.000
Employability (<i>Employ</i>)	Dummy variable 1= Yes; 0=No			

Source: Authors' calculations based on survey data

Battese and Coelli's (1995) inefficiency effect model, with p exogenous variables that influence learning, can be written as:

$$\mu_i = \delta_0 + \sum_{l=1}^p z_l \delta_{li} \quad (2)$$

The equations (1) and (2) were simultaneously estimated using maximum likelihood method assuming half normal and exponential specifications. Learning efficiency for individual i was defined by, $E_i = \exp(-u_i)$ which takes the value one if $u_i = 0$.

Results

Empirical results of the parsimonious models³ are reported in Table 2.

Table 2: Stochastic Frontier Parameter Estimates-Dependent Variable: *ln (CGPA)*

<i>Stochastic frontier model</i>		
	MLE (half-normal)	MLE (exponential)
Constant	1.4357 (0.0998)***	1.4294 (0.1004)***
ln(Formal)	-0.0222 (0.0100)**	-0.0231 (0.0099)**
ln(Self)	0.0132 (0.0047)**	0.0123 (0.0047)***
ln(Sleep)	-0.0475 (0.0228)**	-0.0497 (0.0230)**
<i>Inefficiency Model</i>		
Constant	5.2563 (1.7010)**	7.6639 (2.4791)**
FYGPA	-2.8603 (0.5459)***	-3.9064 (0.8172)***
Class	-0.0541 (0.0213)***	-0.0684 (0.0288)**
Level		
Part II	0.0161 (0.2845)	0.0085 (0.4233)
Part III	-0.7455 (0.3162)***	-0.9683 (0.4547)**
Employ	0.9453 (0.5499)*	0.9748 (0.8097)
N	276	276
Log Likelihood	335.756	309.1352
LR for one-sided error	36.72***	50.24***
σ_v	0.0423 (0.0053)***	0.0497 (0.0048)***
σ_u	0.1209 (0.0089)***	0.0684 (0.0075)***
σ^2	0.0164 (0.0019)***	0.0071 (0.0086)***
λ	2.8602 (0.01263)**	1.3762 (0.0108)**
Average efficiency prediction	0.93	0.94

Notes : Standard errors are in parentheses.

*, ** and *** Indicate coefficient is significant at the 10%, 5% and 1% or lower probability levels.

The signs of the coefficients of stochastic frontiers are as expected with the exception of a negative estimate for variable *Formal*. Variables *FYGPA*, *Class*, *Level* and *Employee* are statistically significant. Positive significant coefficient of λ which provides an indication for the relative contribution of u and v to ε , implies that one-sided error component dominates the asymmetric error component in determining ε . This produces evidence for the validity of using inefficiency model to explain the determinants of efficiency.

Conclusion and Policy recommendations

³ First unrestricted models were estimated and then moved to the parsimonious models excluding insignificant variables.

Mean efficiency of 0.93 and 0.94, under half-normal and exponential specifications imply higher learning efficiency among social sciences. No significant variation of efficiency among degree programs could be observed except in economics degree which appears comparatively less efficient than others. This may be due to the specific nature of the subject. Students in Economics comparatively archive lower GPA (mean is 3.0). First year GPA, which reflects entrance quality to a special degree program, turns out to be highly significant and positive, while A/L Z score, which reflects entrance quality to a university, turns out to be insignificant (0.1921 with SE of 0.3968)⁴. Both model specifications are appropriate for modelling learning efficiency. Cobb-Douglas specification is preferred over Translog representation. Student being an employee worsens the learning efficiency in higher education.

These results have several important policy implications. Firstly, the findings suggest the necessity of a policy change pertaining to university admission in social sciences, in the direction of increasing student enrolment through bringing down cut-off Z – score to an acceptable level. This also answers the question of limited number of students being admitted to State universities, a major criticism on higher education sector. Secondly, the university authorities need to pay attention to improve first year instructional quality in any mode. Policy makers are motivated towards student centred higher education policy and university authorities need to modify their teaching processes. Finally, the students should have a well-planned time budget.

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⁴ Results of unrestricted models are not reported

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Internship of Undergraduates, their Academic Performance and Future Employability

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Key words: Internship, Undergraduates and Employability

Introduction

The phenomenon of internship training is quite new to the different programs in the disciplines of arts and management. Most of the time the objective of introducing internship to undergraduate programs is to improve academic performance and future employability. In recent years, there has been an increase in the number of studies examining the effects of the internship/working part time while studying. However internship can be seen as complementary to educational achievements because different skills are improved with practice. In addition, it can be treated as a substitute for education because time spent on internship reduces that on education.

Further, nature of the work assigned to undergraduates during their internship can sometimes be seen as some laborious task that does not match with their program and involving no proper coordination and supervision. The students who worked on career specific skills earned higher grades than those students engaged in general work experience (Wenz and Yu, 2010). Bukaliya (2012) in his study on Zimbabwe, pointed out that the students prefer internship, because they gain exposure to the real world of work but that there is no effective supervision and there is resistance from current employees too. Beffy et al (2010) and Furr and Elling (2000) have suggested that working while studying reduces performance at the year end examination and that the effect of part time work is smaller when the working hours are less per week. The findings of Watanabe (2005) did not contribute to proving either the positive or negative relationship between part time work and academic achievements. Though studies have looked at the effects of internship/part time work, there seem to be no studies that link such work to future employability.

In the context of Sri Lanka it is questionable whether internship has positive effects or negative effects on undergraduates' academic performance and their future employability. Existing literature seems contradictory and effects of internship/part time work have positive as well as negative effects on academic performance based on the nature of the work and duration of work. Considering the Sri Lankan context, there

is a lack of research studies particularly in the field of humanities and social science degree programs on the issue at hand.

Objectives

This study is an attempt to identify the effects of internship of undergraduates in the field of management and commerce degree programs on their academic performance and future employability and to use the findings of the study to enhance the quality of the internship program to increase the academic performance and future employability of such undergraduates.

Methodology

Primary data and secondary data sources were used for the study. Secondary data were collected from the university system. Primary data were collected from a sample of undergraduates in the Faculty of Management Studies and Commerce in the University of Sri Jayewardenepura via a structured questionnaire. A control sample and an ‘experimental’ sample were included and required data were collected from both groups of students: those who participated in internship/training programme and those who did not participate in such programmes. The methodology is highly quantitative and multiple regression analysis was employed with the statistical package of E-views 6.0 version. Academic performance is measured based on the grade point average of the undergraduates.

Ten variables selected for the model were Gender, Place 1 (*hostel*), Place 2 (*boarding*), Place 3 (*home*), Courses followed during the university period, Training period, Study leave, Lecture note coverage, Attendance of lectures and Family Index (*equal weighted average value of the variables in the family background, namely, Family Income, Number of Children, health condition of the parents, Number of Dependents, Education background of Father and Mother*). Criteria used to measure the future employability were “waiting time for a job after graduation” and “level of job”. A comparison is carried out between the ‘experimental’ sample (Undergraduates who participated in internship) and the control sample (Undergraduates who did not participated in internship) to identify clearly the effects of internship on their academic performance and future employability.

Results

As per the regression exercise, the following equation was developed for the academic performance of undergraduates (see Table 1 also):

$$\text{AVERAGE GPA} = C + \text{GENDER} - \text{TRAINING} - \text{STUDY_LEAVE} - \text{COVERED} + \text{ATTENDANCE} + \text{FI}$$

The regression equation for academic performance shows that gender, attendance and Family Index have a positive impact on academic performance and training, study leave and lecturers use of notes have a negative impact on it. Gender is a dummy variable in the regression analysis. Therefore it can be interpreted that male students have a better academic performance than female students.

Table 1: Output-Multiple Regression Analysis

Dependent Variable: AVERAGE_GPA				
Method: Least Squares				
Date: 09/07/12 Time: 23:00				
Sample: 1 60				
Included observations: 60				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
GENDER	0.125832	0.103519	1.215546	0.2295
TRAINING	-0.002781	0.148276	-0.018758	0.9851
STUDY_LEAVE	-0.014366	0.034473	-0.416738	0.6786
COVERED	-0.062477	0.103616	-0.602966	0.5491
ATTENDANCE	0.789142	0.156297	5.048983	0
FI	0.433776	0.133555	3.24791	0.002
C	1.402412	0.428634	3.271821	0.0019

Source : Compiled by authors

However, according to the results only attendance and Family Index are significant in determining academic performance. Since the calculated “F” Statistic of 5.58 exceeds the table value of 2.25 for the F distribution with 6 and 53 degrees of freedom, the model can be considered significant at 95% level of confidence. Therefore, we conclude that there is a statistically significant relationship among the explanatory variables with average GPA.

According to the Table 2, graduates with internship have 4 months, 14 months and 2.5 months average waiting time to secure Staff Assistant, Lower Level Management and Middle Level Management positions respectively. The graduates who did not have internship, on the contrary, spent only 2 months of waiting time for Staff Assistant level jobs, while their waiting time for Lower Level Management and Middle Level Management jobs are 15 months and 7 months respectively.

Table 2: Employability and Internship

Statues	Employed	Unemployed		
Number of Graduates	50	10		
Internship %	88%	80%		
	Internship Graduates	Non Internship Graduates		
Average Waiting Time Months	5	6.5		
	Private	Government		
Number of Graduates	16	34		
Internship %	94%	88%		
Average Waiting Time	2.5	7		
Average Waiting Time - Internship Graduates	2.6	6.4		
Average Waiting Time - Non Internship Graduates	0	8		
Service Years	< 1 year	1 - 2 years	2 - 3 years	> 5 yrs
Number of Graduates	22	18	8	2
Internship %	81%	94%	88%	100%
Average Waiting Time	5	7	1	7
Average Waiting Time - Internship Graduates	5	7	1	7
Average Waiting Time - Non Internship Graduates	6	15	0	No
	Staff Assist / Clerical	Lower Level Management	Middle Level Management	
Number of Graduates	13	10	27	
Internship %	85%	99%	88%	
Average Waiting Time	3.5	14	2.5	
Average Waiting Time - Internship Graduates	4	14	2	
Average Waiting Time - Non Internship Graduates	2	15	7	
Average Service Years - Internship Graduates	less than 1 year	2 year - 3 year	1 year - 2 year	
Average Service Years - Non Internship Graduates	1 year - 2 year	1 year - 2 year	less than 1 year	
Current job compare with	Degree	Training	Professional	
Yes	33	34	20	
No	17	16	30	

Source : Compiled by the Authors Note : Time is in months

In addition to that, those who had internship training appear to have been able to gather more years of “higher level” experience within a given period of time than those who had not undergone internship training. This is indicated by the fact that those with internship training behind them managed to step into higher positions after spending less than 1 year in the Staff Assistant Level, and obtaining 2–3 years and 1-2 years average service experience in Lower Level Management and Middle Level Management jobs respectively, while those without internship have had to spend on average 1–2 years in Staff Assistant and Lower Level Management levels and less than 1 year experience in the Middle management level.

