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An Empirical Investigation of Labor Shortage in the Manufacturing Sector in Sri Lanka

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Abstract

Using a countrywide sample survey of enterprises, this study finds empirical evidence that the manufacturing sector in Sri Lanka is facing a serious labor shortage problem. Extent of labor shortage is measured in terms of presence of unfilled vacancies, longevity of vacancies and relative size of unfilled vacancies. This study explores locational variation and firm level variation of labor shortage and found that firm level variation is much wider than locational variation. While locational characteristics explain only 7 to 15 percent of the variation of labor shortage, firm characteristics explain 18 to 27 percent of the variation of labor shortage.

Among locational characteristics, firms located in Western province showed greater extent of labor shortage. Among firm characteristics - labor turnover rate, exporting firms and firms with innovative product were more important in explaining the variation of labor shortage. These three variables alone explain over 10 percent of the variation of the extent of labor shortage.

High incidence of labor shortage was observed with very high youth unemployment, lower labor force participation and very high labor turnover rates.

Among the policies recommended to overcome labor shortage problem, shifting firms to provinces with high youth unemployment rates, measures to increase labor retention rates and policies to increase labor force participation rates are important. Macro policies to encourage shifting of firms to remote provinces is needed for sustainability of such efforts.

Key words: Labor shortage, Regional labor markets, Mismatch, Sri Lanka labor market

1. Introduction

The Labor market of Sri Lanka is identified by many as a market with high and prolonged unemployment and under-employment. ILO (1971) described it in terms of attitude mismatch. Later Rama Martine (1999), Lakshman (2002), and Ranasinghe (2014), interpreted youth unemployment mainly as an aspirational mismatch problem. Currently, the skills mismatch hypothesis has become the key explanation for the youth unemployment problem in Sri Lanka and according to this, jobs are available. However, majority of youth do not have the required minimum skills to hold them. See, *inter alia* Ranasinghe and Herat (2011), and Senarath and Patabendige (2014) for applications of the skill mismatch hypothesis to describe the graduate unemployment problem of Sri Lanka.

While these empirical articles contribute to the conventional wisdom that Sri Lanka is a labor surplus country, an alternative hypothesis is gaining momentum based on several media statements by high-ranking officers and opinion makers of the country. The alternative hypothesis intends to describe Sri Lanka as a labor short country.

In this regard, the Chairman of Board of Investment (BOI) has disclosed that over 200,000 vacancies in BOI factories (especially unskilled categories) continue to exist regardless of various attempts to resolve it (Sri Lanka Brief, 2016).

Based on Key Informant Interviews (KIIs), Athukorala (2016) found that the problem is industry-based and location-based. It is more prominent in the Apparel industry and in Western province where more industries are concentrated. He also found some positive evidence to show that labor shortage problem is more prominent in Free Trade Zones (FTZ) and industrial parks because of the problem of social stigma against working in factories located in zones.

Sectorial labor shortage in Sri Lanka has been addressed in some recent literature. [Labor shortage in agriculture sector (Karunagoda, 2004), (Hayleys PLC, 2016) and (Warushamana, 2010) in manufacturing (Warushamana, 2010), (Business Time- Research Consultancy Bureau (BT-RCB), 2014) and in construction (Basnayake & Premathilaka, 2015)]. It is reported that many industries are considering importing workers to sustain operations, while others are considering automation (Institute of Policy Studies of Sri Lanka, 2015).

This paper, using a multidimensional definition of labor shortage, empirically examines the intensity of labor shortage problem in the manufacturing sector of Sri Lanka.

2. Literature Review

The term "labor shortage" means a positive gap between labor demand and supply at current wage levels. This can be overall or sectorial (Geographical, Industrial or Occupational) and labor shortage can be demand driven (increasing demand at preset wage) or supply driven (decrease labor supply at present wage). Most of the literature on labor shortage is highly concentrated on skills shortage in advanced countries. Dobbs, et al., (2012) predicts that there

will be a 13 percent of high skilled and 15 percent of medium skilled workers' shortage and a 10 percent of surplus of low skilled workers at the global level. Dobbs et al, (2012) further predicts that the shortage will be more visible in advanced economies and the surplus will be more concentrated in developing economies.

In general, most of the literature identifies demand side and supply side factors for labor shortage. [See *inter alia* (Barnow, Schede, & Trutko, 2010), Blank and Stigler (1957), Trendle, (2008), Arrow and Capron (1959), Franke and Sobel (1970) and Shah and Burke (2003) for demand side interpretations for labor shortage]. Shah and Bruke (2003) identified changes in technology, work organization, shifts in consumer tastes, commodity price changes or demographic shifts as main reasons for change in labor demand (Shah & Bruke, 2003).

Shah and Burke (2003) identify a labor shortage as:

...demand for workers for a particular occupation is greater than the supply of workers who are qualified, available and willing to work under existing market conditions... (Shah & Bruke, 2003, p. v).

Labor shortage can be either quantitative (not enough numbers) or qualitative (not required qualifications).

Supply side interpretation goes mainly with changes in education, preference for various forms of work, ageing population, net outmigration and education planning. [Shah & Bruke, 2003 Barnow *et al* (2010) and European Parliament (2015)].

