

# Low Productivity and Related Causative Factors: A Study Based on Sri Lankan Manufacturing Organisations

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## Abstract

Inability to explore the full potential of available resources is evident in majority of organisations in developing countries. The reasons for this low productivity are industry specific and dependent on factors unique to the socio economic conditions of the country. The main purpose of this study was to explore the underlying causes for the low productivity in Sri Lankan manufacturing sector. The study analysed quantitative data from a questionnaire survey carried out in selected medium and large scale manufacturing organisations. The structured questionnaire survey was conducted to assess the extent to which identified factors contributed to low productivity in the organisations. Respondents were chosen based on years of employment (>1 year) in the organization and whether they are directly dealing with the activities of the production process. Out of 30 respondents, 60% agreed that, ineffective resource utilization, poor information flow and non-productive/unnecessary activities as the main factors that contribute to low productivity. Focusing on an organised workplace, systematic production processes, standardised quality assurance practices and production methods will greatly help Sri Lankan manufacturing organizations to be more productive.

**Keywords:** Causes for low productivity, Developing countries, Low productivity, Manufacturing industry, Sri Lanka

## Introduction

The manufacturing sector plays a vital role in any economy for two main reasons. Firstly by generating direct and indirect employments and secondly by contributing to the growth of overall gross domestic product (GDP) that provides a foundation for growth in other sectors of the economy. Therefore, the development of this sector is significantly important for any country irrespective of the level of development. However, the manufacturing sector in many countries is in a state of transition. Due to the fact that the new manufacturing giants with low wage economies like China and India tend to compete on

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cost, the established players prefer to move up the manufacturing value chain to compete on technology and innovation. As a result manufacturing companies try to redefine, redesign and improve their production systems to meet the competitiveness demanded by the challenges of present markets (Dangayach & Deshmukh, 2001; Yusuf & Adeleye, 2002). However in this prevailing situation, the Sri Lankan manufacturing sector has not achieved its potential (Tranfield et al., 2003). With that statement in mind, this study will investigate the major factors contributing to low productivity in the Sri Lankan manufacturing sector.

The growth of Sri Lankan economy was entirely attributable to the strong performance of industry sector which consists of construction and manufacturing sectors with a growth of 10.3 % (Central bank of Sri Lanka, 2010). The manufacturing sector, accounting for approximately 55 % of the total industry output, recorded a growth of 7.5 % during 2010 compared to 3.4 % in 2009 (Central bank of Sri Lanka, 2010). Meanwhile, the manufacturing sector, which made a large contribution to the overall economic growth during the last few years, continued to offer large portions of the labour force which is approximately 18% in 2010 (Neely, 2005) with 17,367 establishments (Department of Census & Statistics, 2009). Therefore, the manufacturing sector is a significant sector for Sri Lankan economy.

The Sri Lankan manufacturing sector is dominated mainly by food, beverages and tobacco (more than 48% of industry GDP in 2010), with garments and leather products constituting a significant share of the remainder (Central bank of Sri Lanka, 2010). Across the literature surveyed, considerable studies appeared to be referring to increasing international competition involving the emergence of new competitors. However, compared with other Asian countries the production costs in Sri Lanka are higher (Gattoufi et al., 2004), so Sri Lankan companies pick niches to survive (Construction Specifications Institute, 2011). Although wages in the manufacturing sector are lower than East Asian countries and on par with other South Asian countries, labour costs typically comprise of 25% or less of operating costs (Gattoufi et al., 2004). Furthermore, there has long been a suspicion that poor management practices have held back the productivity of firms in developing countries.

The study conducted by (Fonseka, 1999) tried to identify best practices adopted by a few selected firms in Sri Lanka's manufacturing sector and identified productivity improvement as an important strategy to be adopted by the sector. Moreover, the study identified that cheap labour is not likely to be remain as a competitive edge for Sri Lankan firms. While low levels of productivity are seriously affecting Sri Lanka's ability to remain competitive, it is essential to understand that productivity is affected by the quality of jobs in the industry (Kelegama & Epaarachchi, 2001). Despite the significance of the industry very little has been done for the improvement of the productivity of the manufacturing industry. Without realising how individual input resources affect productivity, manufacturing firms can mismanage resource investment, which will ultimately hinder the growth of productivity (Wacker et al., 2006). However, there is a lack of evidence regarding a comprehensive industrial survey conducted in Sri Lanka to identify reasons for low productivity in the manufacturing sector. Therefore, in this study, an attempt is being made to identify the major determinants of productivity and causes of low productivity of the manufacturing sector in Sri Lanka through a questionnaire survey.