Conclusion and Policy Recommendations

Faculty of Management Studies and Commerce (FMSC) of University of Sri Jayewardenepura comprises of twelve departments and some of these do not insist on the undergraduate internship in 3rd year and 4th year in the degree course. Internship is a credited elective course in departments that offer internship as a subject for the degree course.

According to the finding of the paper, it can be concluded that Internship is not a significant variable in determining undergraduates’ academic performance. Therefore internship does not seem detrimental to academic performance. Attendance of lectures and Family Index are significant variables in explaining the academic performance of undergraduates. Therefore, the departments and the FMSC have provided night time lectures to motivate attendance in an attempt to strengthen undergraduate academic performance.

Second major conclusion is that Internship is highly correlated with employability of undergraduates. Those who did not have field internship had to spend more time in lower level job positions and their waiting time to obtain middle level and higher level jobs are greater than those with internship training.

It is therefore suggested that the internship is important and therefore that further issues, such as quality of the internship, financial strength of the students, and the equality among the students should be focused on and can be uplifted by having proper linkages among the three parties (FMSC, internship trainees, and industry). In this context issues such as the length of the internship training period, payment for interns, the nature of work and cooperation of other workers needs to be addressed.

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The Impact of Part-Time Employment on Education of Undergraduates (A Case Study from Sabaragamuwa University of Sri Lanka)

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Key words: Part-time employment, Undergraduates, Academic performances

Introduction

Although many undergraduates in Sri Lanka allocate their time, energy and commitment fully to education, a considerable proportion of undergraduates, by choice, divide the above three components between education and employment. Usually, the objectives of these two time allocations are highly contradictory. Many studies have found that part-time employment of students has adverse effects on academic performance (Callender, 2008; Darmody and Smyth, 2008). However, some argue that holding part-time employment will not significantly affect the academic performance of students (Oi and Morrison, 2005).

Sri Lanka is facing rapid population aging and the challenge of a shrinking labour force according to Arunathilake (2009). Due to this, more part-time employment opportunities will open up for students. Therefore, involvement of students in part-time employment will increase rapidly in the future. According to the theory of displacement (Hofman and Steijn, 2003), students will grab more job opportunities from unskilled workers. Part-time employment however could also have a negative influence on building up expert human capital for the professional labour market due to the poor performance of students in their academic activities. Therefore, identifying the impact of part-time employment on education will be important for policy makers in both the fields of education and labour markets.

Objective

The main objective of this study is to observe the impact of part-time employment on educational performance of undergraduates.

Methodology

Primary data were collected from 200 students representing all five faculties of the Sabaragamuwa University between October and December 2011, using a questionnaire.

A stratified random sampling method was used in selecting the sample from among 3rd and 4th year students, representing all five faculties of the university. 26 students from the Faculty of Agriculture, 40 students from the Faculty of Applied Sciences, 17 students from the Faculty of Geomatics, 63 students from the Faculty of Management Studies and 54 students from the Faculty of Social Sciences and Languages were included in the sample, proportional to the student numbers in the respective faculties. The first three faculties were taken as Science faculties in the analysis.

OLS regression models were used to identify the impact of part-time employment on students' Grade Point Average, by using 'undertaking part-time employment', 'hours of work in part-time employment' and several other socio economic variables as independent variables. Descriptive statistics were also used for the analysis.

Results

The study found that male students engage more in part-time employment than female students. The key reasons for having part-time employment are to obtain work experience and to cover financial expenses. Providing private tuition is a common form of part-time employment.

Table1: Comparison of GPA between undergraduates holding part-time jobs and others by faculty, year and gender

Category	Holding part-time job		Not holding part-time job	
	GPA	N	GPA	N
Faculty				
Science Faculties(Agriculture, Applied Sciences , Geomatics)	3.0483	26	3.1944	57
Management	2.9113	28	3.1439	35
Social Sciences	2.8032	22	2.9605	32
Year of Study				
3rd year	2.8663	35	3.0930	61
4th year	2.9785	41	3.1457	63
Gender				
Male	2.8946	46	3.0931	62
Female	2.9763	30	3.1464	62
Total	2.9268	76	3.1198	124

According to Table 1, undergraduates holding part-time employment obtained lower GPA in last year's examinations than those who did not hold such part-time employment for all categories.

According to Table 2 (below), the GPA of the students in the overall sample and for the three faculty divisions was negatively affected by part-time employment. The gap in GPA among management faculty part-time job holders and others is higher than that in the other faculties. Considering part-time job holders, the relationship between hours of work and GPA also shows a significant negative relationship.

Table 2: Simple regression models to see the impact of part-time employment on academic performances

Regression models for different samples (No of obs)	Explanatory Variable	Unstandardised Coefficients			Goodness of fit in the models
		B	Std. Error	t value	
Total (200)	(Constant)	3.120	0.030	103.85	F =15.67 (0.000)
	part time employee	-.193	0.049	-3.96	R ² = 0.07
Science Faculties (83)	(Constant)	3.194	0.049	65.28	F =2.79 (0.099)
	part time employee	-0.146	0.087	-1.67	R ² = 0.03
Management (63)	(Constant)	3.144	0.039	80.01	F = 15.57 (0.000)
	part time employee	-0.233	0.059	-3.95	R ² =0.20
Social Sciences and Languages (54)	(Constant)	2.960	0.060	49.60	F =2.82 (.099)
	part time employee	-0.157	0.094	-1.68	R ² =0.05
Only for part time job holders (76)	(Constant)	3.228	0.092	35.02	F =12.05 (0.001)
	Hours of work in part-time employment	-0.012	0.003	-3.47	R ² =0.14

Note : Dependent variable: GPA for last year

According to the multiple regression model (Table 3), being a part-time employee and being a social science student have negative relationships with GPA while age, having parents educated up to G.C.E. A/L or more, fluency in English and financial support from home have positive relationships with student's GPA ($R^2 = 0.31$, $F = 12.078$).

The study involves a paired sample t-test to see the difference between GPA in semesters pre and post engaging in part-time employment. Paired differences of the mean (0.16776), was statistically significant at 99% confidence level.

From among the of part-time employed undergraduates, 16 percent were unable to sit at least one subject at the examination in the last year, and most part-time job holders believed that the marks of their continuous assessments are negatively affected by their employment. Only a small percentage of such students participated in other professional courses simultaneously with the degree, in comparison to undergraduates not holding such work positions. Employed undergraduates have poorer involvement in social activities at university than others. Part-time employment further adversely affects students' mental and physical health conditions, which could have an indirect influence on their academic performance.

Table 3: Multiple regression model for GPA

Variable	Unstandardised Coefficients		t
	B	Std. Error	
(Constant)	1.648	0.553	2.978
Being Male Student	-0.051	0.045	-1.145
Being Part Time Employee	-0.109	0.049	-2.212
Having parents educated up to G.C.E. A/L or more	0.119	0.046	2.609
Being a student from faculty of Social Science and languages	-0.181	0.048	-3.785
Age of the student	0.056	0.023	2.425
Having Fluency in English	0.168	0.057	2.969
Financial Support from home	0.000	0.000	1.763

Conclusion and Policy recommendations

The study concluded that part-time employment of undergraduates has negative impacts on the academic performance of such students in the Sabaragamuwa University. This situation is common to all faculties. Therefore, the university should pay attention to this situation and should implement policies to limit this practice. Since financial constraints is the key reason for part-time employment, the government could intervene to resolve this issue, by increasing the financial support given through subsidy programs such as Mahapola and Bursary for undergraduates, as part time employment seems to have an adverse impacts on future human capital formation.

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Human Resources for a Knowledge Economy: Placing Sri Lanka among Global Benchmarks

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Key Words: *Science and Technology, Human Resources, Growth, Innovation, Education*

Introduction

The demand for and the supply of highly skilled science and technology (S&T) personnel, although often studied separately, is essentially one concept that indicates a country's readiness to adopt technologies and later, to innovate.

Global examples show that focusing on S&T education and the development of S&T industries bring great economic benefits to a country. As an example, in China, R&D facilities geared towards creating an indigenous defense technology opened up avenues for low end innovations to take place. These innovative processors were prompted by spillover defense technologies, and by now have dominated the low cost imitator market of mobile phones and automobiles (Cheung, 2011). Further, India progressively came up in the development ladder with rapid improvements in its Information and Communication Technology (ICT) sector. Consequently, by the year 2000, the Indian software sector was an 8.75 billion dollar industry, with its major markets outside its borders being the US and Canada. Brazil too, is reaping the benefits of its continued commitment to S&T and is increasingly being chosen as an investment destination for multinational companies to set up their research and development facilities (National Research Council of the National Academies, 2010).

As a neighbor to the two emerging economic powers in the world – China and India, Sri Lanka is likely to have many opportunities to grow by being an investment destination for these economies. In this light, the most gainful way-forward for Sri Lanka is via investment in S&T. Investing in S&T means investing in S&T education and research and development (R&D) activities which is essentially investment in human resources in S&T.