An economy can experience labor shortage in the presence of an ageing population whereby more people go on retirement and new additions to labor market are relatively less. Mass scale outmigration of youth can also be a cause for labor shortage. Increases in non-labor income (foreign remittance for example) can lead to an overall reduction in labor supply in the market and that can also be a cause of labor shortage. All the above examples represent short supply in overall labor market. Adding to this, labor shortage can also be due to mismatch of labor demand and supply (a situation where the number of workers is sufficient to fill jobs, but workers are unable or unwilling to fill vacancies due to mismatches) (Boswell & Straubhaar, 2005). Boswell & Straubhaar (2005) have identified four types of mismatches; (1) *qualifications mismatch*- workers who do not have the necessary education, training or experience to fill vacancies, (2) *preferences mismatch*- workers may have adequate qualifications, but do not want to do a particular job because of inadequate pay, status or working conditions, (3) *regional mismatch*- workers are able and in principle willing to do the job, but are located in the wrong geographical area and are not ready to move, and (4) *mismatch due to information deficits*- workers are not matched to jobs because of a lack of information on existing vacancies, or inadequate recruitment procedures on the part of employers (Boswell & Straubhaar, 2005). Shortages due to mismatch can coexist with high levels of unemployment.

Barnow, Schede, & Trutko, (2010) presented several dimensions of the labor shortage namely: (1) geographic scope of the shortage (depending on the occupation and the nature of the market, labor markets can be national or regional in scope. Similarly, a particular occupation may have a nationwide shortage, or the shortage may be confined to a few labor markets or a single region of the country), (2) longevity of the shortage (shortages can be relatively brief, lasting for a few weeks or months, or prolonged, lasting for one or more years), (3) severity of the shortage, and (4) sub-specialty shortages (Barnow, Schede, & Trutko, 2010).

Whatever the root cause of the labor shortage, the adjustments would take time and are often costly. During the adjustment process, employers will report shortage, skills gaps and recruitment difficulties. The duration of this process depends on the characteristics of the labor market, the magnitude of the changes and the speed of the adjustments. Changes in both the price (wages) and quantity play a part in the resolution of the imbalance. Slowness in the adjustment of wages, slowness in the adjustment of supply, and lack of labor market information can be identified as the ways in which shifts in demand can give rise to shortages that may persist for a considerable time (Shah & Bruke, 2003). A summary of possible causes for labor shortage is presented in the Table 1 below.

Table 1: Determinants of Shortage of (skilled) labor	
Labor Supply	Labor Demand
<ul style="list-style-type: none"> • Demographic changes • Lack of migration, regional immobility 	<ul style="list-style-type: none"> • Innovation activities requiring new qualified personnel • High product demand (business cycle)
<ul style="list-style-type: none"> • Over-qualification • Family/work conflicts 	<ul style="list-style-type: none"> • High recruiting costs • Qualification-related mismatch because of structural change
<ul style="list-style-type: none"> • Too small public investment in education system 	<ul style="list-style-type: none"> • Lack of further education measures • Home-made labor shortage: making no use of inexperienced graduates or elder personnel

Source: Adopted from (Horbach, 2014)

Trendle (2008) has identified major implications of labor shortage under three broadly identified levels as at *individual level*, *firm level* and *aggregate level*.

Longer working days than expected at current wage level, and assigning works for which they are not qualified (misallocation) are the main consequences of labor shortage on individual workers.

In the presence of labor shortage, individual firms are compelled to use their workers and equipment less efficiently than they desire resulting in lower output and reduced profits.

At the aggregate level, the major consequence of a sustained shortage is that the economy will be operating less efficiently than it could; meaning resources are not put to their most productive use. Thus, aggregate production for the nation is below capacity (Barnow, Schede, & Trutko, 2010).

Production of lower quality output, lower productivity of workers and machinery, higher wages and the economy settling into a low-skill equilibrium and lower economic growth as it misses opportunities can also be recognized as consequences of labor shortage (Trendle, 2008).

In general, the measures used for identifying and measuring the labor shortage can be divided into two broad categories (Roy, Henson & Lavoie, 1996, and cited in Shah & Bruke, 2003). The first category of measures includes market economic indicators, (e.g. vacancy, hiring and separation rates, relative wage movements and employment and unemployment changes to infer imbalances for particular occupation groups). However, these measures provide a market-wide perspective and identify shortages only if there are insufficient numbers of appropriately skilled people in the market to fill vacancies at the going wage rates and employment conditions. The second category consists of employer-based surveys, interviews and focus groups as the means to make inference on imbalances. In the second approach, a high degree of recruitment difficulty is often associated with a shortage. A further difficulty with data from these surveys lies in attempting to discriminate between anticipated and actual shortages (Shah & Bruke, 2003).

In the absence of vacancy measures, shortages can only be identified by employer actions to obtain additional labor (Barnow, Schede, & Trutko, 2010). If a shortage exists, employers would increase their recruiting efforts. These efforts would include increase advertising in usual outlets, advertising in other media thus expanding the recruiting area, using public or private employment agencies, and paying bonuses to employees who bring in workers. Further, the employers would increase use of overtime, reduce minimum qualifications for the job, restructure work to use less of the “shortage” occupations, substitute machinery and equipment for labor, train workers for the jobs, improve working conditions, offer bonuses to new workers, offer stock options to workers, improve pay and fringe benefits, contract out work, and turn down work to reduce the labor shortage (Barnow, Schede, & Trutko, 2010).

It was observed that measuring occupational shortages is difficult in the United States (Barnow, Trutko, & Piatak, 2013). Four reasons were identified as the possible reasons for that. First, the best indication of a shortage is an increase in the number and duration of vacancies, but in the United States, occupational vacancy data are not available for most occupations. Secondly, there is an absence of a precise dividing line between a tight labor market and a shortage. The third reason is that the Standard Occupational Classification (SoC) system used in the United States measures occupations too coarsely for measuring shortages, and the fourth reason is using interviews to assess the presence of a shortage is imprecise (Barnow, Trutko, & Piatak, 2013).