## Literature Review

Productivity is defined as a measure of quantifying the output against the amount of input. It expresses the relationship between the quantity of goods and services produced (output) and the quantity of labour, capital, land, energy, and other resources to produce it (input) (Zandin, 2001). The only meaningful measure of industrial competitiveness is productivity (Khurana & Talbot, 1998) and hence this topic is widely discussed especially in the manufacturing sector due to its solid link to the organisational profitability. Consequently, there is a range of research studies taken place across the world to improve the productivity and this section of the paper focuses on such efforts in the manufacturing sector focusing on the Asian region.

Total factor productivity (TFP) and the learning potentials are inevitably applied as a mean to investigate and understand mechanisms to enhance the productivity with learning improvements in organisations (Pramongkit et al., 2002). A study carried out in estimating technical efficiencies and TFP growths in the Indonesian manufacturing sector from 1993 to 2000 by Margono and Sharma (2006) revealed that food, textile, chemical and metal products industries have technical efficiency of 56% on average.

Evidence of low productivity can be seen in most parts of the region. From the study of Margo and Sharma (2006) it was found that the growth in productivity in food, textile and metal production sectors were reducing at rates of 2.7%, 0.3%, and 1.6% respectively though the chemical sector only reflected a marginal growth of 0.5% in Indonesia. Further, an empirical study by Pramongkit et al., (2002) has found that the TFP of the Taiwanese manufacturing sector has merely increased by 0.2% a year during 1981 to 1999 and any industry specific reasoning for this was out of scope of the study.

A range of factors for low productivity has been identified from different studies across the region. Margo and Sharma (2006) identified the ownership (Private or Public) of the entity has caused the technical inefficiency of the food sector and the location and size of the entity have contributed to the technical inefficiency of the textile sector. In the chemical and metal production sectors, ownership and age of the entity have contributed to the technical inefficiency.

A comprehensive study undertaken on firm productivity of Bangladesh manufacturing industry by Fernandes (2008) has found that the age of the firm has an inverse U-shape relationship with TFP whereas the firm size has a negative correlation on TFP. However, according to Margono and Sharma (2006) large firms were more efficient than small firms. Further, firms with educated and experienced management, firms with foreign ownership, firms which manufacture only to export and firms with quality standard certifications have higher TFP whereas firms which have power supply issues, firms with heavy bureaucracy and firms with corruption were shown to have an adverse effect on the TFP (Fernandes 2008).

Tomura (1997) stated in his study on the productivity of Japanese Iron and Steel industry, not only large scale high speed facilities but also the operators' tacit knowledge and team work activities to continuously improve the manufacturing technologies, are important for high productivity. Similarly, a study by Hasan (2002) on Indian manufacturing industry reveals that there is a significant positive impact on productivity from imported technologies and new domestic capital goods where the latter making a higher contribution to productivity.

It is frequently argued that location related factors such as the culture and government policies affect the factory productivity. However, according to Roger (1991), the careful examination of statistical evidence has not confirmed this argument. He further argues that,

the process industry plants do not show specific productivity gains than non-process plants when analysed statistically, despite the manager's assertion.

Among the very few studies conducted in Sri Lanka, an empirical study carried out by Bandara & Karunaratne (2010) on Sri Lanka's manufacturing productivity covering 27 industries over a 20 year period ending 1997 suggests that Sri Lanka's productivity slow down was mainly due to the decline in technical progress rather than the technical efficiency both of which extensively contribute to the TFP. They further argue that this is mainly due to the political instability and prolonged ethnic conflicts during the period. A comparative study done by Pandey & Dong (2009) on the manufacturing productivity of China and India has found that the TFP growth of manufacturing sector over the period of 1998 to 2003 in China is 11% higher than that of India. They reason out this difference is due to substantial government policy changes in China which were not evident in India. Both of these studies reveal important national level reasons for low productivity. However, ground level reasoning for low productivity is yet to be investigated.

Many authors suggest various strategies to improve productivity. Jan (1994) suggests that reduction of throughput time is an effective strategy to improve productivity of manufacturing firms irrespective of the size, nationality and type of the industry. Wacker et al. (2006) states in their review that investment in both human and equipment resources will improve plant efficiency and the manufacturing productivity is also increased from various non-production activities such as well-defined tasks, employee improvement suggestions, and the interaction of production employees with equipment engineers. However, according to Jan (1994), factors such as investments in new technology, motivating employees through gain sharing, computer aided information management and planning systems and management restructuring could not be associated with the productivity improvements. On the other hand, studies in Japan by Yamada et al. (1997) and Tomiura (1997) stated that there is a significant positive influence of capital resources on productivity.