Human resources dedicated to S&T are also called highly skilled workers and ideally have the ability to absorb current technical knowledge in the existing production

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process, while creating new and improved methods for the future. Highly skilled workers, S&T workers, or human resource for science and technology (HRST) have been a worldwide focus for a long time, but, was only formally introduced as a development concept in 1995 by the Organisation for Economic Co-operation and Development (OECD) through the Canberra Manual.

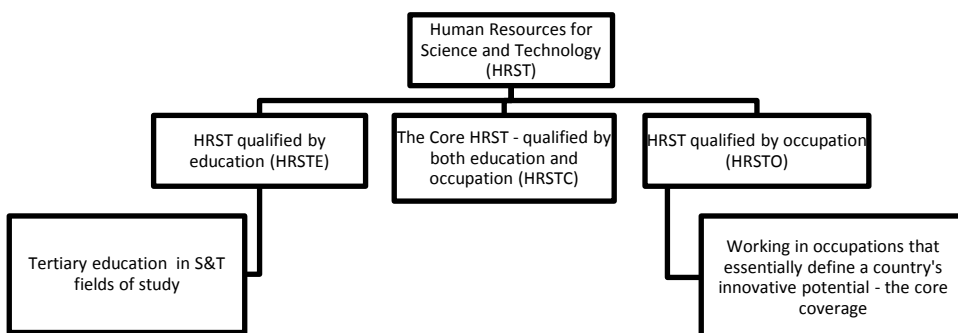
Objectives of the Study

With the changes taking place in the world economy it is essential that the stock of highly skilled persons, as well as prospective addition to such human resources in the labour force are measured, so that the realities of achieving already set growth objectives can be understood.

In this light, the objective of this study is to define and understand the highly skilled human resource in Sri Lanka, and its implications for the island's development. For this purpose the current research will identify possible definitions of HRST and sources of data available for descriptive analysis. Finally, an appraisal of Sri Lanka's HRST achievements compared to BRICS (Brazil, Russia, India, China and Singapore) the European Union (EU) and the OECD countries will serve the purpose of understanding the policy implications of HRST to the local economy.

Methodology

Figure 1: Defining Human Resources for Science and Technology



Source: Figure presented by the author based on the Canberra Manual, 1995

The recommended definition of the Canberra Manual 1995 was adopted to understand the concept of HRST in Sri Lanka in this study. The manual described HRST as people who are qualified in tertiary education and employed in S&T occupations that demand higher levels of skills. This broader definition was left open for modification so that individual development priorities could be reflected in the HRST workforce.

The importance of HRST as a concept lies in its subcategories. These sub-categories of HRST are recorded in the Figure 1 above.

Data sources

Labour force surveys (LFS) are the only forms of consistent data sources available to carry out specialized analysis such as HRST. However, the nature of the data available is such that important sub-classifications that have great policy relevance cannot be interpreted due to inadequate representation in the sample. To avoid such statistical inaccuracies, two LFSs for two different years (2009 and 2010) were attached to ensure that the calculations are statistically accurate. University Grants Commission (UGC) data on graduate enrolment and output were also used to obtain finer details into HRST qualified by education.

A sub-section of this research assesses Sri Lanka's achievements against other countries. This will be partly done via the Eurostat database and OECD Data, where HRST counts of each country are readily available; while a considerable part of this comparative assessment will also be done using a report published by the Levin Institute on HRST in BRICS countries

Results

On average in the period 2009/2010 Sri Lanka counted 1.6 million persons qualified to be HRST. 219,000 of the HRST count were both educationally and occupationally qualified (HRSTC). 129,000 of the remaining HRST personnel were only educationally qualified (HRSTE) and 1,219,000 were qualified by occupation (HRSTO).

Ideally, a major part of the HRST count should consist of those who are both educationally and occupationally qualified to be in S&T work, where the demand for highly skilled persons are met with adequately qualified supply. Yet, in the case of Sri Lanka, the majority of the HRST pool was only qualified by occupation. In addition, a closer look at those HRST personnel qualified by education (HRSTE) alone, indicate that only 63% of this sub category was employed in S&T occupations. Of the remaining HRSTE, 84,000 were not employed at all, and the rest were employed in jobs for which they are overqualified.

Although, next to the BRICS and the EU, HRST headcount in Sri Lanka is comparable, comprehensive examination into each of the HRST categories made it clear that Sri Lanka has scope for improvement. For example, compared to India's 65% in 2004 (Levin Institute, 2009) and the EU's 30% in 2008 (Meri, 2008) of HRSTO working with less than tertiary credentials, Sri Lanka's 78% in 2009/2010, indicates the necessity of investing more in S&T education.

Sri Lanka has much to do to achieve its already set growth objectives. As the number of S&T workers and S&T investment define Sri Lanka's innovative potential, it remains a growth imperative to ensure that more people are attaining tertiary education in S&T fields of study, and that educationally qualified persons are employed in suitable S&T occupations.

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Labour Turnover in the White-Collar Job Categories of the Sri Lanka's Ready-Made Garments (RMG) Industry: Emerging Trends and Causal Factors in the Post- MFA Period

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Key Words: Labour turnover, Sri Lanka's apparel industry, Post-MFA, Brain drain of middle management, Labour Productivity

Background

Sri Lanka's ready-made garments (RMG) industry has been through many stages of growth and structural formation that bears upon the constituents of the industry, most notably its labour force. During its years of launch the RMG industry growth led to the creation of a pro-competitive labour force and the industry- labour partnership grew into one of synergy and mutual reinforcement. In the post-MFA era that began in the mid-1990s, the RMG sector faced intense competition in securing its position in the global apparel value chain. As the fortunes shifted from a high growth mode to painful restructuring, the RMG industry faced the unenviable challenge of retaining and sustaining its competitive labour force. Consequently, the industry went through mergers and restructuring, while over 35% factories faced closure. These challenges have had a profound impact on the RMG industry as a whole, and dramatic consequences on the labour force in particular. Whilst the closure of such a large number of factories created chaos in the industry, it soon enabled those that survived to make use of the redundant workforce as an abundant pool of talent and make good of it. However, this initial respite failed to create a sustained performance in the industry. Under the intensifying value chain competition that intensified with the encroachment of Chinese, and later countries like Bangladesh, Vietnam, etc. the RMG sector is faced with yet another round of stress. The industry increasingly is in need of many talented workers to ward off competitive pressure. Consequently, labour turnover, in particular in the middle management categories, has been identified as amongst the issues that are of utmost concern to the industry if it were to maintain the gains it made in the global apparel trade so far.

The literature on labour turnover is wide ranging involving a broad scope of the topic. However, the studies and the perceived analyses are subjective, as they are influenced by the nature of the firm, industry, region, country and the period of analysis. The literature also recognises that no one procedure or model could capture the intricacies involved in the subject. For instance, even within a firm, different categories of labour

are influenced by differing factors as labour turnover is perceived as the outcome of complex interactions of many factors. Thus, it makes it difficult to pinpoint and establish a well-defined relationship between the factors that cause turnover and its reciprocal impact upon the factors. Evidently, the issue of blue collar worker labour turnover and related issues have been extensively covered in a multitude of studies, though the discussion of turnover issues of white collar categories have been few and far between.

Objectives

Notwithstanding that labour turnover cuts across many occupations, this study makes its specific focus of labour turnover in the executive categories in the RMG industry in Sri Lanka in the post MFA transformation years.

The study endeavours to bring out critical factors that underlie the current outcomes of labour turnover, and also possible explanations industry perceives as the reasons, so that industry can better manage them before they reach epidemic proportions. Whilst the study acknowledges the limitations it imposes on the final outcomes, we are of the view that it elucidates the important parameters that may be analysed in depth in rigorous studies in the future.

Methodology

This study explores the subject via two channels: a first questionnaire focused on the opinions of the top most executives of the firms studied; and a second questionnaire targeted at middle management levels that are comparable across the industry. The choice of this particular category of employees for the research study is justified on the grounds that this segment of the labour force is quite critical for the maintenance of the status-quo of the industry vis-à-vis its trading competitors. A survey of 50 white collar employees covering 5 RMG firms, and 5 questionnaires addressed to the respective company heads provide the source of information for the study.

The methodology adopted in this study is confined to opinion surveys involving qualitative assessment of the findings. The information gathered are then matched with the objective of ascertaining how the industry as a whole perceives the issue of turnover and its contributory factors. For this, specific targeted factors are considered which are then matched with industry findings. It needs noting that this study will serve as a pilot study of the subject that may be analysed in-depth by employing industry-wide studies in the future.

Summary of findings

The definition of turnover from a management perspective is somewhat varied across firms. The industry considers a turnover around 2-3% that prevailed until the second half of 2000s to be not much of a problem. Evidently, turnover issue has been critical in production departments and merchandising, whereas it is less so in other divisions. The industry copes with such inevitabilities through temporary transfers of similar staff from other sections to cover the gaps. This procedure however exerts extra burden on the managerial staff who are transferred and the production staff below as in it involves “additional controls” as the production line requires readjustment.

Those who join the industry young tend to be enthusiastic, willing to learn and undertake longer shifts due to a culture that gives the promise of upward career mobility. Those who enter the industry young have the potential of becoming a middle management staff within a period of 3-5 years. Evidently, these young employees show high lateral mobility as the industry has well standardised practices established that enables them to fit in within short gestation periods. Their career development paths too are planned well ahead and across the industry. Thus, it remains a less influential factor in labour turnover.

The industry has an informally recognised hierarchy where top notch firms are setting trends and practices with others following suit. Evidently, many who join young aspire to join the upper tier firms as a matter of prestige and personal value. It is also a fact that many go back to the lower tier firms after some time to gain higher perks, often the firm that they first left. The reason for this paradox is that many who come from those upper echelon firms are welcome as they bring with them the latest practices and knowhow that are vital for the survival of the firm and industry at competitive levels. Interestingly, it is evident that most firms regard themselves as a unit of a large production base that shares know how, practices and human skills.

