

Critical Factors which Govern Labour Productivity in Building Construction Industry in Sri Lanka

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Abstract

The concept of construction productivity began in the early 20th century with a series of time and motion studies to improve bricklaying operations. However, it remains an interesting and a dominant issue in the construction industry, promising cost-savings, timely delivery and efficient usage of resources. Productivity is directly linked to motivation, and motivation is in turn dependent on productivity. Suitable motivation is therefore a contributor to maximizing workers' productivity. The low motivation of construction workers has contributed significantly to the declining productivity that cannot be determined in the construction industry. The study seeks to unravel the factors that affect construction workers' motivation and the corresponding effect of the identified motivational factors on workers' performance and overall productivity. Fifty factors, which usually affect motivation and productivity were obtained from preliminary survey and reviewing literature. A total of 352 questionnaires were administered for the survey. The survey revealed that, among the 50 factors considered, Medical care, Overtime, Social activity opportunities, Job security, On-time payment, Canteen for employees, Supervision, Accommodation, Communication, and Love and belongingness are the most critical factors that can be used to improve the construction productivity.

Key words: *Labor productivity, building construction, motivation, developing countries*

Introduction

Construction Industry has its own difficulties in improving productivity, as the product or service delivered is not standard. Further, there is an increasing attention towards labor productivity in construction industry since industry faces multiple problems everyday related to workforce [1], [2]. Productivity improvement in the construction industry is a deliberate process to improve the capacity and effectiveness of the industry to meet the demand for building and civil engineering products, and to support sustained national economic and social development objectives. However, building construction industry in Sri Lanka, these difficulties and challenges are present alongside a general situation of socio-economic stress, chronic resource shortages, institutional weaknesses and a general inability to deal with key issues in human resources. There is also evidence that the problems have become greater in extent and severity in recent years [3].

Construction has now become the key development factor for many countries. Construction projects are characterized by their uniqueness. Even though the construction claims the second largest labour component,[3] that has long been considered to have the highest labour component in comparison to other industries[4],

[5]. In most countries, labour cost comprises 30 to 50% of the overall project's cost, and thus, regarded as a true reflection of the economic success of the project [6].

Consequently, considerable effort has been directed to understanding the productivity concept, with the different approaches taken by researchers resulting in a wide variety of definitions of productivity [7], [8]. Productivity has been generally, defined as the ratio of outputs to inputs [7]. On the other hand, productivity has been defined as the utilization of resources in producing a product or services [9].

Like Sri Lanka, where most of the building construction work is still on conventional type. Productivity in the construction industry in Sri Lanka is not only influence by labour behavioral patterns, but also by other factors such as equipment, materials, construction methods, and site management. However, the need to improve on quality and productivity felt more and more In Sri Lanka, very limited work has been done, to study the productivity in the Construction Industry. Nevertheless, it is felt that much has to be done to improve on it.

Construction projects are an important priority in Sri Lankan's national plans. The construction industry generally plays a vital role in a national economy due to the usage of its products such as roads, buildings and dams for the production of goods and services. An enhanced productivity has a positive effect on the gross domestic product (GDP) of every nation. In spite of the immense size and significance of the construction industry to the economies of most nations, its productivity is one of the controversial and least understood factors [1].

In the global construction industry, site workers account for 40% of direct capital cost of large construction projects and there is the need to maximize the productivity of human [10]. More than only 30% to 50% of workers time is spent directly on the work and hence, there is the need for proper utilization. Improving productivity is a major concern for any profit-oriented organization, as representing the effective and efficient conversion of resources into marketable products and determining business profitability [11]. Peter et al. [12] briefly studied labour productivity on construction sites in Nigeria. Their study concluded that there was a need for establishing output figures on various construction sites through time study techniques.

Indonesia as a developing country, studies have found that fairness of pay, good relationship with workmates, overtime payment, bonus, and good safety are the first most predominant motivational factors [13]. At the same time, it was found that five most predominant de-motivating factors were disrespectful supervision, little accomplishment, lack of co-operation amongst workmates, discontinuity of work, and unsafe working conditions [13]. Lim et al. [14] studied factors affecting productivity in the construction industry in Singapore. Their findings indicated that the most important problems affecting productivity were: difficulty with recruitment of supervisors' difficulty with recruitment of workers' high rate of labour turnover' absenteeism from the work site and communication problems with foreign workers.