Most studies have made attempts to quantify the productivity of various industry sectors and few studies have discussed underlying causes for any low productivity. It is important to find out what factors affecting the productivity and how influential they are in the context of the particular region of concern. The literature shows that the popular perceptions among the industry community regarding poor productivity which have not yet been proved with a scientific method. There is a lack of studies on international productivity regarding factors that affect productivity and understanding of how and why productivity varies between countries which is a largely untapped area of research (Wacker et al., 2006). Hence this study focuses on identifying the factors affecting productivity and estimating the extent to which each factor contribute towards productivity.

## **Methodology**

The research methodology adopted in this paper includes a critical review of current literature and a survey. The structured questionnaire was selected as a primary data collection tool and target population was junior executives and middle management levels of the manufacturing organisations as they are normally responsible for directing the workforce and initiating the changes in the organisation. While workers are an essential component of change, the present research clearly tried to consider productivity issues and the related factors from an organisational and management viewpoint.

The research questionnaire facilitated the respondents to reflect the different primary causes affecting the productivity on their point of view and to rate the importance of each

primary cause that limits the level of productivity. The questionnaire comprised with two sections namely respondents' background information and primary causes for low productivity which were identified based on the previous literature, together with input and modifications by academic experts. The participants were asked to indicate their response based on the five points Likert scale. Before administering the questionnaire, a pilot study was conducted with a sample of five participants from the industry. The main purpose of the pilot study was to verify the completeness and practicality of the questionnaire in capturing the factors relevant in Sri Lankan context. By considering the modifications suggested by the pilot study participants the main questionnaire survey was launched through the mail. The sampling methods adopted in this study were non-probability sampling techniques namely convenience and snowball sampling. This method of sampling is preferred when it is difficult to get a response from sample elements selected at random. The survey ran for 30 days in October 2011 and closed with 30 valid responses.

### Survey Findings and Analysis

The survey findings from the first section of the questionnaire which describes the background information about the respondents and their company are analysed in the next two sections.

#### Position of Respondents

Of the 30 questionnaire sampled, 53 % were from middle level management, 47 % were from junior level management. The average work experience of respondents engaged in the questionnaire survey is seven years and they are representing a wide spectrum of manufacturing industries as shown in Figure 1. Consequently, the information obtained from the participants can be regarded as reasonably reliable due to the work experience of the participants.

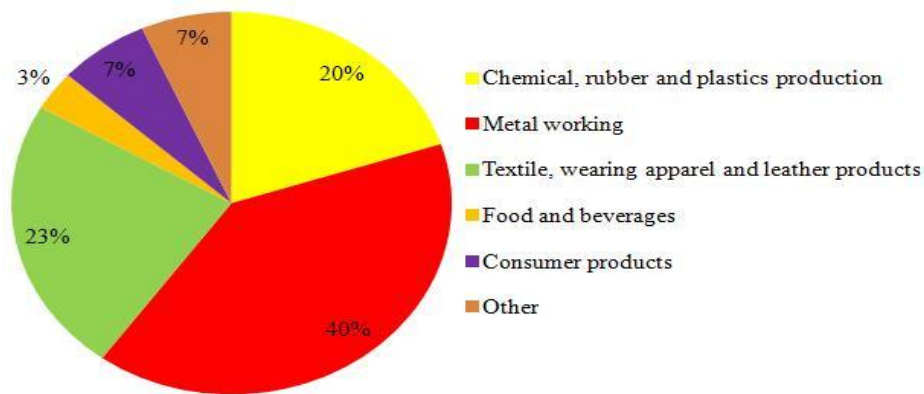


Figure 1. Composition of Respondent's Industry

#### Position of Organisation

Respondents were asked to record the number of employees in the organisation, operational years and workers' union arrangement details. According to the responses, 83% of the organisations under study have more than 100 employees. The average operating years of the firms is more than 19 years which is an indicator for a well established organisation with unique organisational cultures. The results from the data analysis show almost 66% of the organisations do not have workers' union arrangement

and 10% of the organisations have participative type workers' union arrangement (as shown in Figure 2).