Firms, as a policy, advocate informal culture to promote belongingness and commitment. Wages too remain fairly competitive and thus remain less influential in making employees quit. One of the reasons that potentially influences labour turnover is the work-life balance issue which is evidently biased towards work. The average age groups of the industry are 20- 45 years with more employee concentration found at the lower end of the age spectrum. Though those who reach 40-50 years are more inclined to leave the industry as they find it takes a toll on their lives, their turnover remain somewhat lower than their younger counterparts. Though distance is an influential factor in the choice of their place of work, many factories that are located in the outskirts and rural areas seem to have been less affected as the firms manage to employ middle management from the same localities.

Strikingly, since the second half of the 2000s, many smart middle managers have been lost due to the brain drain to competitor countries such as Bangladesh, Vietnam and Cambodia, Myanmar, etc. with devastating consequences, giving credence to the widely held belief that substantial differences in wages still remain a crucial pull factor in labour turnover.

Conclusions

The conclusions that we derive upon are that, as expected, labour turnover has many connotations, underlying reasons and implications. Whilst it's quite subjective and the opinions are mixed, clearly that it was not the labour turnover per se, but the kind of labour that is crucial in Sri Lanka's apparel industry. The competitiveness of a firm appears to have close relationship with the harmony of its value creation process. Especially those who hold key positions in the value chain that could cause devastating impact on the firm's competitiveness in the event they leave. Evidently, the firms concerned would do their utmost to retain such staff as right replacements are increasingly harder to find. However, the evidence suggests that the labour turnover in the current context is unprecedented in terms of its character and begs for new ideas and strategies to deal with it.

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Moonlighting among Married Men over Life Cycle Stages in Sri Lanka

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Key Words: Moonlighting, Life Cycle Stages, Age Composition of Children

Introduction

Moonlighting (multiple job holding) has become a prominent feature in most of labor markets. Worker's motivation to moonlight is influenced by several factors including hours constrained motive (to compensate for insufficient work hours), heterogeneous job motive (to perform different tasks) and financial motive (to meet their regular household expenses) (Heineck, 2009). Motives could also change during different stages of the worker's life cycle. In the life cycle stages following parenthood, financial motive becomes the leading decision variable in moonlighting among married men. The reason is that they feel squeezed by the lack of finances to meet the new family requirements during this stage according to Wilensky (1963, cited in McClain and Moen, 1989, p.45). Such family requirements vary according to the age composition of children.

Objectives

Main objective of this study is to examine the changes of the probability of moonlighting by married men in Sri Lanka with the changes of age composition of their children. Identifying other socio economic determinants of moonlighting for the selected group is a supplementary objective.

Methodology

The study is based on a sub-sample of 5,673 married, employed male household heads in the age group of 31-50⁶, extracted from Quarterly Labour Force Surveys in 2010. This group records the highest moonlighting rate among all age groups. Binary logistic

⁶ The missing observations (188) resulting for the question of engaging in secondary employment (q 21) are dropped from the sample of 5,861 married, employed male household heads in the age group of 31-50.

regression models and OLS regression models were used for the analysis. 3,114 cases are used in the logistic regression analysis after removing missing values in two independent variables of log per hour earning and log years of education⁷. The dependent variable of being a moonlighter or not being moonlighter is used in all binary logistic regression models. The age composition of employees' children (no children, having children less than 6 years old, having children between 6-14 years old, having children more than 14 years of age) which is based on the mean age of children in each household, is used to indicate life cycle stages of married men.

Results

The cost of maintaining children has been growing rapidly in the modern world. This 'cost' is determined by both direct and indirect expenses consequent to parenthood. Direct cost includes costs of food, clothing, health and education of children. Indirect cost includes opportunity cost of wife's employment (Kaufman and Hotchkiss, 2003, p.117). If wife is employed, the opportunity cost is the market price of time intensive activities of a housewife. Time intensive activities of a mother are very high in the life cycle stages with infants, pre-school or school-going children within the age of child dependency. A huge amount of finances are required to convert these time intensive activities into market intensive activities. In the Sri Lankan context, short-term departure or reduction of labour force participation by reproductive age women is not so prominent since labour market policies are not so flexible. Therefore, both married men and women have to earn more to meet the family cost of children as defined above. Considering married men with children of less than 6 and 6-14 age groups, their total work hours (summation of primary and secondary work hours) are significantly higher than the other groups as found by OLS regression models. The study also found that married men are more likely to moonlight at these two stages of the life cycle, rather than men with no children, the reference category (Table 1 below).

Years of education also increases moonlighting by married men. Underutilization of educated workers by primary employer is one reason for seeking additional moonlighting opportunities. However, it could reduce the commitment to work in the first job.

According to neoclassical labour leisure model, increasing income reduces labour supply. Therefore, low per hour earning from the main job increases labour supply of

⁷ Log per hour earning is regressed on log years of education and the residual of the model was used as log per hour earning to avoid the issues of multicollinearity between the two variables.

worker. If the employees are not allowed additional work hours in their primary jobs, moonlighting is the best way of expanding work hours.

Table 1: Binary logistic regression model for the determinants of moonlighting among married men between 31-50 age groups

Explanatory Variables	B	Wald Statistics	Odds Ratio
Demographic composition of children (Ref: No children)		6.31	
Children less than 6 years old	0.52	3.36	1.68
Children between 6-14	0.50	3.58	1.65
Children more than 14	0.23	0.66	1.26
In years of education	0.23	3.27	1.26
In per hour earning (residual)	-0.12	5.41	0.89
Having EPF entitlement(Formal private sector worker)	-0.72	18.72	0.49
Being rural sector worker	0.33	3.90	1.39
Interaction Rural* Agricultural worker	0.63	12.55	1.88
Constant	-3.19	66.34	0.04

Note: Number of observations = 3114

Source: Author's calculations using Quarterly Labour Force Survey, 2010

Workers having EPF entitlement in formal private sector are less likely to moonlight than workers in other work sectors since they are fully utilized by the primary employer. Overtime availability is also high for them in the same primary job.

Moonlighting among rural sector workers is higher than in the non-rural sector. Rural agricultural sector workers (28% of rural workers) moonlight more than rural or non-rural non-agricultural workers. This could be a result of hour's constrained motive and financial insecurity in such employment. According to Gunathilake (2010) the agricultural sector is the primary sector that contributes to working poverty.

According to Table 2 below, having an employed spouse increases the possibility of moonlighting of married men other than in the group of men with children less than 6 years old. Employment of the wife changes time intensive household activities into market intensive activities (Becker, 1965). Since the cost of time intensive activities

increases, both husband and wife should earn more. Importance of impact on moonlighting of EPF entitlement, years of education, per hour earning in primary employment, being rural sector, being rural agricultural worker differs by life cycle stages based on age composition of children. Hosmer and Lemeshow tests are insignificant for all binary logistic regression models indicating the goodness of fit of the models.

Table 2: Binary Logistic regression models for the determinants of moonlighting among Fathers in different life cycle stages based on demographic composition of children

Variables	Less than 6 (N=628)			Age 6-14 (N= 1626)			15 or more (N= 641)		
	β	Wald	Odds ratio	β	Wald	Odds ratio	β	Wald	Odds ratio
In years of education	0.79	4.76	2.21	0.24	2.00	1.28	-0.28	1.10	0.76
In per hour earning-main job (residual)	-0.17	2.21	0.85	-0.08	1.05	0.93	-0.31	4.75	0.74
having EPF entitlement (Formal private sector worker)	-1.02	8.69	0.36	-0.77	11.09	0.46	-0.48	1.40	0.62
Being Rural sector worker	0.10	0.08	1.10	0.52	4.77	1.68	0.31	0.67	1.36
Interaction Rural* Agricultural worker	0.66	2.06	1.93	0.66	7.35	1.93	0.47	1.54	1.60
Having Employed spouse	0.40	2.16	1.49	0.96	37.85	2.60	1.04	13.20	2.82
Constant	-3.81	19.02	0.02	-3.28	61.29	0.04	-2.51	17.55	0.08

Source: Author's calculations using Quarterly Labour Force Survey, 2010

Conclusions and Policy Recommendations

The study concludes that moonlighting among married men is higher for the two groups with children less than 6 years of age and 6-14 years of age and that the total hours of work in above two life cycle stages are higher for married males. This could create a work-family imbalance. Before identifying specific policy implications for these groups, positive and negative implications of moonlighting should be analyzed. Most of

the researchers have found that introducing flexible work schedules helps to achieve work-family balance leading to higher family welfare.

Low per hour income and years of education encourage more moonlighting. One reason is that the full capacity of the highly educated group could not be totally extracted by the primary employer. Moonlighting reduces the labor market risk to a certain extent because in case the main job is lost, the worker will have a second one. However, moonlighting could lead to inefficiencies in the primary job.

Rural agricultural workers are more likely to moonlight and this has important policy implications. As underemployment and poverty are some possible reasons for this, creating opportunities for additional earning is necessary to minimize the issues of working poor in this group. Poverty alleviation programmes including ‘Samurdhi’ and other development programmes such as ‘Divineguma’ could absorb this additional labour by encouraging and facilitating new small-scale enterprise development. This would help increase labour productivity in economically insecure sectors and avoid issues of working poor.

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Factors contributing to delay in diagnosis of pulmonary tuberculosis patients after care seeking in the district of Anuradhapura, Sri Lanka

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Key words: Tuberculosis, Health care, delay, Diagnosis, Patients

Introduction

Tuberculosis (TB) is classified as a re-emerging disease. In 2011, The World Health Organisation (WHO) cited that 8.7 million people worldwide fell ill with tuberculosis and 1.4 million people died because of the disease. In the South East Asian region alone, 500 million people are already infected with the Pulmonary Tuberculosis bacilli and 3 million new cases of Pulmonary Tuberculosis (PTB) develop annually (Dolin and Kochi, 2000). WHO targets reducing the burden of PTB, and halving the PTB deaths and prevalence by 2015 through its “Stop Pulmonary Tuberculosis Strategy” and supporting the “Global Plan to Stop Pulmonary Tuberculosis”. In Anuradhapura, a total of 315 PTB cases were reported in 2007 and out of these 167 were smear positive PTB patients. In 2005, the national case detection rate was 47.9/100,000 population and the rate for the Anuradhapura district was 34/100,000.