Labour productivity has been investigated by many researches and identified various factors in different construction industries [15],[16],[17]. However, the construction delays with respect to poor productivity of construction labour are very common in

developing countries. Hemanta et al. [18] found that out of 45 attributes, poor labour productivity is one of the key attributes that significantly contribute the Indian construction delays. Since major component of annual expenditure goes for construction, it is highly important to study the factors that can improve the labour productivity in developing countries.

Aim and Objectives

The aim of this research is to develop ways of improving productivity through varied motivational strategies. This is because of the declining trend of productivity and difficulties in its measurement in the construction industry. In view of this, the research is to look into the problems relating to motivation in construction companies in Sri Lanka. The main objective of the study is to identify and evaluate the most significant factors affecting on productivity in building construction industry.

The methodology used in this study was, literature review, personal interviews and survey questionnaire, which can be categorized as quantitative research. Quantitative approaches are more specific and result oriented and it involves the collection of numerical data in order to explain, predict, and/or control phenomena of interest.

Data collection and analysis

A thorough literature, 68 different factors were identified and then those were screened with personal interviews. However, at last, 50 factors were short-listed and those were incorporated with the questionnaire survey. A survey was then conducted liaison with the tradesmen, were asked to rank the factors according to their relative importance as well as the effect. In addition, the perceptions of the extent to which the identified motivational factors influence productivity were sought.

Sample justification was done by demography of respondents. A total of 352 successive responses were received from workers. The trade, age, educational level of the worker respondents, skill level, years of experience, and type of job were deeply analyzed to justify the sample.