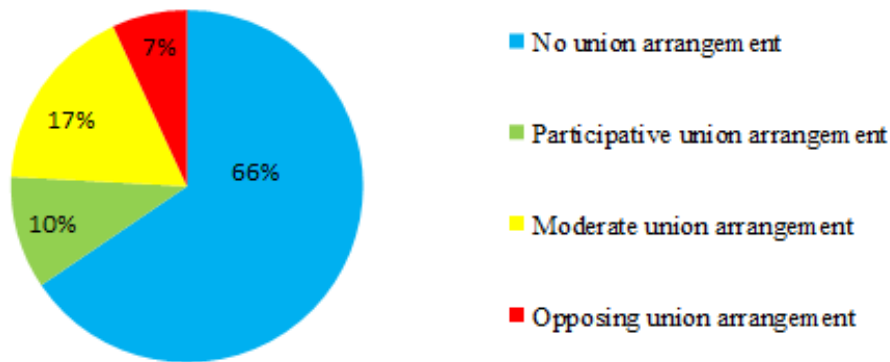


Figure 2 . Workers' union arrangement in the organisations under the study

### Respondents' Perceptions on Primary Causes for Low Productivity

The descriptive analysis was conducted on the respondents' perceptions on the primary causes of low productivity as defined in the questionnaire. This section is mainly focusing on the relative importance of primary causes on low productivity. Respondents rated the primary causes on a Likert scale mentioned in the Table 1 as prevalent in their organisations. The primary causes mentioned below were identified through the literature survey and pilot survey. In addition, respondents were also encouraged to cite additional factors contributing to low productivity of their respective organisations.

Table 1 : Importance of Primary Causes for Low Productivity in Organisations

Primary Causes	Importance Scale				
	Very Unimportant	Unimportant	Neither Important nor Unimportant	Important	Very Important
A Ineffective use of resources	1	2	3	4	5
B Non-productive /unnecessary activities	1	2	3	4	5
C Low labour productivity	1	2	3	4	5
D Worker disputes	1	2	3	4	5
E Poor information flow	1	2	3	4	5
F Excessive rework	1	2	3	4	5
G Waste of material	1	2	3	4	5
H Frequent machine breakdowns/stoppages	1	2	3	4	5
I High variability of cycle time	1	2	3	4	5
J Excessive inventory	1	2	3	4	5

Graph of frequency of response vs. primary causes are indicated in

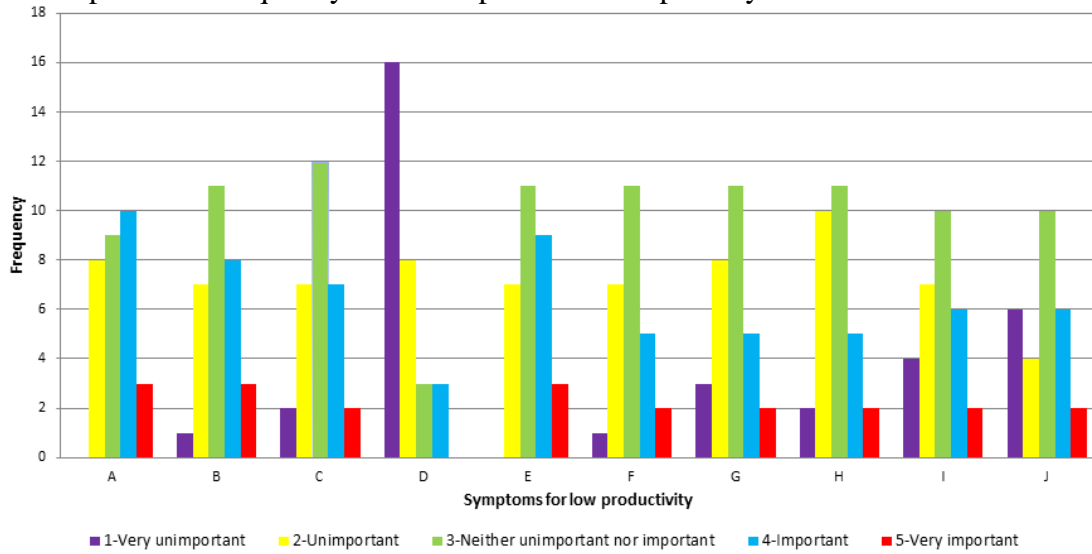


Figure 3. It was noted that higher number of participants has identified three primary causes namely; ineffective use of resources, non-productive /unnecessary activities and poor information flow as important factors for low productivity. Furthermore, low labour productivity factor had equal weighting for importance and unimportance. It was found that for some symptoms some participants have not responded. The majority was in strong disagreement with primary cause worker disputes as a reason for low productivity. Furthermore, from the graph it can be seen that substantial number of participants was in moderate view with the primary causes. The authors think that this could be the fact that some participants tend to be neutral than being critical about their organisations or they did not have an idea about whether actually the primary causes mentioned are prevalent in their organisation.