Objectives

- I. To describe the type of the health care providers visited by pulmonary tuberculosis patients
- II. To assess the time interval between the first visit to a health care provider and initiation of anti-tuberculosis treatment (i.e. health care provider delay)
- III. To describe the mode of referral of patients with pulmonary tuberculosis from the initial contact with a health care provider up to the treatment facility
- IV. To determine whether socio-demographic characteristics and presenting symptoms of patients influence the delay in initiation of treatment since care seeking
- V. To compare the delay in initiation of treatment since care seeking between smear positive and smear negative, and new and relapse pulmonary tuberculosis patients

Methodology

The analysis is largely based on a descriptive study conducted at the chest clinic and branch chest clinics, in Anuradhapura. The main health care provider for the

Anuradhapura district is the state and there are 62 government health institutions comprised of 24 Central Dispensaries, 23 Rural Hospitals, 7 Peripheral Units, 5 District hospitals, 2 Base Hospitals and a General (Teaching) Hospital. The main chest clinic is located at the Anuradhapura Teaching Hospital, and the branch chest clinics are functioning at the Base Hospitals. In addition, there are 8 microscopic centers in the district. The study population comprised of Pulmonary Tuberculosis patients registered in the District Tuberculosis Register, Anuradhapura and satisfying the following selection criteria:

- Pulmonary Tuberculosis patients registered at the Chest Clinic, Anuradhapura between 01st of January 2008 and 30th of November 2008.
- Aged more than 15 years at the time of registration

The independent variables were grouped into two main entities: characteristic of health care providers and patients such as socio-economic and demographic factors. The variables selected for the description of service functions of health care providers were type of health care provider visited, mode of referral and investigations done at health facilities visited by the patients. The variables describing socio-economic and demographic characteristics of patients were age, sex, and ethnicity, and marital status, level of education, occupation and income. In addition, variables such as contact history of Pulmonary Tuberculosis, smoking and alcohol consumption were also studied. An interviewer-administered questionnaire was used for data collection. The questionnaire was designed to meet the specific objectives of the study after reviewing literature and consulting experts. Most of the questions were close ended and were arranged to achieve the best line of flow for ease of administration and clarity and thereby to increase the respondent's compliance. Collected data was entered by the principal investigator into the Statistical Package for Social Sciences (SPSS) Version 16. Measures of central tendency were used to describe continuous data. Tests of significance were used to compare groups. Chi square test was applied wherever appropriate to assess the significance of relationships when comparing discrete data.

Results

As defined in the study, health care provider delay of 10 days or more was considered a "long delay". 84% of patients experienced longer provider delay of more than 10 days. Only 22% of patients in the age group 36 to 55 had a health care provider delay of 10 days or less. In the younger age (35 year or less), 91% of patients had a longer provider delay. The proportion of female patients and male patients with shorter delay was 25% and 14% respectively. However difference in the duration of health care provider delay in relation to sex was statistically not significant. The proportion of Sinhalese and ethnic minorities patients experiencing longer provider delays was 85% and 78%

respectively. The proportion of ever married patients with longer provider delay (87%) was much more than that of never married patients (61%). About 53% living within city limits experienced longer provider delay, while among patients having residence outside city limits this proportion was 84%.

43% of patients had only primary education and among them 84% experienced longer provider delay. 86% of patients who were unemployed or unskilled experienced longer health provider delay. Among the skilled workers and professionals, 83% experienced longer delays. The proportion of lower income group patients with longer provider delay (90%) was much more than that of higher income group (72%). There was no statistically significant association between smoking status and alcohol use with provider delay. About 44% who had contact history of Pulmonary Tuberculosis experienced shorter provider delay while only 11% without contact history had a shorter provider delay. About 80% of patients who visited a government health care facility first experienced longer provider delay while among those who visited a private health care provider, 94% experienced longer delay.

Conclusion and Recommendations

The delay in gaining care for PTB is striking, and is consistently so for all age groups, income groups, ethnic groups and both sexes. Rapid diagnosis and treatment is important in PTB for the patient and in the prevention of spread of PTB.

Continuous medical education for health care providers, especially about the need to diagnose Tuberculosis as early as possible, clinical features and diagnostic procedures, is necessary with special attention to private health care providers to reduce provider delay. An effective referral mechanism should be established to refer the suspected patients to the chest clinic or hospital with facilities for investigation. Improvement in diagnostic facilities particularly the sputum microscopy in remote areas of districts will reduce the health care provider delay. Improving awareness of the public regarding symptoms of Tuberculosis and the need to visit health care institutions with facilities for sputum microscopy when they develop symptoms such as chronic cough and loss of weight can help to reduce provider delay. Further, research is beneficial to assess the present knowledge and practices of the health care providers and general public in the region which can be used to implement appropriate public health programmes.

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Women's Labour Force Participation and Fertility Preferences

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Key Words: Sri Lanka, Women Labour Force Participation, Determinants of Fertility Preference, Binary Logistic Regression.

Introduction

In the olden days, it was hard for women to decide the time of the next birth, number of children and time to stop childbearing, except for women who were highly educated career women, according to the views of women who bear the burden of pregnancy and child birth (Caldwell and Caldwell, 1987). Further they concluded that the number of children a woman bore reflected the desired fertility of her husband and his relatives. However, in the modern society, women's status is gradually changing. At present, women's traditional household activities are changing due to the influence of various socioeconomic and demographic conditions. Especially with more women engaging in income generating activities, a new era has been created relating to women's status.

Preference theory is a sociological theory developed by Catherine Hakim (2000) that points out historically five socio economic conditions that have created this new scenario for women:

- First one is the contraceptive revolution that gave women control of their fertility;
- Equal opportunities increased women's access to all position and occupations;
- Expansion of white-collar occupations attracted women;
- Increased secondary earning opportunities such as part time jobs, working at home, telemarketing and annual hour's contracts;
- Changing attitudes and values in modern societies which give everyone the freedom to choose their own lifestyle.

Considering economic factors, the view of fertility behavior is discussed within neoclassical economics, in a model of fertility, originally developed by the economist - Harvey Leibenstein (1922-1994) in 1957. He assumes that parents have sole decision making power within the household and husband and wife have the same utility function. A far more influential economic model was presented by economist Gary Becker in 1960. He introduced two key elements to the theories of household behavior:

preferences and constraints. Theory of consumer behavior assumes that an individual with certain tastes or preferences for a range of goods and services tries to maximise their utility subject to income constraints and the relative prices of goods. Based on this assumption, in the fertility analysis, children are considered as a special kind of consumption good. Therefore fertility becomes a rational economic choice of family's demand for children, relative to other goods. Diane Macunovich (1996) identified women as also having an active role in the decision making process and that they also have material aspirations. In her model she measured the interrelationship between relative income and female wage. Male's relative income increases fertility, while fertility decreases with increased wages earned by women.

Several previous studies found strong associations between fertility and women's educational level, desired family size, contraceptive usage and age at marriage, while men's education has a weak association (Mahmud and Johnston, 1994; Martin, 1995; Jejeebhay, 1995; Angeles, Giulkey and Mroz, 2003). According to Oyediran and Isiugo-Abanihe (2002), spousal communication about family planning, age of husbands and wives, current level of exposure to media, have significant negative effects on future fertility preferences in Nigeria. Bankole and Singh, 1998 and Bongaarts (2003) concluded that husband's educational level, occupation and the desired number of children affect the fertility preferences of women. Further, educational attainment of women increased age at marriage and lowered fertility preferences. According to Khan and Sirvageldin (1979), income of the household and land owned by it were not significant factors for demanding children by rural women in Pakistan. United Nations (1985) and Kazi and Sathar (1993) concluded that the type of employment influences the reproductive intentions and behavior more than employment per se. FBS (1991) and NIPS (1992) found that women who lived in urban areas have lower fertility intentions in Pakistan.

Further, Mason (1987), Mahmud and Johnston (1994) and Bhuyan (1996) concluded that women's employment is an important factor in women's autonomy. Women who work outside the home do not want to risk more pregnancies. Further they like to increase the birth spacing and limit the number of children. Therefore women's employment pattern could be a potential factor in determining fertility levels. On the other hand economic factors have an effect on fertility behavior through their influence on the age at marriage. Mahmud and Johnston (1994) showed that employment increased the desire to delay marriage. Therefore women's employment and fertility preferences are important areas in the demographic field in both developed and developing countries. Further fertility and fertility preferences are important indicators of socio economic development of societies. Therefore, many researchers have tried to identify determinants of fertility preferences in both developed and developing countries. Even though there are some studies related to fertility preferences in Sri Lanka, it is hard to find out recent studies focusing particularly on fertility preferences

of women employees. Further, fertility intention considered a reflection of subsequent fertility behavior. Therefore, the findings of this study could help in formulating policies in the future.

Objectives

The prime objective of this study is to identify the impact of women's labor force participation on fertility preferences.

Methodology

This study used secondary data from the Sri Lanka Demographic and Health Survey (SLDHS) conducted in 2006/2007 by the Department of Census and Statistics. The data were collected through personal interviews based on questionnaires. 11036 currently married women aged 15-49 years were interviewed to identify their fertility behavior: of these 4767 wanted another child while the balance (6269) wanted no more children.

Descriptive statistics including frequencies and cross tabulations and methods of data presentation like graphs and diagrams were used for the preliminary analysis. Binary logistic regression was performed using the sample of females who expressed their fertility preferences. The desire for another child was used as the dependent variable in all binary logistic regressions.

Results

The regression results are summarised in Table 1 below.

The study found that women's employment is positively related with demanding another child. Women's employment could increase the economic potential and thus influence the fertility intention of women. Further their economic contribution is very important to the country.

However, in the Sri Lankan set up, women's active participation in the labor market, both in the formal and informal sectors, results in some difficulties particularly with regard to looking after their children. This is partly due to the fact that the Sri Lankan labor market does not provide enough child care facilities for employees. Therefore, the government and private sector should jointly improve child care facilities in the working environment to help women maintain their "dual career" successfully.