Remedial measures for short supply of labor are widely discussed in Barnow et al (2012). Their policy recommendations address changing recruitment policy, incentive payments, alternative work arrangements (Overtime and Agency Hiring), reduction of entry qualifications for jobs, restructuring of production process to accommodate available skills, automation of certain sections of production process and to offer on the job training (if skills mismatch is the cause).

3. Research Problem

In order to formulate the research problem, researchers conducted several KIIs among top industrialists and representatives from business associations. Most of the KIIs agreed that it is difficult to find workers, especially in the Western province and Apparel sector in Sri Lanka. In formulating the research problem, literature on agency hired workers in Sri Lanka [See, *inter alia* Ranasinghe and Pushpakumara, 2015, and Talking Economists IPS Blog, 2016] and labor turnover and retention intention [See, *inter alia* Weerasinghe *et al* (2012), Sandeepanie and Ubayachandra, 2015 and Liyanage and Galhena, 2014) are also considered.

Weerasinghe *et al* (2012) found that retention rates of machine operators in the Apparel sector is closely related to the basic salary and welfare facilities provided by the firm. They further find that marginal effect of increasing basic salary is significantly related to an increasing retention rate. Sandeepanie and Ubayachandra (2015) found that retention rates of different occupations depend on mixed factors such as salaries, motivations, and promotions amongst other things.

Liyanage and Galhena (2014) identified personal factors such as civil status and residency of the workers as key determinants of labor turnover intention. Increasing salaries, skill-based incentive schemes and friendly working environments are identified as the most cost-effective strategies to increase retention intention.

This study attempts to explore the seemingly controversial issue of labor shortage in the manufacturing sector in Sri Lanka. With long standing beliefs and a statistical foundation for high youth unemployment problem (and hence labor surplus) in Sri Lanka, the labor shortage hypothesis is a controversial issue, particularly in regards to its statistical validity. This research is about the statistical validity of the labor shortage hypothesis in Sri Lanka.

This proposed study pays special attention to the Apparel sector of Sri Lanka as this sector plays an important role in the manufacturing sector of the country. According to available statistics, 30 percent of the total establishments and 45 percent of the total workforce in the manufacturing sector come under the 'Textile, Wearing apparel, Leather and related Products' category (Department of Census and Statistics of Sri Lanka, 2015).

4. Research Questions

Following the literature review and KIIs, this study intends to answer following research questions.

1. Is there a significant labor shortage in the manufacturing sector in Sri Lanka?
2. Is there a locational dimension in labor shortage problem in Sri Lanka? In particular, is the labor shortage problem is more visible in some locations than some other locations?
3. Is the degree of the labor shortage problem in Sri Lanka different across industries? In particular, is the labor shortage problem more acute in Apparel sector in Sri Lanka?

4. Does the intensity of labor shortage in manufacturing sector vary with firm characteristics?

5. Conceptual Framework and Methodology

5.1 Concepts

Following Barnow et al (2013), labor shortage is defined in multiple dimensions. Barnow et al, (2013) has identified two dimensions as *presence of unfilled vacancies* and *longevity of vacancies*. For the present study, one additional dimension is introduced. The additional dimension introduced in this study is the vacancies to workforce ratio. These three variables identify firms with vacancies, how many vacancies are available in those firms and whether firms have to take unreasonably longer period to fill vacancies.

The relationship between these three dimensions of labor shortage and firm-characteristics, industry type and business locations are done using several multivariate methods.

5.2 Data and Data Sources

5.2.1. Quantitative Data

The only available data allowing the analysis of the labor shortage in manufacturing sector in Sri Lanka is the World Bank Enterprise Survey. This survey was administrated in every region of the world for the manufacturing and services sectors. This survey uses standardized survey instruments and a uniform sampling method to minimize measurement error and to yield data that is comparable across the world's economies (The World Bank, 2016). The 2011 Enterprise Survey for Sri Lanka was conducted from June 2011 through November 2011 covering 610 business firms in all the provinces of Sri Lanka. However, for this study only 332 cases were considered (cases that were matched for both the screener and sample survey and cases that were considered as 'truthful' and 'somewhat truthful' by the interviewer and for the detailed analysis only manufacturing sector firms were considered).

In this data set, the three dimensions of labor shortage can be measured using following three variables. The three variables are SARL10a, 10b and 10c of the World Bank Enterprise survey. Among them, SARL10a and SARL10c are dichotomous variables with only two options. Question SARL10a classifies responding firms to two groups as firms with unfilled vacancies ($V=1$) and those without unfilled vacancies ($V=0$).

SARL10c classifies firms with vacancies ($V = 1$) into two groups as those firms with vacancies lasting for more than 4 months ($L=1$) and firms with vacancies lasting less than 4 months. For the purposes of this paper, these two variables are merged into one to construct an ordered variables (Y) with three options; (1) Y is equal to zero if there are no vacancies in the firm, (2) Y is equal to one if vacancies are available but in general, vacancies are filled within 4 months, and (3) Y becomes three if vacancies exist and it takes more than 4 months to fill them. This

model implicitly assumes that not having unfilled vacancies is the optimal situation and vacancies lasting more than four months are the worst situation.

Question LARC10b is about the number of vacancies available. The enterprise survey has also gathered information about the current workforce. By dividing the number of vacancies available by workforce, we can construct another measure of relative significance of the vacancy problem in the manufacturing sector of the country.

