

Importance of Measurement of Labour Productivity in Building Construction - An Overview

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Abstract— Productivity is an important aspect of construction industry that may be used as an index for efficiency of production. Efficient management of construction resources can lead to higher productivity which can help to achieve cost and time saving. Productivity remains an interesting subject and a leading theme to efficient use of resources in construction sector. It has been observed that low productivity of construction workers is one of the major causes of time & cost overrun in construction projects. Construction is labour oriented industry. It heavily relies on the skills of its workforce. The labour is industry's most valuable asset. It is important to improve efficiency of production by improving productivity of labour. Decreasing productivity of project has always been major concern for construction Industry.

Key words: Labour, Time, Cost, Labour Productivity

I. INTRODUCTION

Due to its critical importance to the profitability of construction projects, productivity is the most discussed topic in the construction industry. Productivity is the ratio of output to all or some of the resources used to produce that output. Resources comprise labour, capital, time, energy, raw material etc. Productivity translates directly into cost savings and profitability. There are two measures of construction productivity: (1) total factor productivity, where outputs and all inputs were considered; and (2) partial factor productivity, where outputs and single or selected inputs are considered. In construction, productivity is usually taken to mean labour productivity, that is, units of work produced per man-hour. So, here productivity is the ratio of output to labour cost or output to work hour. Apart from old urban or industrial centers, new urban or industrial centers have appeared on map where construction works are going on expanding and fast growing construction sector and lack of grater employment opportunity elsewhere has drawn large numbers of workers in this sector. There are more than 25 million of construction workers in India. Construction is labour oriented industry. Most of the construction laborers migrate to cities and metros are from poor families and are illiterate. Their lack of education and skill make their choices very limited. When they come to big cities, they have to face numbers of problems because of their inexperience and lack of skill. Performance of labour in building construction is affected by so many factors and is usually linked to the performance of Time, Cost and Quality. Therefore, it is important to evaluate factors affecting labour productivity in building construction.

II. LITERATURE REVIEW

The following are the previous research review based on labour productivity in building construction.

Ameh et al. (2011) established the relationship between time overrun and labour productivity on construction sites in Lagos, Nigeria. He concluded that factors causes time overrun are inadequate fund for the project, inadequate planning of project before take-off, inadequate tools and equipment, delay in delivery of materials, subcontractors' incompetency and design changes during project execution. And factors that affect productivity in the construction sites are use of wrong construction method, inadequate construction materials and inaccurate drawings/specification were the most significant. Based on the outcome of the study, he gave recommendations which improved productivity in the construction industry and to reduce time overrun on projects in Nigeria.^[2]

Attar et al. (2012) carried survey of building projects in Sangli, Kolhapur and Pune districts, where an increase in productivity is being sought. He identified ten most significant factors affecting labour productivity for small, medium and large companies. The groups of factors which are highly effective are: supervision, material, execution plan, and design. He said that for large companies, equipment factors have also highly effective. While in small and medium companies, owner/consultant factors also need special attention.^[1]

Shehata et al. (2012) said proper management of resources in construction projects can yield substantial savings in time and cost. Here State-of-the-art methods and techniques of productivity measurement are used. And also concluded that the key for productivity improvement is not to complete as many tasks as possible or to maximize workload but focus on maintaining a predictable workflow and thus be able to match the available workload with capacity (work hours).^[9]

Dayakar et al. (2012) concluded important factors affecting labour productivity are quality of site management, material shortage, timely payment of wages, labour experience, misunderstanding between labour and superintendent. Work concentrated on labour productivity ratios that reduced day by day, which in turn harm organization's profitability. MS excel methods and SPSS software used for analysis. Fifty one factors were considered for study and categorized into four different groups which were work content issues, work environment issues, workforce issues and regulations.^[4]

Khaled et al. (2013) comprised 30 productivity factors and classified them under three primary categories: Human/labor, Industrial and Management. Their study represented five factors which are most significant in construction labour productivity in Egypt: (1) Labour experience and skills, (2) Incentive programs, (3) Availability of the material and ease of handling, (4) Leadership and competency of construction management and (5) Competency of labour supervision.^[6]