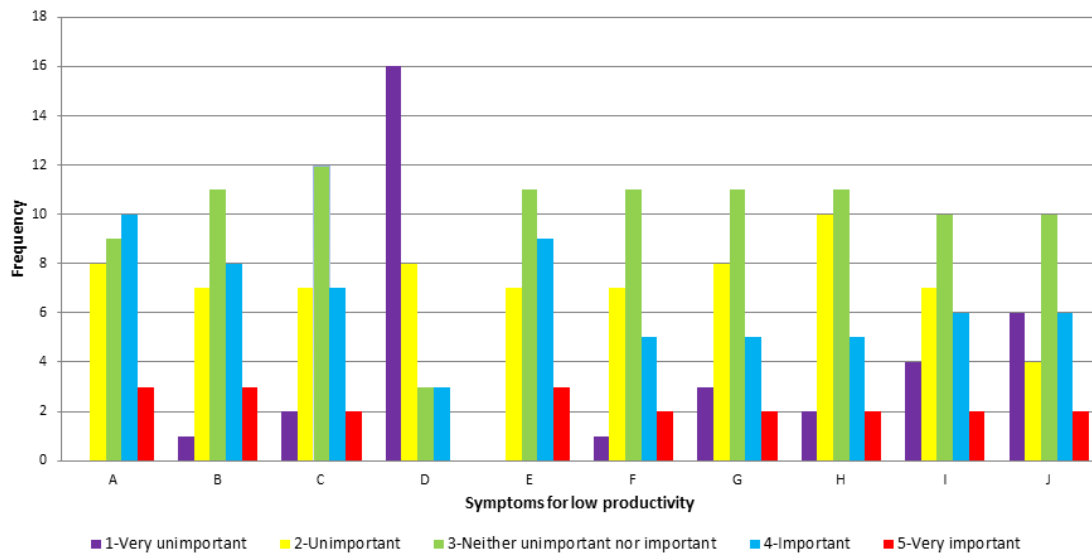


Figure 3: Frequency vs. Primary Causes for Low Productivity

To determine the importance ranking of causes of low productivity from the point of view of the respondents, the relative importance index (I) was computed as:

$$\text{Relative importance index (RII)} = \frac{\sum_{i=1}^5 W_i X_i}{\sum_{i=1}^5 X_i}$$

Where,  $i$  - response category index,  
 $W_i$  - the weight assigned to the  $i^{\text{th}}$  response and  
 $X_i$  - frequency of the  $i^{\text{th}}$  response given as percentage of the total responses for each case.

Table 2 shows the relative importance indices and the ranks of the primary causes for low productivity as postulated by the respondents. Apart from the relative index scale, the percentage of respondents scoring less than two, three (mid-point) and more than four on the Likert scale were also evaluated for each factors. These were used to rank the factors where their relative importance indices are the same.

It was observed that the three most significant sources for low productivity as perceived by respondents in the manufacturing industry in Sri Lanka were: ineffective use of resources (equipment, workers, etc.), poor information flow and non-productive/unnecessary activities. According to the table above it can be seen that ineffective resource utilisation has been agreed as a reason for low productivity by nearly 43% of the participants. 58% and 56 % of the participant identified that Non-productive/unnecessary activities and poor information flow as two main productivity symptoms. Further, nearly 52% agreed that low labour productivity as one of the causes for overall low productivity.