5.2.2. *Qualitative Data*

In addition to the quantitative secondary data, six Key Informant Interviews (KIIs) were also conducted. These included Human Resource managers from the leading firms of the industry, firms located in rural and sub-urban areas, and an industrial association (Joint Apparel Association Forum Sri Lanka – JAAFSL). The interviews were held at the working places of interviewees. Size and location were the main criteria of selecting the participants and interviews were conducted using a semi-structured interview guideline. The focus of the KII was to identify whether the participants experience a labor shortage, the possible reasons behind the labor shortage, and the measures taken to face it. The information gathered from the KIIs was used for formulating research question and providing policy recommendations.

5.3 The Model and Methods of Estimation

5.3.1. *The Model*

As indicated in the introduction of this paper, labor shortage is defined in three dimensions; *incidence of Vacancies (V)*, *longevity (L)* and *Vacancy Proportion (VP)*.

The choice of explanatory variables is generally based on the theoretical and empirical findings from the literature review. However, availability of relevant data in the World Bank Enterprise Survey 2011 has limited the choice of explanatory variables to a great extent. Therefore, for the purpose of the analysis, two sets of variables are identified as explanatory variables. These are *locational characteristics* and *firm characteristics*.

Four variables are selected as locational characteristics. The four locational characteristics are province¹, whether the firm is located in a dedicated industrial zone (FTZs or industrial parks), whether the firm is located within the business city or outside and a set of dummies classifying locations by population density. In this context, it is assumed that labor shortage can be more visible in highly industrialized locations because labor demand in such locations is greater. Therefore, dummies representing Western Province, North Western Province, Industrial Zones and Business Cities are expected to have positive coefficients due to demand pressure in such

¹ Due to few observations from some provinces, only two provincial dummies are introduced; Western Province and North Western Province. All the other provinces are in the reference category.

locations. Dummies representing Populated Cities are expected to have negative sign because labor supply in such locations is higher.

The firm characteristics available in the survey are Product Type (Apparel, Food and Other), Firm Size, Market (Export vs. domestic markets), Firms producing innovative products and Firms Labor Turnover Rates.

In this context, it is assumed that labor shortage in Apparel Sector is more visible than the other manufacturing sectors. Signs of Firm Size, Markets and Innovative firms are unpredictable. It can be positive because such firms demand larger volumes of labor and therefore, challenges they face might be more serious than the labor shortage challenge faced by other firms. Labor Turnover rate is expected to have a positive effect on labor shortage at firm level because high turnover means labor supply to that firm is unstable. Workers leave the firm with shorter tenures and therefore, management has to attend recruitment and training continuously.

Every dependent variable of the model is regressed first on locational characteristics (Model 1) and then on firm characteristics (Model 2). In the final specification, each of the dependent variables are regressed on both locational and firm characteristics (Model 3).

5.3.2. *Methods*

Table 2 below presents the statistical techniques used to analyze the data pertaining to each research question described above.

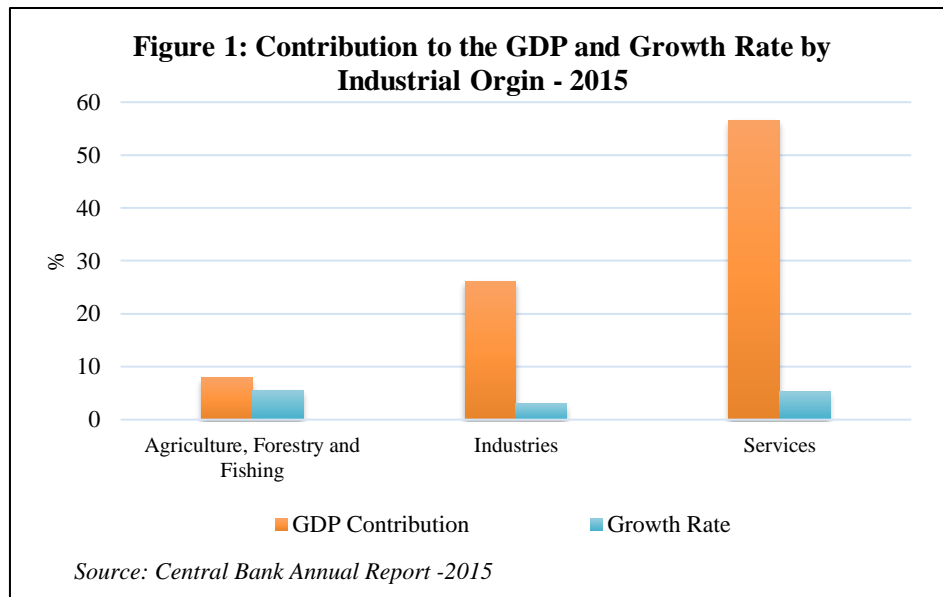
Table 2: Research Questions and Analytical Methods

Question	Dependent Variable	Method	Remarks
Q1, Q2 and Q3	SARL10a	Bi-variate LOGIT	Predict probability of having unfilled vacancies.
	SARL10b	Tobit. (Left Censored)	Predict the probability of severity of shortage in terms of relative size of vacancies.
	SARL10c	Ordered Probit	Predict Probability of longevity of vacancies.
Q5	All three above	All methods described above.	Industry characteristics and labor shortage