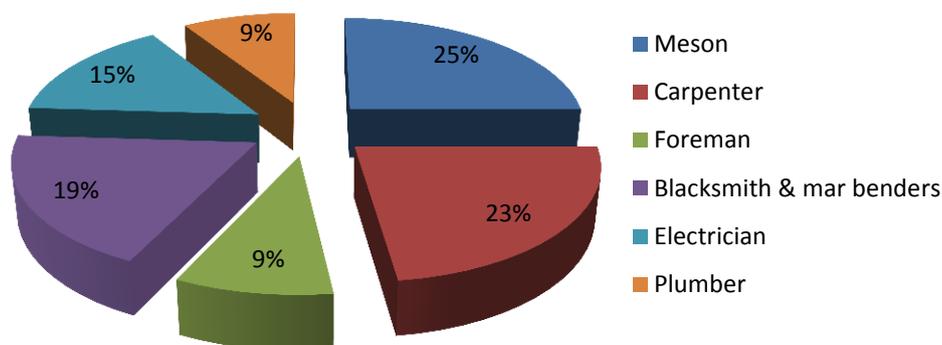


Figure 1: Different trades considered in the survey

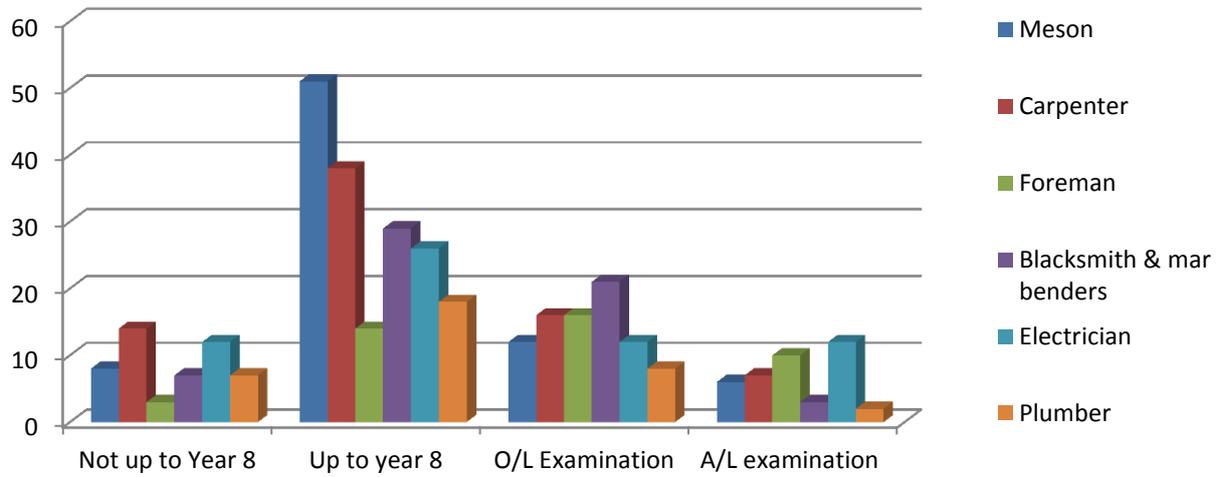


Figure 2: Education qualification among the tradesmen

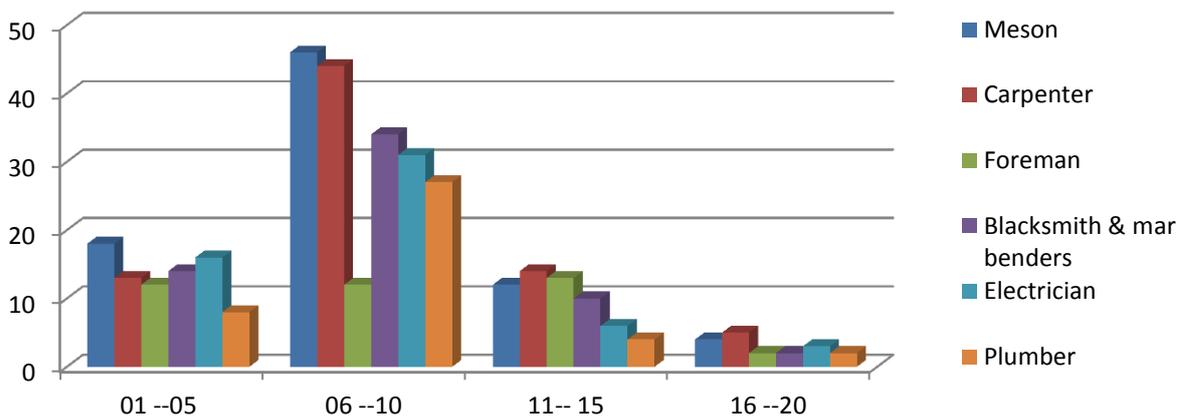


Figure 3: Experience in number of years among the tradesmen

Figure 1, Figure 2 and Figure 3 shows the type of tradesmen considered and their educational level and work experience respectively. Those clearly explain that the survey has covered the full spectrum of tradesmen in the construction industry.

Table 1: Top Ten Factors affecting labour productivity (F.I Factors)

| S/N | Factors that affect labour productivity | F.I |
|-----|--|------|
| 1 | Medical care (Having a particular hospital to attend in case of illness or subsidizing the cost of hospital bills) | 0.92 |
| 2 | Supervision | 0.9 |
| 3 | Canteen for employees (Good food for free or at a reduced price) | 0.9 |
| 4 | Late payment of interim certificate | 0.9 |
| 5 | Social activity opportunities (Sports & Entertainment) | 0.9 |
| 6 | Job security (Permanent job, Job all the time, payment) | 0.88 |
| 7 | Accommodation (Provision of physical accommodation, package as subsidy to rent apartment) | 0.88 |
| 8 | Relations with workmates ,Teamwork (Everyone contributing in the work, all hands on deck) | 0.88 |
| 9 | Communication (Easy flow of information, being well communicated) | 0.87 |
| 10 | Love and belongingness | 0.87 |

Respondents were asked to evaluate each factor in terms of effect as well as the significance. Effect was graded as high, medium and low. The significance was given numbers 1-5 representing strongly not significant, not significant, average, significant and strongly significant. Then to screen the 50 factors, which were short listed; three different analytical tools were considered. Frequency index (FI) explains the usual occurrence or exhibiting of the characteristics of the factors. The nearer the value of frequency index of the identified motivational factor is to unity (1), the higher the effect on worker motivation. A ranking of frequency indices were done to ascertain the most frequent factors.