Table 1: Logistic Regression Results on Desire for Another Child

Explanatory variables	B	S.E.	Wald	Exp(B)
Being employed	0.200	0.056	12.753	1.221
Ethnicity			419.636	
Tamil	0.444	0.103	18.630	1.559
Muslim	2.022	0.099	416.383	7.555
Other	-0.055	0.331	0.027	0.947
Residence			10.151	
Urban	-0.224	0.071	9.870	0.799
Estate	-.146	0.136	1.145	0.864
Ever born Children	-1.900	0.039	2354.132	0.150
Wealth			30.666	
Poorest	0.496	0.099	25.116	1.641
Poorer	0.409	0.092	19.884	1.505
Middle	0.346	0.089	14.995	1.414
Richer	0.209	0.082	6.501	1.232
Age at marriage	-0.050	0.006	79.900	0.951
Husband's education			23.953	
No Schooling	-0.327	0.690	0.225	0.721
Secondary	0.365	0.086	18.187	1.440
Higher	0.345	0.096	12.853	1.412
Degree and Above	0.659	0.171	14.862	1.933
Fertility Preference of Husband			9.556	
More Children	-0.036	0.090	0.156	0.965
Fewer Children	-0.059	0.123	0.225	0.943
Don't Know	-0.341	0.111	9.463	0.711
Constant	3.225	.194	275.510	25.160

Source: Author calculations based on DHS, 2006

Residential setting has been identified as a key determinant of fertility preference. According to the above model, women in the urban and estate settings have a negative preference for another child. Family planning programmes are successfully operated and media exposure of women is high in Sri Lanka. Therefore, women's knowledge

about family planning activities and exposure to outside world may reduce their intention of having more children. Number of ever born children also negatively affects demand for more children. Women who have already achieved their desired number of children tend to have lesser fertility intentions. The study concluded that there is a downward trend in the fertility preferences as age at marriage increases. Ethnicity is also a very important factor in determining fertility intentions of women. Muslim, women have a higher tendency for demanding another child than Sinhala women. The religious and cultural norms of Muslim women appear to influence their high fertility intentions.

As an economic factor, the wealth criterion is also a very important variable associated with fertility preference. According to above results, there is a positive relationship between wealth and fertility preference of women. Wealth is especially important in exposing people to new ideas and commodities. Therefore it influences their fertility intention. Contradictory findings regarding husband's education and fertility preferences could be found in previous studies. However in this study, Husband's education level is statistically significant, and husband's fertility preference also influences the decision to have another child.

Table 2: Goodness of Fit of the Binary Logistic Regression Model

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	8918.983 ^a	0.385	0.515

The Nagelkerke R^2 value is 0.515. The interpretation is that about 51.5% of the variation in fertility preferences can be explained by the above explanatory variables.

Conclusion and Policy Recommendations

Fertility preference is an important factor in demographic studies and human development. This study used desire for future child as a measurement of fertility preferences: According to the binary logistic regression, residential sector, husband's educational level, numbers of ever born children, wealth, husband's fertility preferences, age at marriage, ethnicity and women's labor force participation, are statistically significant in determining women's fertility preferences.

According to the above model, women who are active in the labor market have high intention to have another child. The reason could be that the female labour force

participation might be increasing their financial capabilities and their ability to bear child care costs. Empirical evidence however shows that working women in Sri Lanka, unlike those in developed and even in some developing countries, face difficulties, with regard to child care. The Sri Lankan labor market does not pay adequate attention to the provision of child care facilities for employees. Therefore, the government and private sector should take steps to improve child care facilities in working environments, and formal rules and regulation should be established with regard to childcare facilities. Facilities for married women during their maternity period need further improvement. Such strategies could possibly lead to increased labor market participation by women that will result in greater economic contributions to their families as well as to the country. It would also help reduce the dropout rate of women from the labor market owing to motherhood.

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**,yq;ifapd; nkhj;j ntspehl;L jdpahh; gztDg;gy;fspy;; kj;jpafpof;F ehLfspd;
gq;fspg;G**

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gztDg;gy;fshFk;.

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of Foreign Employment, 2009). kj;jpafpof;F ehLfspy; njhopy; Ghpgh;fs; %ykhd
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Ma;T Kiwapay;

,t;tha;thdJ Kjyhk;> ,uz;lhk; epiyj; juTfisg; gad;gLj;jp msTrhu; kw;Wk; gz;Grhu;
Ma;TKiwfisg; mbg;gilahff; nfhz;L Nkw;nfhs;sg;gLfpwJ. Kj;dpiyj; juTfs;
Neu;fhzyfs; %yk; ngwg;gl;Ls;sd. kj;jpafpof;fpy; njhopy; Ghpgh;fs; kw;Wk;
ntspehl;L gazKfth;fspkUe;J ,it ngwg;gl;Ls;sd. ,uz;lhk; epiyj; juTfs; ,yq;if
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KbTfs; ngwg;gl;Ls;sd.

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$$T_R = \beta_0 + \beta_1 \text{MER} + U$$

,q;F T_R - nkhj;jgz mDg;gy;fs;> MER- kj;jpafpof;fpd; %ykhd gz mDg;gy;fs;> U- tOcUg;G> β_0, β_1 Fzfq;fs; vd;gtw;iwf; Fwpf;Fk;.

Ma;Tf;fhf gad;gLj;jg;gl;l khjpupAU

nkhj;j ntspehl;L jdpahh; gztDg;gy;fspy;;> kj;jpafpof;F ehLfspd; gg;fspg;gpid fz;lwptjw;F NeHNfhl;L vspa gpw;nryT khjpupAU (Simple Regression Models) gad;gLj;jg;gl;Ls;sJ. ,k;khjphpAUtpy; epfo;jfTg; ngWkhdk; (P), JzpTf; Fzfk; [R-sq(adj)], F ngWkhdk;> t Gs;sptpguk; Nghd;w gy;NtW Gs;sptpguq;fs; kjpg;gPL nra;ag;gl;Ls;sd.

ml;ltiz – 01: NeHf;Nfhl;L khjpupAU

khjpupAU	P - Value	F	[R -sq (adj)]
$TR = \beta_0 + \beta_1 \text{MER} + U$	0.000000	9196.670	0.998046

MfNt> ,q;F NeHNfhl;L khjphpAUthdJ JzpTf; Fzfk; kw;Wk; F ngWkhdk; Nghd;wtw;wpd; mbg;gilapy; rpwe;j khjphpAUthff; fhzg;gLfpd;wJ.

Ma;Tf;fhfgad;gLj;jg;gl;lkhjpupAUtpd; tpsf;fk;

kjpg;gPL nra;ag;gl;l khjpup gpd;tUkhW mikAk;.

$$\hat{Y}_t = \hat{\beta}_0 + \hat{\beta}_1 \text{MER}_t$$

,jid fPOs;s ml;ltiz 02 fhl;Lfpd;wJ.

ml;ltiz -02: nkhj;j Ntiyth;a;g;Gr; rhHgpd; kjpg;gPLfs; (NeHNfhl;L khjpupAU)

khwpfs;	gpw;nryTf; Fzfk;	tngWkhdk;	epfo;jfTg; ngWkhdk; (P)
C (khwpyp)	768.6670	0.452464	0.6567
kj;jpa fpof;F ehLfspd; %ykhd gz mDg;gy;fs; (MER)	1.691180	95.89927	0.000
			R-Sq (adj) = 99%

ml;ltiz 01 ngWNgw;wpd; gb> gpw; nryT JzpTf; Fzfj;jpd; ngWkhdk; [R-Sq (adj)] = 99 rjtPjkhFk;. ,jw;fhd NeHNfhl;L rhHe;j khwpahd nkhj;j Ntiyth;a;g;gpd; khwypy; rhuikhwp 99 rjtPjg; gq;fpid tpsf;Ffpd;wJ. NkYk; F ,w;fhd epfo;jfTg; ngWkjp (P-Value) 0.01 I tpl Fiwthf ,Ug;gdhy; khjpupAUthdJ Gs;sptpgu uPjpahf nghUSs;s tifapy; NghJkhdjhf cs;sJ vd F Nrhjid fhl;Lfpd;wJ.

Ma;tpd; KbTk; tpje;JiuAk;

gFg;gha;tpd; gb> kj;jpafpof;F ehLfspd; %ykhd gzmDg;gy;fspd;; gpw;nryTf; Fzfk; 1.69 MfTk; epfo;jfTg; ngWkhdk; (P – Value) 0.000 MfTk; fhzg;gLfpd;wJ. kj;jpafpof;F ehLfspd; %ykhd gzmDg;gy;fs; xU myfhy; mjpfupj;jhy; nkhj;j ntspehl;L gzmDg;gy;fs; 1.69myfhy; mjpfupf;Fk;. ,J NeHf;fzpj; njhlHgpidf; fhl;Lfpd;wJ. ,k;khwpapd; epfo;jfTg; ngWkhdk; 0.000 Mff; fhzg;gLtjdhy; kj;jpafpof;F ehLfspd; %ykhd gzmDg;gy;fspd;; nry;thf;fhdJ nkhj;j ntspehl;L gzmDg;gy;fspy; Gs;sptpgu uPjpahf nghUSs;stifapy; nry;thf;Fr; nrYj;Jfpd;wJ. vdNt ,q;F nkhj;j gzmDg;gypy; kj;jpafpof;F ehLfspypUe;jhd gzmDg;gy;fshdJ nry;thf;Fr; nrYj;Jfpd;wJ vd ,t;tha;T KbT nra;fpd;wJ.

eilKiwapy; cs;s fy;tp Kiwapid njhopw;re;jf;F Vw;gjhf rPh;jpUj;jk; nra;jy;> njhopw; gapw;rpfis cs;ehl;by; toq;Fjy;> ghuk;ghpa njhopy; tha;g;Gfis jtph;j;J nefpo;r;rp \$ba njhopy; tha;g;Gfis Nehf;fpajhf Copaj;j jahh;gLj;jy;> ntspehl;L gaz Kfth;fis muR fz;fhzpj;jy;> ntspehl;L njhopy; tha;g;G njhlh;gpyhd jfty;fis toq;ff; \$ba tifapyhd tiyaikg;nghd;wpid jhgpi;jy;;> ntspehl;L njhopyhsh; eyd; njhlh;gpy; me;ehLfSld; xg;ge;jq;fis Nkw;nfhs;sy;> Nghd;wtw;wpid nraw;gLj;Jtjd; %yk; ntspehl;L jdpahh; gztDg;gy;fspid cah;e;j mstpYk; ePbj;jpUf;jj;f;f jd;ikapYk; ngwyhk;.