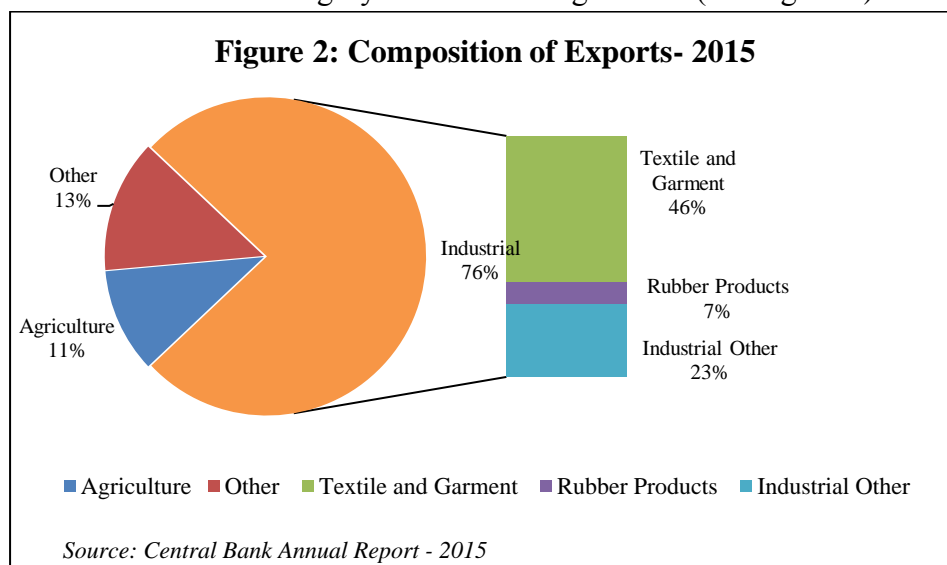
6. Analysis

6.1 Background

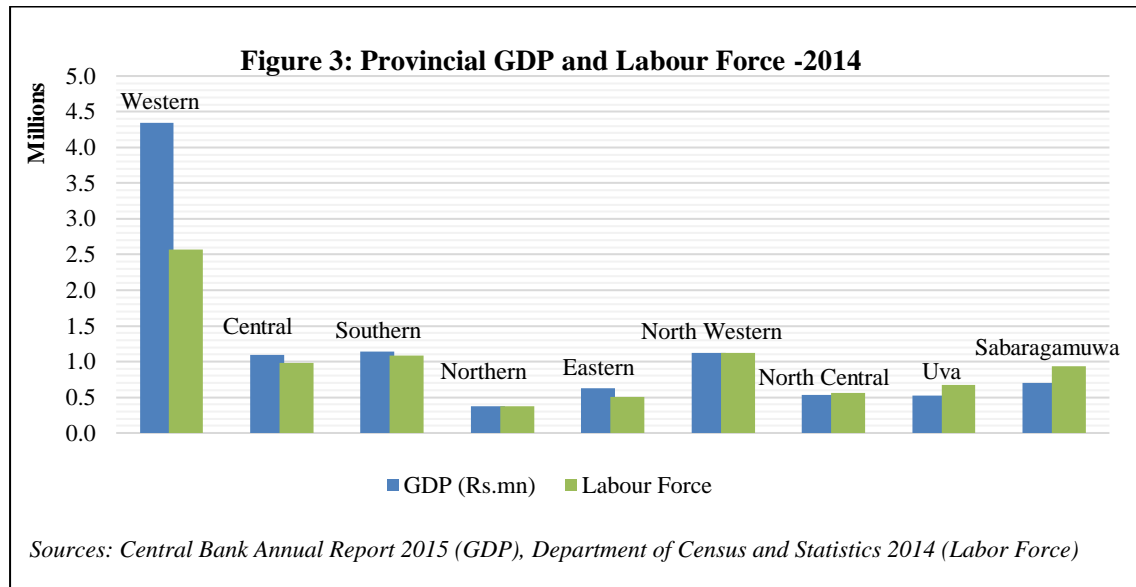
In 2015, the GDP of the country amounted to 82.3 billion US dollars compared to 80.0 billion US dollars in 2014, recording a 7.0 per cent growth in nominal terms (Central Bank of Sri Lanka, 2015). The contribution of the service sector to the country's total GDP was 57 percent in 2015, and the agriculture sector contribution by the industry sector and agriculture sector was 26 percent and 8 percent respectively (Figure 1).



The agriculture and services sectors recorded a growth rate of 5.5 and 5.3 per cent respectively in 2015 compared with the relatively low growth rate of the industry sector (i.e. 3 per cent) for the same year. In 2015, total exports of the amounted to \$US10,505 million out of which 11 percent was agricultural products, 76 percent was industrial products and 13 percent was other products (Central Bank of Sri Lanka, 2015). The major component of the industrial exports is classified under the category of 'textile and garment' (see Figure 2).



The main contributor to the GDP as well as to the labor force is the Western Province (see Figure 3). In 2014, 42 per cent of the GDP was generated in the Western Province and 30 per cent of the labor force was located in the same province. Southern, North Western and Central provinces are the other important contributors to the GDP (with more than 10 per cent of contribution) and the importance in terms of labor force are concentrated in North Western, Southern, Central, and Sabaragamuwa provinces.



6.2 Incidence of Labor Shortage

This section of the paper examines the extent of labor shortage that exists in the manufacturing sector of Sri Lanka. For this purpose, the three dimensions of labor shortage defined under the methodology of the paper are explored. This section is limited to present only uni-variate analysis of the variables mentioned above.

Table 3 below summarizes statistical evidences for the analysis in this section.

Table 3: Descriptive Measures of Vacancies in Manufacture Sector

Presence of Unfilled Vacancies (V)	%	Total Cases
Apparels	58.12	117
Foods	20.69	116
Other Manufacturing	33.33	99
All	37.65	332

Workforce to Vacancy Ratio (VP)	
Apparels	16.98
Foods	3.74
Other Manufacturing	6.37
All	9.19

Longevity of Vacancies (L)		
Apparels	88.24	68
Foods	79.17	24
Other Manufacturing	48.48	33
All	76.00	125

Source: Authors' calculations using World Bank Enterprise Survey 2011

Table 3 presents data on the three key measures of labor shortage in the manufacturing sector of Sri Lanka. The first panel of Table 3 indicates that nearly 38 percent of manufacturing firms in the sample had unfilled vacancies when the survey was conducted. Percentage of firms with unfilled vacancies in Apparel sector is higher than that of other sub-sectors (58 percent).