Important index (II) facilitates the identification of tactical approaches to increasing productivity. The nearer the value of importance index of the identified factor is to unity (1), the more significant it is to worker motivation and hence, a greater impact on worker productivity. A ranking of importance indices were undertaken to ascertain the most frequent factors [19], [20].

Table 2: Top Ten Factors affecting labour productivity (I.I Factors)

| S/N | Factors that affect labour productivity | I.I |
|-----|--|------|
| 1 | Overtime (Provision of extra money after normal working time) | 0.91 |
| 2 | On-time payment | 0.87 |
| 3 | Medical care (Having a particular hospital to attend in case of illness or subsidizing the cost of hospital bills) | 0.86 |
| 4 | Social activity opportunities (Sports & Entertainment) | 0.85 |
| 5 | Working in social insurance | 0.83 |
| 6 | Job security (Permanent job, Job all the time, payment) | 0.83 |
| 7 | Opportunity to undertake challenging task (Being given goal to work towards it through your own directives) | 0.83 |
| 8 | Accommodation (Provision of physical accommodation, package as subsidy to rent apartment) | 0.82 |
| 9 | Bonus at the end of project or year (showing appreciation at the end of the project and year) | 0.81 |
| 10 | Love and belongingness | 0.81 |

Severity index gives the analytical explanation of the critical effect on motivation and significance to productivity. It further gives the aggregate effect and significance to motivation. When a severity index approaches unity (1), it gives the explanation of how severe the factors are to motivation and productivity. Ranking of severity indices were done to ascertain the most critical or severe factors from which a discussion of the first ten factors were made. Finally, the severity index was calculated using the formula below.

$$\text{Severity index (S.I.)} = \text{Importance index} \times \text{Frequency Index}$$

Table 3: Top Ten Factors affecting labour productivity (S.I Factors)

| S/N | Factors that affect labour productivity | S.I |
|-----|--|------|
| 1 | Medical care (Having a particular hospital to attend in case of illness or subsidizing the cost of hospital bills) | 0.79 |
| 2 | Overtime (Provision of extra money after normal working time) | 0.78 |
| 3 | Social activity opportunities (Sports & Entertainment) | 0.76 |
| 4 | Job security (Permanent job, Job all the time, payment) | 0.74 |
| 5 | On-time payment | 0.73 |
| 6 | Canteen for employee (Good food for free or at a reduced price) | 0.73 |
| 7 | Supervision | 0.72 |

| | | |
|----|---|------|
| 8 | Accommodation (Provision of physical accommodation, package as subsidy to rent apartment) | 0.72 |
| 9 | Communication (Easy flow of information, being well communicated) | 0.71 |
| 10 | Love and belongingness | 0.71 |

Even though two separate analyses show slightly different answers, many of the critical factors are common in Table 1 and Table 2 as well as Table 3. Workers financial stability and also medical care were ranked at top in both cases. Provisions of medical facilities were ranked as the first in top ten severe factors with Severity Index of 0.79, Frequency Index of 0.92 and Important Index of 0.86. According to the results calculated considering FI and II, the importance of medical facilities can improve the productivity as same as the motivation that can be gain through financial assistance.

Workers in a construction site are always exposed to various hazardous substances and physical agents, e.g. asbestos, lead, silica dust, organic solvents, sewer gases, welding fumes, radiation, noise and vibration. Excessive exposures to these substances/agents may result in acute injury, chronic illness, permanent disability or even death. Loss of concentration at work and fatigue arising from poor health conditions may increase the risk of accidents [21], [22]. These features would further increase the health risks of workers. Working in hazardous environment it is no surprise that construction workers are particularly susceptible to illness and injury. According to the information gathered from the workers, they are highly unsafe and most vulnerable section of the society. One of the biggest problems is that many construction workers cannot afford to pay for treatment. Irrespective of the craftsman trade, irrespective of their age group, in the opinion of the respondents, job performance and productivity can increased through health promotion programmes as well as providing medical facilities in the workplace.

Then these critical factors were analysis over their age and the trade to understand whether there are any variations between demographical factors.

