

Factor Affecting Labour Productivity In Construction Projects

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Abstract- Construction project is said to be successful if it is completed in schedule duration and estimated cost. For that purpose productivity has to be efficient. Productivity forecasting plays an important role in strategic and operational planning. Quantitative forecasting is used for decision making process for many of complex situations. The construction industry is a unique one, highly diversified and fragmented, and one that produces unique products. It is not therefore less difficult to define labor productivity in this industry than it is in the rest of the industry. Labor productivity is still a complex issue in construction and extremely difficult to measure due to the heterogeneity of the industry's products as well as of its inputs. Accordingly, in this study a review on improvement of labour productivity in construction industry.

Keywords- Labor Productivity , Productivity Forecasting , Spss Software , External Factors , Manpower Factors

I. INTRODUCTION

Construction industry is world's largest and most challenging industry. Human resource has a strategic role in increasing productivity in construction industry. With the effective and optimum use of human resources can help in productivity growth. The construction projects are mostly labour based with basic use of hand tools and equipment's in which labour cost consists of about 30% to 50% of total project cost. Indian construction industry is one of fastest growing sector globally. The construction sector gives second largest employment after agriculture. India shares about 8% of total GDP and also provides employment to around 35 million peoples directly or indirectly.

In construction industry one of the biggest problems faced is of unskilled labour which implies in productivity loss and impacts on cost overrun and schedule daily. Labour productivity is one of important factor which affects physical progress of construction project. To perform effective job, construction labour should be familiar with materials, tools and machineries that they use. Many researchers have shown that poor construction management practices leads to poor performance, wastage of efforts in different phases of construction projects.

Researchers tried to overcome some of challenges by adding their efforts in construction project, however many problems are yet to be solved in terms of construction productivity. Identifying and analyzing the critical factor that influence construction productivity will lead to develop most effective method and strategies to improve the construction productivity in upcoming time. Construction project is said to be successful if it is completed in schedule duration and estimated cost. For that purpose productivity has to be efficient. Productivity

forecasting plays an important role in strategic and operational planning. Quantitative forecasting is used for decision making process for many of complex situations. There has been a change in the way the construction industry has been working due to the use of advanced tools, technology, management skills, material, and heavy equipment. The industry plays a much more "prominent role in developing countries compared to developed countries" (Altaf, 1979). The importance of the industry can be measured by how much the sector adds to the country's economy through its contribution to the Gross

Domestic Product (GDP) and the portion it takes in any nation's employment population (Sweis et al, 2009). In many developing countries, major construction projects account for 10% of their Gross Domestic Product (GDP) and approximately 50% of the wealth invested in fixed assets (Abdul Karim et al, 2005). Moreover, the development of the construction industry in developing countries lags far behind other industries in those countries compared to developed countries (Yiman, 2011). The nature of the industry is considered very complex since it involves many stakeholders such as owners, contractors, consultants, regulators, and suppliers (Ghoddousi et al, 2012).

Each construction project is unique and that is due to its nature based on size, budget, material, location, weather conditions, and manpower (Budawara, 2009). However the goal of all construction projects is to build projects on time, within budget, with the stated quality standards, and within a healthy and safety environment. Research has shown that 20% of these construction projects fail to achieve their goal as a result of overscheduling, delays, or cost overruns that can put any construction project at risk (Archibald, 2012; Nasirzadeh et al, 2012; Jarkas, 2012; Omran et al, 2011; Wah Chui et al, 2010; Kalsum et al,

2010; Saunders et al, 2009; Sambasivan et al, 2007; Enhassi et al, 2007; Proverbs et al, 1999; Thomas et al, 1997). Construction projects risks are generally perceived as events that affect the projects' cost, time, and quality. The extent to which risks exist in a particular project is linked negatively to the likelihood of a successful outcome to any projects (Hughes, 2006).

Some of these risks include labour productivity factors that lead to low productivity, which ultimately leads to project failure. That agrees with (Ugwoeri, 2012) "That low labour productivity can result in project delays and increases costs". (Hughes, 2006) states that "failure to properly manage risks often leads to increased cost, schedule, delays, disputes, claims and litigation". Since productivity has an inverse relation to cost, improving low labour productivity will not just reduce cost, but will also benefit the contractor by increasing profit margins (Ghosh et al, 2004). Finding labourers is considered a very easy task for contractors/subcontractors. They either have their own team that works for them, or they form a new team by publishing a small advert in any national newspaper. So, there is a need to explore/investigate and analyse the factors beyond this decline followed by identifying the key drivers of improving labour productivity.

II. METHODOLOGY

Survey research is defined as collection of different data by asking people questions" (Fowler, 1993). The data collection process used in this research had the option of two basic methods: questionnaires and personal interviews. A questionnaire was preferred as the best effective and suitable data-collection technique for the study. A survey was given to employees from different trades involved with the construction project.