Shah Meet et al. (2014) stated that productivity can be an influential factor in minimizing the project losses or increased profits. Productivity can help a company gain competitive advantage and slim profit margins. He suggest the top factors which affects productivity based on the survey conducted in the central Gujarat region were low payment, poor construction methods, use of technology/level of mechanization, delays in material delivery etc.^[8]

Shashank et al. (2014) grouped factors affecting labour productivity in six different group which are Motivation group, Manpower group, Material/Equipment group, Safety group, Managerial group, Quality group. They said Motivation factor has the highest impact on labour productivity. So they suggested that, the construction company should increase labour satisfaction by paying a reasonable salary, developing financial reward or recognition program and improving the living condition on site.^[11]

Thiyagu et al. (2015) proposed fifteen independent groups affecting the labour productivity in the construction projects. The topmost factors affected the labour productivity are given Sanitation and hygiene of the construction site and the temporary shed; Labour injuries on site; Alcoholism; Working overtime; Shortage of construction materials; Payment delays; Change orders from the designers; Improper equipment; Poor quality of construction materials; Misunderstanding among laborers.^[12] Dharani et al. (2015) found that construction laborers are migratory in nature and therefore geographically searching for employment. Thus their employers keep on changing and it is impossible for both the parties to develop long-term relationships and loyalty to their employers. He found most of the construction labour is also engaged in some other profession like farms, factory, domestic servant etc. and hence they do not give full importance to construction work and tend to work informally. Due to this labour cultivates informality, and Informality lowers productivity growth.^[3]

Saravanan et al. (2016) concluded eleven different factors influencing labour productivity which are time, quality, safety and managerial factors, experience of labour, type of project, misunderstanding, external factors, motivation, material/tools and natural factors.^[10]

Ghate et al. (2016) observed that measurement of labour productivity is helpful in saving the time of the project as well as cost of project without hampering the quality of work. They used work study and work measurement techniques for data collection of labour and improvement in labour productivity. They concluded that this techniques helped to reduce cost by 20% of labour cost per floor.^[5]

Mahesh et al. (2017) found prior knowledge of labour productivity during construction can save money and time. Investments for projects are very high and because of the complexity in construction, various factors can highly affect overall productivity, thus the project can end up adding even more time and money in order to be completed. First method used for analysis was the person product moment correlation coefficient.^[7]

III. VARIOUS FACTORS AFFECTING LABOUR PRODUCTIVITY

Identification and evaluation of factors affecting labour construction productivity have become a critical issue facing

project managers for a long time in order to increase productivity in construction. Understanding critical factors affecting productivity of both positive and negative can be used to prepare a strategy to reduce inefficiencies and to improve the effectiveness of project performance.

Knowledge and understanding of the various factors affecting construction labour productivity is needed to determine the focus of the necessary steps in an effort to reduce project cost overrun and project completion delay, thereby increasing productivity and overall project performance.

Based on the study & survey, Factors affecting construction labour productivity have been identified and are grouped into 15 categories according to their characteristics, namely

- a) Design factors
- b) Execution plan factors
- c) Material factors
- d) Equipment factors
- e) Labour factors
- f) Health and safety factors
- g) Supervision factors
- h) Working time factors
- i) Project factors
- j) Quality factors
- k) Financial factors
- l) Leadership and coordination factors
- m) Organization factors
- n) Owner/consultant factors
- o) External factors

IV. BARRIERS TO IMPROVING LABOUR PRODUCTIVITY

There has been much work identifying the factor that affects productivity. Ineffective management has been cited as a primary cause of low productivity rather than other factors. Apart from that there are also some barriers to improve the productivity and these barriers are as follows:

- a) Lack of alignment of goal
- b) Contractual conflict
- c) Difficulties in measuring productivity
- d) Weak commitment to continuous improvement
- e) Lack of labour force focus

V. GUIDELINES FOR IMPROVING THE LABOUR PRODUCTIVITY

- a) Properly training to the labourers
- b) Motivation to workers towards project completion.
- c) Properly and in advance material procurement & management
- d) On time payment to the workers
- e) Systematic flow of work.
- f) Properly, clearly & in time supervision.
- g) Advance site layout
- h) Maintain work discipline
- i) Facilities to the labourers
- j) Clearance of legal documents before starting of work
- k) Systematic planning of funds in advance
- l) Pre monsoon plan to avoid work stop
- m) Maximum use of machinery and automation system 14 Advance equipment planning.

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