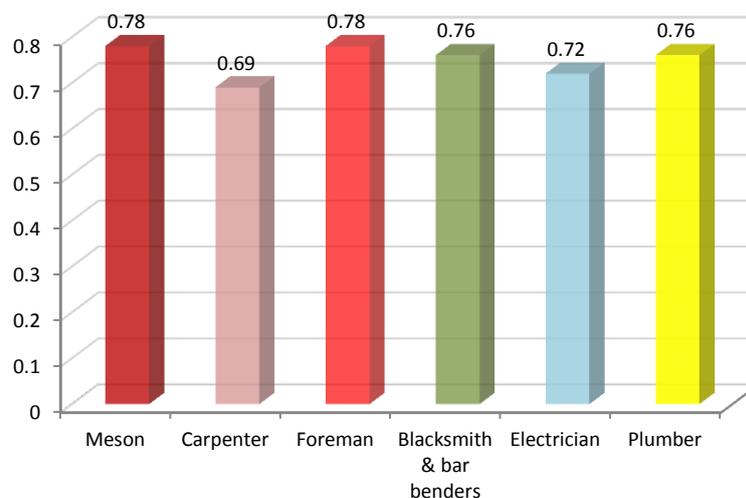


Figure 4: **Severity Index variations with the Trade of Workers (Medical Facilities)**

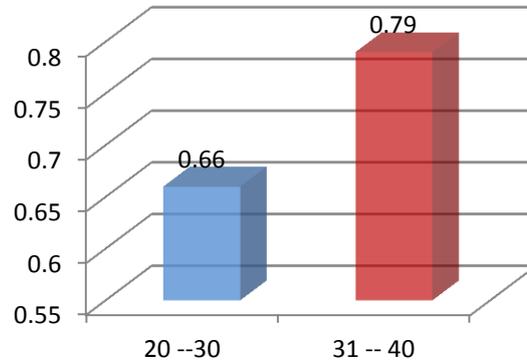


Figure 5: **Severity Index variations with the Workers Age Group (Medical Facilities)**

Figure 4 and Figure 5 show the variation of Severity Indexes over trade of workers and their age groups. Even though there is not much difference between the values found in Figure 4, age has a significant affection over the medical facilities. When the tradesmen get older as well as to attract and retain good quality experienced tradesmen, it is very important to provide them with a good medical scheme. Similar analysis can be carried out for other significant factors as well.

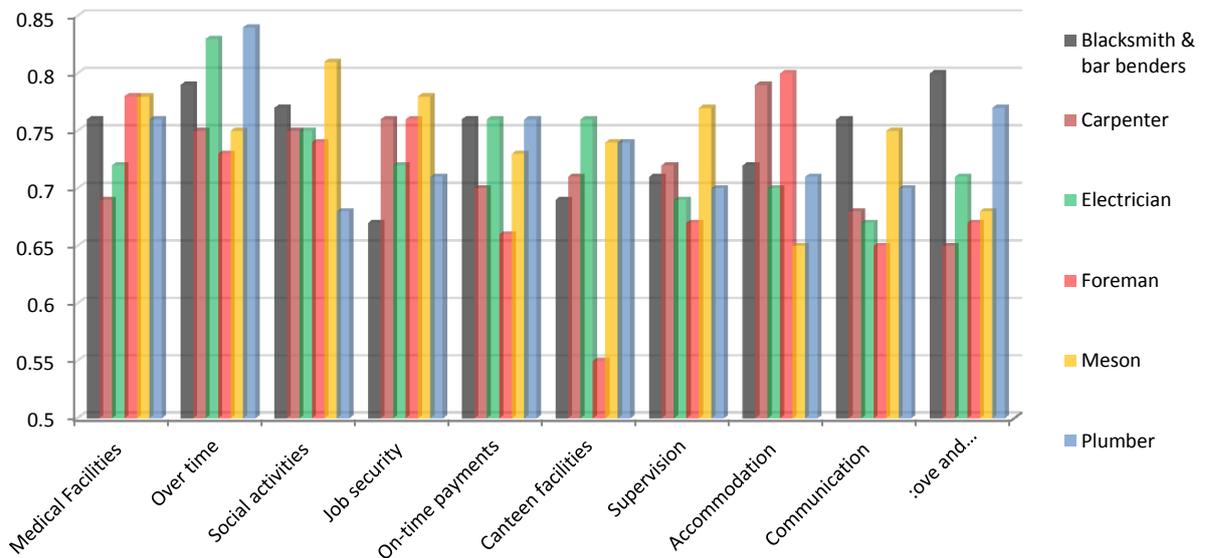


Figure 6: **Severity Index variations with the Trade of Workers for critical 10 factors**