Middle panel of Table 3 presents statistical evidences about the relative size of vacancies available in the 38 percent of firms with unfilled vacancies. It shows that the number of vacancies amounted to 9 percent of total job opportunities available in the manufacturing sector and 17 percent of opportunities in Apparel sector.

Bottom panel of Table 3 indicates that nearly 76 percent of firms with vacancies take more than 4 months to fill vacancies. In Apparel sector this percentage is reported as 88 percent.

6.2.1. Determinants of Labor Shortage

Regression results are reported as an Appendix to this paper. Analysis of the regression results in Model 1 show that only some locational characteristic satisfy the theoretical expectations described in Section 5.3.1. Explanatory power of regional models in terms of Pseudo R² and its overall significance in terms of the LR-statistics is relatively low. Explanatory power of Model 1 ranges from 7 percent (Longevity model) to 15 percent (Proportion of vacancies model).

Model 2 presents the effects of firm characteristics on labor shortage. With firm characteristics, explanatory power is increased significantly indicating that firm characteristics are more important in determining the variation of labor shortage problem than locational characteristics.

Pseudo-R² of firm characteristics model ranges from 18 (Longevity) percent to 33 (Vacancy Proportion) percent.

Model 3 presents overall regression results with all explanatory variables. In all the models, the overall explanatory power ranges from 21 percent (Longevity) to 37 percent (Vacancy Proportion).

Comparison of the improvement of explanatory power with each specification shows that the firm characteristics play a highly significant role in determining the variation of labor shortage problem in Sri Lanka.

Statistical validity of individual regression coefficients are presented below using the overall regressions in Model 3.

As far as locational effect is considered it is found that in all the models, only the dummy representing Western Province is statistically significant. Dummies representing firms located inside business city, and dummies representing populated cities and industrial zones (including FTZs) are not significant².

In all overall models, exporting firms show a positive sign indicating that the extent of labor shortage problem in exporting firms is high. This variable is not, however, statistically significant in the vacancy proportion model (Table A2). This indicates that more firms exporting their products have unfilled vacancies and it takes longer time for them to fill vacancies. However, the number of vacancies relative to the total opportunities available in exporting firms is not significantly different from firms producing for domestic markets.

All the other variables are with positive signs and statistically significant under all the models. According to the findings of this exercise, firms operating at higher scales (small vs. large and medium scale) face a greater labor shortage problem. This suggests the problem is more acute in exporting firms and innovative firms. We argue this is quite a serious problem as it is these firms which contribute most notably to national product and employment and are most likely sustainable in the long run. Therefore, because labor shortage is more acute for these firms the problem will become more serious in the long run unless effective measures are introduced to solve it.

Labor shortage is more visible in Apparel industry than the other manufacturing industry covered in the survey. This goes along with the common understanding in the sector that expansion of more attractive job opportunities in services sector is a reason for this situation.

² This is against the common understanding that the problem is more acute in FTZ and industrial zones [Athukorala (2016)]. It is argued that social stigma against work in zones and difficulties to find reasonable accommodation discourage youth to accept jobs available in zones. However, this study finds no statistical evidence to support this hypothesis. In this regard, some of the KIs explained that location of firms inside zones also have some positive externalities. For example, there is large numbers of “reserved labor” in zones which most of the recruitment agents surround.

Positive and very significant association between labor turnover rate (LTOR) and all measures of labor shortage is found. This suggests that labor shortage is mainly a Human Resource Management (HRM) problem at the firm level. With a good HRM plan, firms could be overcome the problem by increasing retention rates.

As the conventional wisdom dictates that the labor shortage is a regional issue, using the overall models, probabilities of the occurrence of each outcome at province level is predicted. Table 4 presents province level results. In addition to predicted probabilities of labor shortage measures described above, Table 4 also reports Youth Unemployment Rate (YUR), Labor Force Participation Rate (LFPR) and Labor Turnover Rates (LTOR) for each province. YUR and LFPR are available from QLFS Annual Report (2015) and LTOR is calculated using the data available from the World Bank Enterprise Survey 2011. YUR and LFPR in Table 4 are for year 2011.

Table 4: Predicted Labor Shortage Measures, Youth Unemployment and Labor Turnover Rates by Provinces

	V	VP	L	YUR	LFPR	LTOR
Western	0.55	0.15	0.45	0.14	0.45	0.33
Central	0.24	0.03	0.14	0.23	0.51	0.09
Southern	0.25	0.04	0.14	0.23	0.48	0.13
Northern	0.18	0.04	0.12	0.15	0.40	0.24
Eastern	0.19	0.04	0.12	0.20	0.40	0.14
North-Western	0.37	0.07	0.27	0.14	0.49	0.24
North-Central	0.19	0.04	0.12	0.10	0.54	0.29
Uva	0.20	0.04	0.12	0.13	0.57	0.11
Sabaragamuwa	0.29	0.04	0.18	0.21	0.51	0.13
Total	0.39	0.09	0.29	0.17	0.48	0.24

Source: Authors' calculations using World Bank Enterprise Survey Sri Lanka 2011. Youth Unemployment rate from QLFS Annual Report (2015)

Table 4 clearly shows that all the dimensions of labor shortage are relatively high in Western province. This is in favor of Athukorala's (2016) hypothesis that labor shortage is a regional issue. Supplementary data reported in the right-most panel of Table 4 are useful in understanding some causes for provincial differences in labor shortage and will also be useful in deriving some important policy implications.