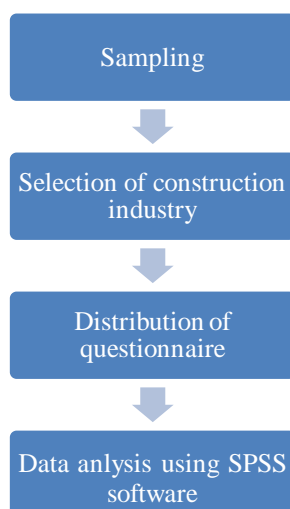


Fig. 1: Flow chart

The main consideration for a survey was that it should be easy for respondents. If questions are too complicated, possibility of high drop-out rate was studied. Care was taken so that the initial questions did not negatively influence the results of subsequent questions. Preliminary text was introduced for explaining the survey project to the respondents. Page breaks on the webpages were introduced to improve the text readability. Logic-based questions were avoided because they could cause respondent frustration and increase the drop-out rate. Study was done to find any serious loopholes and if questions were truly answerable.

The explanatory research design explains and provides details about the different aspects of the research study by collecting data through generalizations. The exploratory research design collects facts about the study by exploring the research questions and does not lay stress on deducing results or outcomes. It majorly provides information about the problem, nature, and other features. The descriptive research design describes the facts about the research by using different tools and techniques so that there is the attainment of in-depth learning about the study facts. Primary data involve a well-constructed and self-developed tool for the data collection. Advanced decisions were made when formulating objective, designing method, selecting the sample, collecting data. At last, data analysis and reporting were planned with experts' approval.

Great care was taken to assure respondents get precise duration to respond to the survey questionnaire and turn in to the researcher online. Considering the length, importance, sensitivity, past experience of researcher's advisor and feedback collected from pilot survey it was decided, the average time to complete the whole survey questionnaire would require about 15 minutes. Duration of 6 weeks was assigned to complete and submit the survey questionnaire. Questionnaire was kept effective and simple for the respondents. Various sections were designed for the survey questionnaire and they were assigned distinct colors for appropriate responding. The next set of questions was targeting the factors affecting labor productivity in the five different groups. It included factors affecting labor productivity. Respondents simply furnished of factors affecting productivity for given typical condition. Hence, each respondent had a choice to select only one option for each factor. The responses were to be based on the understanding, knowledge and experience of the respondents and not related to any definite project. This simple and straight method was selected to establish a means of developing a list of factors affecting labor productivity in building construction.

The target groups in this study were professionals from the construction industry. A list of 255 building-construction organizations was obtained from the Engineering News-Record. The sample size can be calculated with the

following equation for a 94% confidence level (Al-Shahri, M et al., 2001; Israel, 2003; Moore et al., 2003):

$$n = n' / [1 + (n' / N)]$$

Where, n= Total number of population

N = Sample size from a finite population

n' = Sample size from an infinite population = S^2/V

S² = the variance of the population elements and

V = a standard error of the sampling population. (Usually, S = 0.5, and V = 0.06.)

$$n' = S^2/V^2 = (0.5)^2 + (0.06)^2 = 69.44 \text{ For } N=255$$

$$n = 69.44 / [1 + (69.44 / 255)] = 55$$

To obtain 94% of confidence level, it was calculated to send the questionnaire to 55 organizations to accomplish a 94%.

A total of 55 questionnaires were sent to construction professional through e-mail. By the due date, a total of 43 questionnaires were received, resulting in a nearly 78.1% reply rate. Missing data frequently occur after the respondent chooses not to response a question or when the respondent rejects to answer the question (Kim, 1993). The most serious concern presented in the responses was some missing data. Some of the unclear response was clarified over the phone. A total of 12 (i.e., 21.8%) invalid data received were deleted from research study. The reason to discard the data was incompleteness and invalid responses.

acceptable because misunderstanding among laborers can creates disagreement among them and about the responsibilities for each laborer, which leads to a lot of mistakes in work and, consequently, affects labor productivity. A lack of competition among laborers ranked 6th, with an RII of 1248, and ranked 38th among all 40 factors for negatively affecting labor productivity.

Labors' age was ranked 4th in the manpower group, with an RII of 1464, and 34th among all 40 factors that affected labor productivity. (Heizer and Render 1990) supported this result, citing that the age factor generally affects job-site productivity. This result is justified because speed required to perform particular task and strength decline over time affecting labor productivity. Labor absenteeism was ranked 1st in the manpower group, with an RII of 1608, and in 18th among all 40 factors that affect labor productivity. This result is justified given the transient nature of the local workforce and the ease with which construction contractors could hire additional laborers to cover absenteeism. Personal problems were ranked 7th in the manpower group, with an RII of 1236, and 40th among all 40 factors that affect labor productivity. This result might be justified because personal problems cause mental disturbance for laborers, and thus can affect labor safety more than labor productivity.