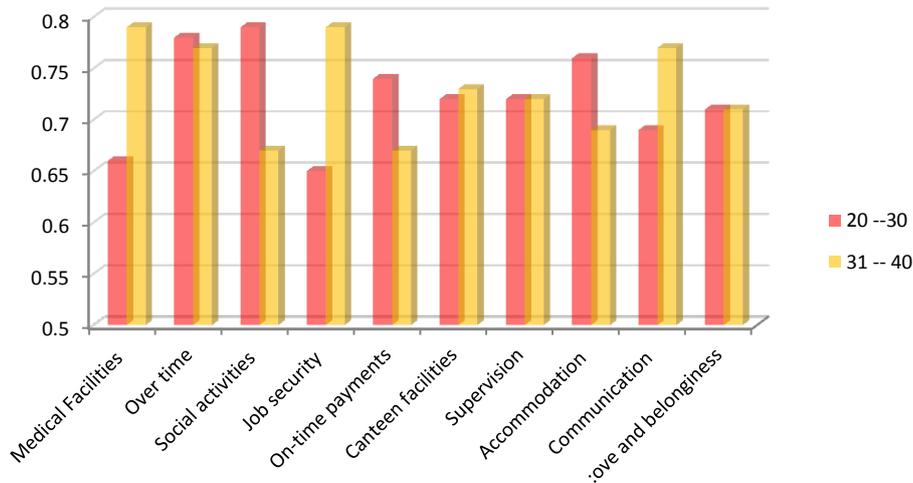


Figure 7: **Severity Index variations with the age for critical 10 factors**

Among, the 10 critical factors their importance is largely varying with their type of job as well as the age group they represent. Figure 6 shows the effect of each factor towards their nature of the job, whereas Figure 7 shows how age affects the productivity factors.

While medical facilities are very much concern for the mature tradesmen, productivity can be improved by facilitating social activities and accommodation for the young masses. On-time payments is another key motivation factor for the youth, since their expenses are not regular as mature masses. Job security plays a key role in driving mature tradesmen towards productivity enhancement. However, over time and love and belongingness has equal motive towards enhancing productivity. Workers always feel motivated when superiors, colleagues and subordinates show concern and care to one another.

Conclusions

The objectives of the study were to identify factors that motivate workers and the effect of these factors on productivity at construction sites. Questionnaire survey was therefore used to undertake this study. A list of 50 factors that affect motivation and productivity was gathered from literature and preliminary survey. Perceptions were then sought on the degree of effect on motivation when they exist and the correspondent significance on productivity. It was observed that a fair to good agreement beyond chance existed between responses given by respondents on motivation. This gave the indication that motivation vary from individuals.

Furthermore, it can confirm that individual differences contributed to the fair agreement to good agreement. It was revealed from the survey that, the ten most severe factors that affect motivation are: Medical care, Overtime (Provision of extra money after normal working time), Social activity opportunities (Sports & Entertainment), Social activity opportunities (Sports & Entertainment), Job security (Permanent job, Job all the time, payment), On-time payment, Canteen for employee (Good food for free or at a reduced price), Supervision, Accommodation (Provision of physical accommodation,

package as subsidy to rent apartment), Communication (Easy flow of information, being well communicated) and Love and belongingness.

In relation to responses on significance to productivity, a high degree of agreement was revealed. This further gave the indication that motivation always influences productivity.

It was further observed that the performance of the well-motivated will be affected positively which in effect will impact positively on productivity of projects. From this study, it may be concluded that the motivation varies from one individual to the other. This can be attributed to the age, trade or profession, qualification, years of experience and years with which the individual has been with the establishment. It can infer from varying research findings on productivity conducted in other part of the world that a corresponding variation in motivation will also prevail.

Among the ten most critical factors established in this study, all factors can be classified into the base needs for the workers irrespective of their age group, trade. Therefore, it is concluded that when attention is directed towards the revealed ten most severe factors, it will enhance motivating workers at their respective establishment. This will in effect impact positively on performance, hence corresponding to productivity improvement.

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