The supplementary data provided in Table 4 show that Sri Lanka has significantly high youth unemployment rate (YUR), significantly low labor force participation rate (LFPR) and high labor turnover rate (LTOR) at both the overall and province level. The relationship between LTOR and labor shortage at micro level is already described. Aggregate information presented in Table 4 above reiterates the same pattern.

Pearson correlation between the province level information presented in Table 4 above is reported in Table 5.

Table 5: Pearson Correlation Between Labor Shortage and Selected Province Level Labor Market Characteristics

	V	VP	L	YUR	LFPR	LTOR
V	1.00					
VP	0.93	1.00				
L	0.99	0.97	1.00			
YUR	-0.13	-0.33	-0.23	1.00		
LFPR	-0.09	-0.21	-0.15	-0.23	1.00	
LTOR	0.53	0.69	0.62	-0.72	-0.25	1.00

Source: Authors' calculations using World Bank Enterprise Survey Sri Lanka 2011. Youth Unemployment rate from QLFS Annual Report (2015)

The correlation matrix given in Table 5 is divided into four panels. Top-left panel reports correlation between three dimensions of labor shortage measure. It shows all the dimensions are very closely and positively correlated.

Bottom-left panel reports correlation between labor shortage measures and selected characteristics of provincial labor markets. All the labor shortage measures are negatively correlated with youth unemployment rates (YUR) indicating that labor shortage is less visible in the provinces with high youth unemployment, and less visible in the provinces with plenty of youth seeking jobs.

Labor Force Participation Rate (LFPR) shows a weak association with provincial labor shortage measures. In general, negative association indicates that labor shortage problem can be eased with a policy to increase labor force participation.

Labor turnover rate (LTOR) is positively correlated with labor shortage. Labor Turnover Rate (LTOR) is firm specific. Higher LTORs indicate tighter labor market conditions. Firms have to be continuously engaging in recruitment and training of workers if LTOR is high.

The bottom-right panel reports the correlation between provincial labor market characteristics; Youth Unemployment Rate (YUR), Labor Force Participation Rate (LFPR) and Labor Turnover Rate (LTOR).

Top-right panel is blank by construction of correlation matrix.

7. Summary Conclusions and Implications

7.1 Summary and Conclusions

Proponents of the labor shortage hypothesis are specific. They argue that there is a severe shortage of unskilled workers in the manufacturing sector in Sri Lanka. This paper is an attempt to explore this hypothesis using a countrywide sample survey of enterprises. This study defines labor shortage in three dimensions; *presence of unfilled vacancies*, *longevity of vacancies* and *proportion of vacancies*. Each dimension is modeled using two sets of independent variables; *locational characteristics* and *firm characteristics*. Using the 2011 World Bank enterprise survey for Sri Lanka, this study found consistent evidence that in Sri Lanka there is a labor shortage in the manufacturing sector. Nearly 38 percent of firms interviewed stated that they have 9 percent of unfilled vacancies and 76 percent of firms with vacancies have taken more than 4 months.

Labor shortage problem is more visible in firms located in Western Province and engaged in Apparel sector business. Shortage is more visible in firms serving export market and firms with innovative production. All measures of labor shortage are positively associated with firm level labor turnover rate indicating that one of the main reasons for labor shortage is high labor turnover.

7.2 Implications

7.2.1. Policy Implications

This study finds strong evidences to show that in Sri Lanka, firms in manufacturing sector are struggling to find workers to engage in production activities in sufficient numbers. However, as this study focused only the quantity of workers, quality is not examined. It is observed that the shortage is high in Western province, in Apparel sector, in firms operating relatively larger scales, firms producing for export, and firms introducing new products to the market. It is further observed that those firms with a high shortage problem also have a very high labor turnover problem and cannot retain their workforce. As far as the regional disparity of labor shortage is concerned it is observed that labor shortage is more visible in the provinces with relatively low youth unemployment rates and those with low labor force participation rates. This study suggests that even if the economy performs at its current growth rate, the labor shortage will be affected. With its prospective plans of very high growth in the services sector, the shortage will become a serious problem for the manufacturing sector in the future. This situation will become even more serious with tight labor regulations and aggressive labor union actions. To overcome this problem, industrialized locations have already gone into three strategic actions; *agency hiring of workers*, *mechanization of production activities* and *importation of workers*. Regardless of trade union protests, agency hiring is already in practice. However, it is noted that the social cost of industrial disputes of those strategies are enormously high. The data analysis in this paper highlights relatively less politically sensitive strategies for both the government and individual firms.

An effective and sustainable action plan to motivate industries to shift their branches outside Western province is recommended. Infrastructure development, and the creation of business-friendly environments in other provinces together with various incentives such as tax holidays would be effective for this purpose³.

The recommendations of Barnow et al (2012), as described in the literature review, are entirely based on the assumption that shortage is based on skills mismatch. In Sri Lanka, at least the part of the story is also based on attitude mismatch. Therefore, image building of the Apparel sector occupations is also an important action. For that purpose, some of the KIs came up with several important suggestions. Launching social media campaigns about Apparel sector workers, making Apparel sector occupations more professional and providing safe and standard accommodation for workers, preferably in the close vicinity of the factory, are noteworthy. Attractive working environments, and an increase in social recognition of working in apparel industry through CSR project could also be useful in making Apparel sector jobs more attractive⁴.