III. RESULTS AND DISCUSSION

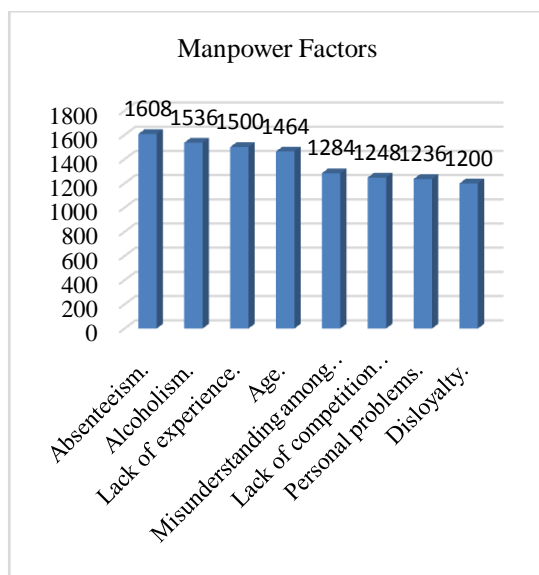


Fig. 2. Manpower Factors

Labor disloyalty had a great effect on labor productivity and ranked in the 8th position for the manpower group, with an importance index of 1200, and 39th among all 40 factors in terms of negatively affecting labor productivity. Misunderstanding among laborers was ranked 5th in the manpower group, with an RII of 1284, and 32nd among all 40 factors that affected labor productivity. This result is

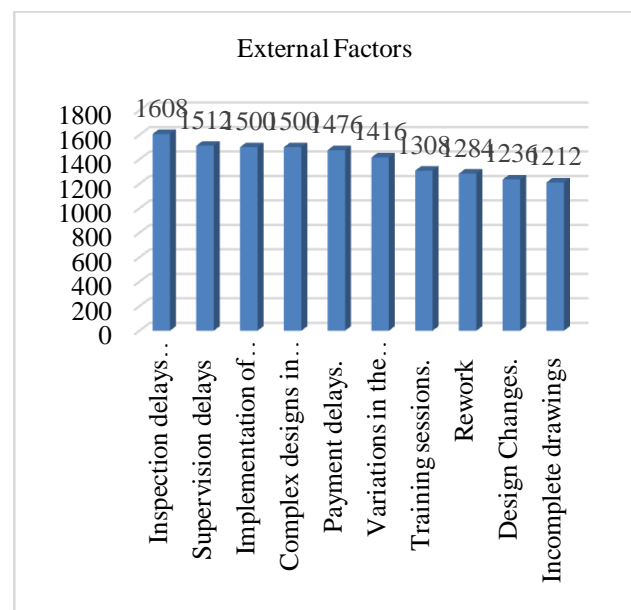


Fig. 3 External Factors Affecting Labor Productivity

Payment delays were ranked 5th in the external group, with an RII of 1476, and 24th among all 40 factors that affect labor productivity. Payment delays in the construction industry are adversarial and disastrous. Late payment affects a company's cash flow and may ultimately lead to a business's failure. Timeliness of payment is important to avoid the risk of the late-payment problem. A study by Zou et al. 2007 pointed out that project-funding problems have been identified as cost-related risks, time-related

risks, and quality-related risks which can significantly influence the delivery of a construction project. The risk of delayed payment from the owner impacts the duration and cost of the project. These risks causes the project's cost to increase abnormally and, subsequently, delay the project's progress. Rework ranked 8th in the external group, with an RII of 1284, and 19th among all 40 factors that affect labor productivity. Past study from (Makulsawatudom and Sinthawarong 2004) confirmed that rework is one of the major factors in the construction industry to affect labor productivity in building construction. The study also listed rework as one of the critical factors effecting productivity and stated that rework is due to incompetent craftsmen and supervisors.

Implementing government laws was ranked 3rd in the external group, with an RII of 1500, and 31st among all 40 factors that affect labor productivity (Table 5.4). For most projects, government authorities refer to specific versions and construction standards of their design. Sometimes, government authorities, who have documented standards for design and construction, may decide to revise those standards after the job has been awarded, based on a previous version, thus affecting the overall labor productivity of the building construction.

Training sessions were ranked 7th in the external group, with an RII of 1308, and 33th among all 40 factors that affect labor productivity. Past studies from (Lema and Samson 2002), (Cheung et al. 2004), and (Iyer and Jha 2005) stated that persons entering the construction industry directly from high school usually start as inexperienced in construction industry or as laborers. They can learn from their job quickly by working closely with experienced people. Whereas, skilled laborers, such as carpenters, bricklayers, plumbers, and other construction trade specialists, most often get their formal instruction by attending a local technical school or through an employer-provided training program..

IV. CONCLUSION

In today's world, the construction industry is rated as one of the key industry. It helps in developing and achieving the goal of society. Study and knowledge of construction productivity are very important because they cause losses to the governing agencies and also influence the economics of the construction industry. Prior knowledge of labor productivity during construction can save money and time. Investments for these 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. This research is intended to identify the causes of probable factors affecting labor productivity in building construction. This study investigates all possible factors through a structured questionnaire administered. The survey results are subjected to analysis, and the ranking of

factors is calculated using the Relative Important Index. The basic ideas of the research is to study various factors affecting labor productivity on construction.

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