Table 2: Relative Importance Index and Rank for the Primary Causes

Primary cause	Percentage of Respondents Scoring			Mean	SD**	RII	Rank
	≥4	3	≤2				
Ineffective use of resources	0.43	0.30	0.27	3.3	0.98	0.65*	1
Non-productive activities	0.37	0.37	0.27	3.2	1.09	0.63	3
Low labour productivity	0.30	0.40	0.30	3.0	1.01	0.6*	4
Worker disputes	0.10	0.10	0.80	1.8	0.92	0.35	10
Poor information flow	0.40	0.37	0.23	3.3	0.94	0.65*	2
Excessive rework	0.27	0.42	0.31	2.6	0.98	0.6*	5
Waste of material	0.24	0.38	0.38	2.7	1.41	0.57*	7
Frequent machine breakdowns	0.23	0.37	0.40	2.8	1.00	0.57*	8
High variability of cycle time	0.28	0.34	0.38	2.7	1.14	0.57*	6
Excessive inventory	0.29	0.36	0.36	2.6	1.52	0.56	9

\* Note: Equal relative importance indices of the individual factors ranked according to the percentage of respondents scoring 4 or more.

\*\* SD stands for standard deviation



## **Discussion**

The study helped to identify ten major factors affecting productivity of manufacturing organisations and the analysis showed that there is a general agreement between respondents on the ranking of the factors. Moreover, analysis of the collected data showed closer values in median, mean and mode and also except for two causes other causes got low values for standard deviation. This assured the quality of the collected data as well as a low degree of dispersion resulting in reliable results. When closely scrutinising these results, few causes such as ineffective use of resources (equipment, workers, etc.), poor information flow and non-productive /unnecessary activities seem to be the key causes which hinder the productivity. What follows is a brief discussion of the ranking of the relative importance of primary causes for low productivity.

### **Ineffective use of resources (equipment, workers, material etc.)**

Ineffective use of resources was ranked as the greatest hindrance to productivity with an overall index of 0.65 and 43 percent of respondents quoted that this factor was “very important” or “important”. Ineffective use of resources refers to problems encountered due to inaccessibility of resources or excessive time expended to acquire and use them. As a result, workers and machines are often get idled which impede the work sequence and progress. It is identified that poor management practices are often the main underlying factors behind the ineffective use of resources in developing countries.

### **Poor information flow**

Of the primary causes for low productivity identified, “poor information flow” was ranked with a relative rank index of 0.40. The poor information flow refers to incomplete, unclear, impractical and inaccurate information feed to the system which often causes wastes. Brenner study, conducted in 2004 (as cited in Taiwo 2010) argued that work environment designed to suit the free flow and exchange of information is a better medium of motivating employees towards higher productivity.

### **Non-productive /unnecessary activities**

With a relative importance index of 0.37, non-productive/unnecessary activities were ranked as the third main hindrance to productivity. Activities which are not adding value to the final product are referred to the non-productive/unnecessary activities. The past studies have found that manufacturing industry has at least 46 % of non-productive activities.

Furthermore, one important point to be noted is that ‘workers disputes’ are not an important cause for low productivity in the Sri Lankan manufacturing industry which could be due to less existence of workers’ union arrangement and participative type of union arrangement prevailing in the firms under study. However, two primary causes namely; waste of material and excessive inventory showed high standard deviation. Therefore, the results reflect that the experts, as a whole, are quite uncertain about certain factors.

## **Conclusion**

Productivity is considered the main value adding strategy within the manufacturing sector. Therefore, productivity issues and related problems faced by manufacturing industry will

need to be considered and viewed from various angles. This argument was not universally well received especially in developing countries like Sri Lanka. Therefore, the evidence suggests that the low productivity is a critical issue that hinder economic growth of developing countries. Most of the time low productivity in manufacturing sector of South Asian region is attributable to labour unrest, poor working attitudes, inefficient organisational culture/management, etc. which are directly related to labour productivity. Interestingly, there is a little empirical research evidence regarding productivity related studies conducted in Sri Lanka to assess the validity of those generally accepted root causes of low productivity.

This study explores the primary causes for low productivity in the Sri Lankan manufacturing sector. A literature review on the productivity in the manufacturing sector and the causes of low productivity provided a comprehensive understanding and also a basis for launching specific investigations in Sri Lankan context. In the context of this study, ineffective use of resources, poor information flow and non-productive activities have been identified as the key factors which are hindering the productivity and frequently prevalent in the Sri Lankan manufacturing industry. Hence, this study disputes the long established perception that the low labour productivity contributes more towards overall low productivity in the manufacturing sector. Therefore, a strategic realignment in planning for productivity improvement is necessary to evolve suitable practices to address the identified main contributing causes.

This study does not intend to provide a detailed account of different sub- causes of each primary cause or propose solutions to specific causes hindering productivity. It is believed that the factors identified in this survey will provide a basis for future research studies to improve productivity of the manufacturing sector in Sri Lanka and other countries in the region as well.

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