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Relationship between Transition of Income Poverty and Assets Base of a Household: A Case Study of the Ratnapura District, Sri Lanka

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Keywords: Transition of income poverty, assets base, SDP, multinomial logistic regression, Ratnapura District, Sri Lanka

Introduction

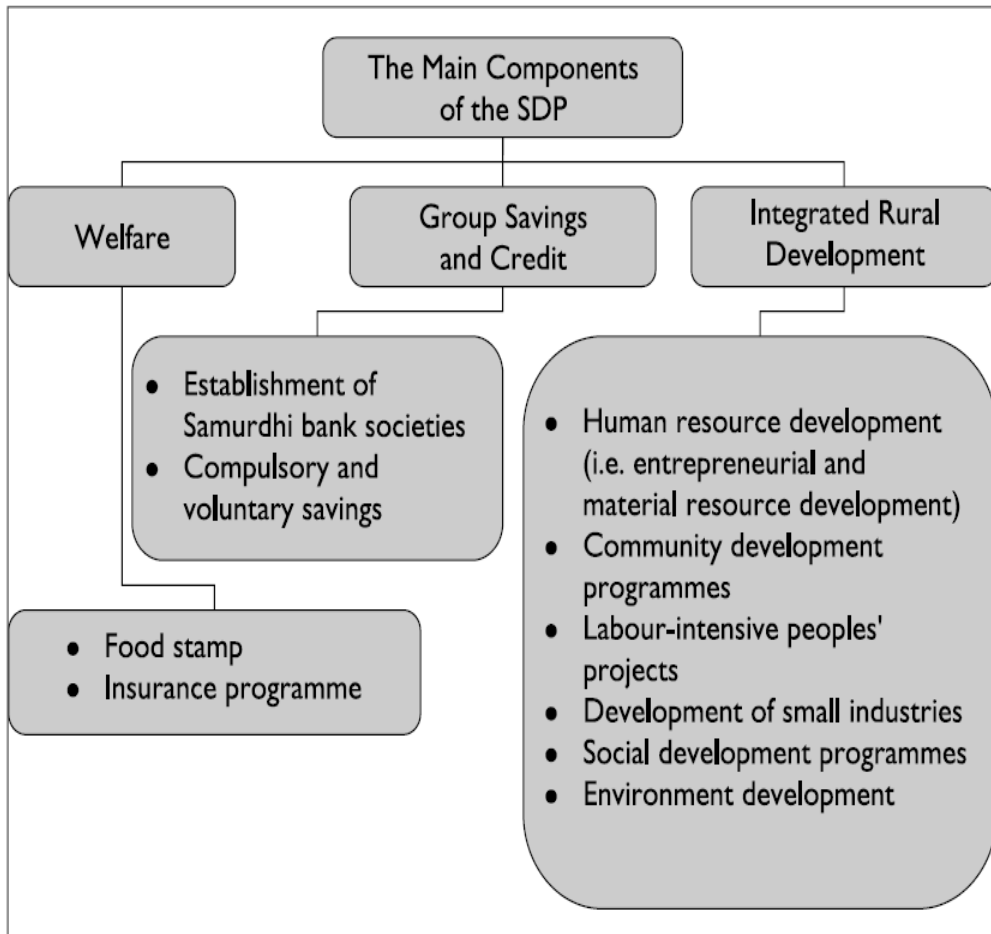
The dimensions of poverty are multi-faceted and complex, and the face of poverty and its impacts vary between regions, countries, communities and individuals (Cahn, 2002). Though it seems very difficult to provide an exact definition for poverty, we would like to follow the definition made in Hengsdijk et al., (2005, p 9) that “poverty is the extent to which households or individuals do not have sufficient resources or abilities to meet their needs”. One of the main reasons for the use of this definition is that there is a close relationship between stock of assets (i.e. human, physical, natural, social and financial) and an individual’s ability to meet his or her needs. The other reason for the use of this definition of poverty is that it provides a framework that allows for its measurement including the complex web of interconnections between socio-economic, cultural, political and environmental factors. This paper is aimed at estimating the relationship between transition of income poverty and development of assets base of a household based on the data from the currently operating Samurdhi Development Programme (SDP) implemented in 1995 by the People’s Alliance Government to reduce poverty in Sri Lanka. Figure 1 shows the various programmes implemented under the main three components of the SDP.

The SDP has both ‘protectional’ and ‘promotional’ objectives. The programmes implemented with protectional objectives are mainly focused on assisting the poor in the face of adverse shocks. The other programmes such as **group-savings, the credit component and human resource development** have focused on long-term poverty reduction goals through empowering and enhancing the assets base of the poor to achieve promotional objectives (Salih 2000). Through these key objectives, it is expected to eradicate poverty through ensuring the participation of the beneficiaries of the SDP in the rural farm and non-farm production process. As a national programme

⁸ This paper is based on author’s research for his Master Degree in Development Management which was awarded to him by the University of Agder, Norway in 2009. The author gratefully acknowledges the comments and suggestions made by the two anonymous referees.

covering about 1.2 million poor families, the government of Sri Lanka is providing the required funds and implementing its strategies and activities to reach its key objectives.

Figure 1: The programmes and main components of the SDP



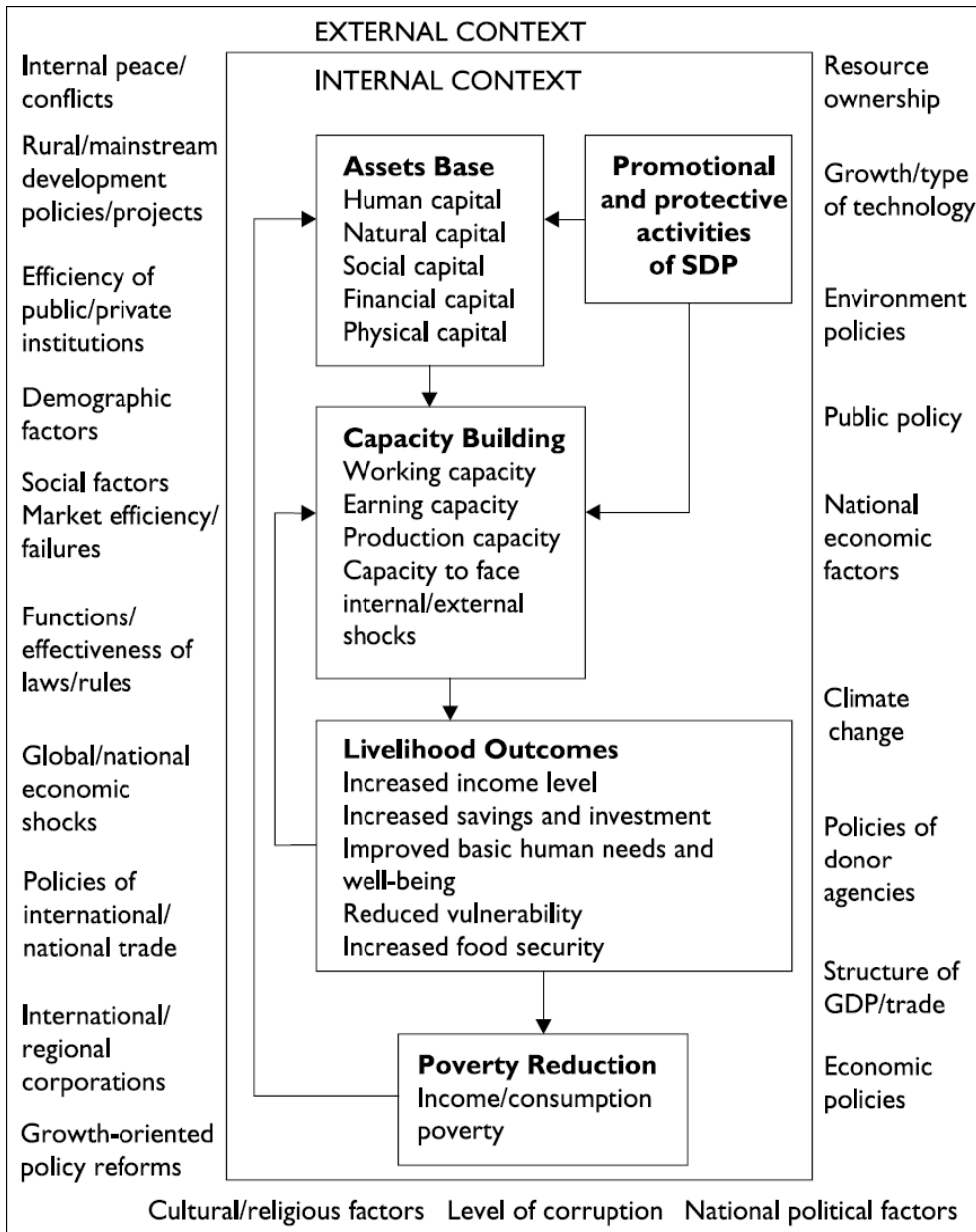
Source: Salih (2000).

Figure 2 outlines the theoretical framework that is to be used in this study. The framework assumes that livelihoods of the beneficiaries of the SDP are mainly affected by the ongoing activities of the project within the internal context. This implies that although there are various kinds of factors in the external environment, which can directly or indirectly affect the livelihoods of people, it is assumed that the development of livelihoods of the beneficiaries of the SDP are mainly affected by activities of the SDP. We hypothesize that promotional and protective activities of the SDP can directly and indirectly affect the livelihoods of its beneficiaries through two channels. The first channel is the assets base, where there are five assets that can directly be affected through the activities of the project. Those assets are human, natural, social, financial

and physical capital. The second channel has direct influence through protective activities of the SDP on the capacity building, and then on the level of poverty.