As the labor turnover plays a key role in determining the labor shortage problem in Sri Lanka, government policies alone will not resolve the problem. Strategic HRD intervention to increase retention of workers is important. In this context, it is observed from the literature review and KIIs that many female factory workers in manufacturing sector, especially those in zones, do not have the intention of retaining their job for a long tenure.

7.2.2. Implications on Further Studies

Absence of most updated and more comprehensive data set to analyze the labor shortage problem in Sri Lanka compelled the researcher to use the World Bank Enterprise Survey for this purpose. While it provides information for all the dimensions of labor shortage problem in Sri Lanka, absence of more comprehensive covariates limited the analysis to use only given sets of covariates. For example, if information about proper measures of pecuniary and non-pecuniary benefits for workers, nature of employment contracts were available, present analysis could have been extended to measure the impacts of such variables on labor shortage.

Information on longevity of vacancies is available in dichotomous form. If actual longevity of vacancies were available, more comprehensive analytical methods would have been used.

The data set used for the purpose of this analysis reflects the situation in 2011. As such, a more recent data set is required to understand the current situation.

³ In this context, lessons from the 200 garment factory project under late president Mr. R. Premadasa government are important. It became a failure in the long-run. This clearly shows that political motivation and various incentives such as tax holidays etc. are not sufficient for sustainability of regionalization of economic activities. Good road network, electricity and ICT facilities in all regions are requirements for sustainability of such an effort.

⁴ Few leading firms in Sri Lanka have already initiated such activities at firm level. Formalization of such activities is required.

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8. Annex: Regression Results

Table A1: Availability of Vacancies

	Model 1		Model 2		Model 2	
	Coef.	z	Coef.	z	Coef.	z
Constant	-1.51	-4.45	-2.91	-7.68	-3.61	-6.48
Location Characteristics						
Firm is located in FTZ or Industrial Park	0.48	0.86			-0.27	-0.42
Firm is located inside the Business City	0.44	1.62			0.41	1.21
Population 50,000 to 250,000	0.13	0.37			0.17	0.41
250,000 to 1 Million Population in the City	0.29	0.46			0.18	0.26
Western Province	1.42	4.59			1.31	3.03
North Western Province	0.73	2.19			0.48	1.17
Firm Characteristics						
Firm exports its products			0.67	1.72	0.92	2.25
Firm produced a new product in last three years period			1.24	3.92	1.36	4.04
Medium Scale Firm			0.95	2.87	0.93	2.70
Large Scale Firm			1.10	2.33	1.19	2.41
Turnover Rate			0.02	4.12	0.02	4.06
Apparel Sector			1.82	5.09	1.06	2.55
Other Manufacturing			0.82	2.29	0.80	2.16
Goodness of Fit						
Pseudo R ²	0.08		0.23		0.26	
LR test	33.47		98.87		107.23	
Number of Observations	324		322		314	

Source: Authors' calculations using World Bank Enterprise Survey Sri Lanka 2011

Table A2: Proportion of Vacancies

	Model 1		Model 2		Model 3	
	Coef.	Z	Coef.	Z	Coef.	z
Constant	-0.31	-5.08	-0.36	-6.83	-0.45	-6.36
Location Characteristics						
Firm is located in FTZ or Industrial Park	0.003	0.03			-0.08	-0.97
Firm is located inside the Business City	0.13	2.96			0.08	1.91
Population 50,000 to 250,000	0.05	0.94			0.05	0.93
250,000 to 1 Million Population in the City	0.02	0.22			0.02	0.28
Western Province	0.28	5.37			0.16	2.89
North Western Province	0.14	2.49			0.07	1.24
Firm Characteristics						
Firm exports its products			0.01	0.14	0.03	0.66
Firm produced a new product in last three years period			0.12	2.89	0.12	3.03
Medium Scale Firm			0.12	2.69	0.11	2.50
Large Scale Firm			0.09	1.33	0.09	1.38
Turn Over			0.00	6.21	0.00	6.00
Apparel Sector			0.26	5.41	0.15	2.82
Other Manufacturing			0.09	1.78	0.09	1.80
Goodness of Fit						
Sigma	0.30		0.27		0.26	
Pseudo R ²	0.15		0.33		0.37	
LR test	47.62		103.58		113.38	
Number of Observations	324		322		314	

Source: Source: Authors' calculations using World Bank Enterprise Survey Sri Lanka 2011

Table A3: Longevity of Vacancies

	Model 1		Model 2		Model 2	
	Coef.	z	Coef.	z	Coef.	z
Location Characteristics						
Firm is located in FTZ or Industrial Park	0.25	0.77			-0.16	-0.45
Firm is located inside the Business City	0.35	2.13			0.34	1.77
Population 50,000 to 250,000	0.13	0.67			0.21	0.92
250,000 to 1 Million Population in the City	0.07	0.19			-0.05	-0.13
Western Province	0.95	5.30			0.79	3.35
North Western Province	0.50	2.57			0.31	1.40
Firm Characteristics						
Firm exports its products			0.29	1.35	0.44	1.95
Firm produced a new product in last three years period			0.58	3.39	0.66	3.69
Medium Scale Firm			0.52	2.84	0.52	2.73
Large Scale Firm			0.63	2.41	0.69	2.54
Turn Over			0.01	4.67	0.01	4.58
Apparel Sector			1.06	5.51	0.58	2.52
Other Manufacturing			0.26	1.34	0.24	1.20
Threshold Coefficients						
/cut1	1.02		1.56		2.08	
/cut2	1.30		1.88		2.42	
Goodness of Fit						
Pseudo R ²	0.07		0.18		0.21	
LR test	42.46		101.75		113.49	
Number of Observations	324		322		314	

Source: Source: Authors' calculations using World Bank Enterprise Survey Sri Lanka 2011