Figure 2: *Theoretical basis of the study*

Links between the external environment, assets base, activities of the SDP and Poverty



Source: Developed by the author

Objectives

The main objective of this paper is to study to what extent the SDP has helped its beneficiaries to develop an assets base to get out of poverty in the Ratnapura district of Sri Lanka.

Methodology

The study employed a random sampling method to collect data from a cross section of 170 households living in the all 17 Divisional Secretariat (DS) divisions in the Ratnapura District. The main criterion in selecting the above households was that they needed to be beneficiaries of the SDP since 1995. We obtained data through a structured questionnaire.

Dependent Variable

Table 1: Categorisation of income poverty groups for 1995 and 2009

Households category	Official poverty line for Ratnapura district in 1995 = 833 LKR ^a	Official poverty line for Ratnapura district in 2009 = 2907 LKR ^a
	Formula	Formula
Extreme poor	Per Capita Monthly Income (PCMI) \leq 416 LKR	Per Capita Monthly Income (PCMI) \leq 1453 LKR
Vulnerable	416 LKR \leq PCMI \leq 1666 LKR	1453 LKR \leq PCMI \leq 5814 LKR
Viable	1666 LKR \leq PCMI \leq 2499 LKR	5814 LKR \leq PCMI \leq 8720 LKR
Sustainable	PCMI \geq 2499 LKR	PCMI \geq 8720 LKR

Source: Department of Census and Statistics of Sri Lanka (2004)

a. LKR (Sri Lankan Rupees)

In the next step we examined the movement (transition) between these four categories from 1995 to 2009. The objective was to determine what effect, if any, the SDP has had on its beneficiaries over the past 13 years.

Table 2: Categorisation of households groups based on the direction of the transition between income poverty categories, 1995-2009, Ratnapura district, Sri Lanka

Households Group	Direction of the transition
Unsuccessful	From viable/sustainable To Vulnerable, From vulnerable/viable To extreme poor, Or Remained in extreme poverty
Struggling	Remained vulnerable
Successful	From extreme poverty To vulnerable/viable, Or From vulnerable To viable
Most successful	From extreme/vulnerable/viable To sustainable, Or Remained in viable/sustainable

Source: Akter, et al., (2008)

Independent variables:

As the data obtained for the development of capital assets (financial, natural, physical, human and social capital) of households were qualitative, we used dummy (categorical) variables to capture the development of each capital asset subject to some criterion that must be fulfilled by each household in order to identify that the household is one which was able to develop its respective capital assets.

The dummy variable to capture the development of natural capital (D_{NC}):

$$D_{NC} = 1 \text{ (Those who have been able to develop natural capital asset)}$$

$$0 \text{ (Those who have not been able to develop natural capital asset)}$$

Criterion (subjective judgments):

The following criterion or a combination of criteria should be satisfied by a beneficiary of the SDP in order to fall in $D_{NC} = 1$: **A or B or C or D or** any other combinations of **A B C D**.

- A:** The SDP helped me to purchase a land for farming activities (i.e. tea cultivation)/ business activates (i.e. opening a retail shop)
- B:** The SDP helped me to build up new livestock (i.e. poultry farming, purchasing a cow for drinking milk/selling milk/making dairy products etc) or to expand the existing livestock in numbers and/or in quality
- C:** The SDP helped me to continue/expand the activities of the existing land (i.e. tea cultivation, vegetable and fruits cultivation etc)
- D:** The SDP assured me the security and the sustainable use of water sources for both survival and livelihood needs

Accordingly, the same method with appropriate criteria was applied to develop four dummy variables for physical, human, financial and social capital assets (Gunasinghe 2010, pp 262-265). The dummy variable for the development of financial capital was excluded from the model due to the high correlation that existed between this variable and the dummy variable used to capture the development of physical capital.

Multinomial Logistic Regression (MNL):

$$\text{Log} \left(\frac{P(Y_i = m)}{P(Y_i = 4)} \right) = f(D_{NC_i}, D_{PC_i}, D_{HC_i}, D_{SC_i}, Edu_i, Age_i, Ndepend_i, D_{Gender_i}, \varepsilon_i) \dots 1$$

The second equation is run only for the significant variables identified in the first equation.

$$\text{Log} \left(\frac{P(Y_i = m)}{P(Y_i = 4)} \right) = f(D_{NC_i}, D_{PC_i}, D_{HC_i}, Edu_i, \varepsilon_i) \dots 2$$

Where, $D_i = 1$ (Those who have been able to develop respective capital asset)

0 (Those who have not been able to develop respective capital asset)

j=NC (natural capital), PC (physical capital), HC (human capital), and
SC (Social capital)

Edu = Years of schooling, Age = Age level

N_{depend} = Number of dependents in the family

$D_{gender} =$ 0 : Female household head

1 : Male household head

$\varepsilon_i =$ Error term

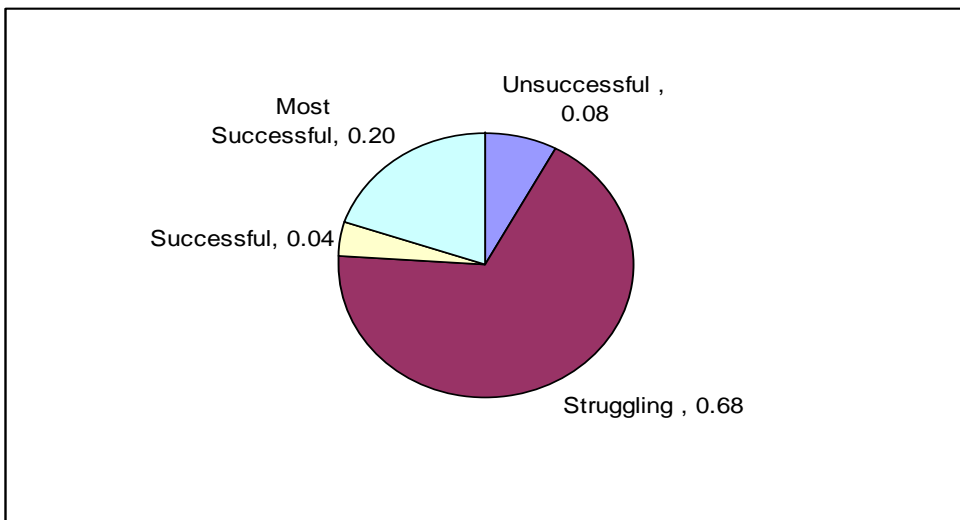
The dependent variable (Y) of equation 1 and 2 has four categories:

M=1 is “unsuccessful households”; M=2 is “struggling households”; M=3 is “successful households”; and M=4 is “most successful households”. Reference category is “most successful households”(M=4).

Results

Figure 3 clearly shows that the probability of a household falling into the ‘struggling’ poverty position is very high (0.68). Furthermore, the mean probability of a household falling into the successful or most successful poverty positions is 0.04 and 0.20 respectively. This means that there is a chance for every 68 households out of each 100 households to fall into a struggling position.

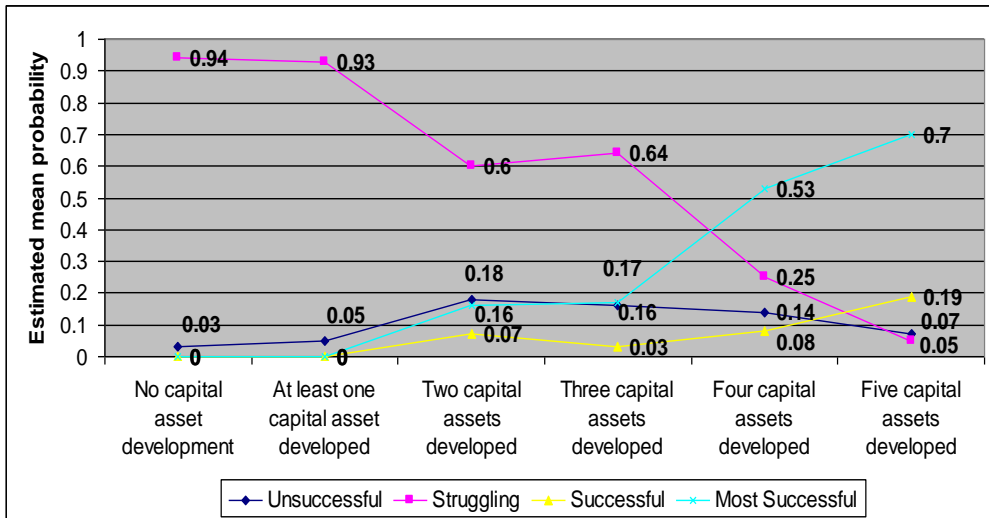
Figure 3: The mean probability of households falling into certain poverty positions



Source: Author’s calculations based on the ‘estimated response probabilities’ of the second MNL equation

Figure 4 shows the relationship between the developments of a household’s capital assets and the mean probability to fall into the poverty household group. Figure 4 clearly shows that with the increase of households’ ability to develop more capital assets, there is less probability for those households to have regressed in terms of achieving higher living conditions. Likewise, households who had developed more than three capital assets have reported a speedy positive progress to become classifiable as ‘most successful’.

Figure 4: The relationship between the development of capital assets and the mean probability of a household to fall in a poverty household group



Source: Author's calculations based on the 'estimated response probabilities' of the second MNL equation

Conclusion and Policy Recommendations

This research assessed the impact of the Samurdhi (prosperity) development programme on poverty alleviation by estimating the relationship between transition of poverty and development of assets base of a household based on the data obtained from its beneficiaries in the Ratnapura district of Sri Lanka. Results confirmed that the developments of natural, physical and human capital assets have significantly affected the determination of 'struggling household group'. Those who were unable to develop these capital assets were more likely to fall in 'struggling poverty position' (remained in vulnerable poverty for a long period). A main policy message is that it is pivotal for the SDP to reassess and reformulate its policy strategies to strengthen assets base of its beneficiaries in order to alleviate their poverty level.

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