

LABOUR PRODUCTIVITY IN CONSTRUCTION

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***ABSTRACT:** Poor productivity of construction workers is one of the causes of cost and time overruns in construction projects. As construction is a labour-intensive industry, this paper focuses on labour productivity in the construction industry. It covers the construction labour productivity definitions, aspects, factors affecting it. The main outcome from the literature is that there is no standard definition of productivity. This study provides a guidelines for necessary steps required to improve construction labour productivity.*

The productivity of labour is particularly important especially in developing countries, where most of the building construction work is still on manual basis. This paper reports on a survey made on project managers and experienced engineers of building projects in Sangli , Kolhapur & Pune districts, where an increase in productivity is being sought. Respondents were required to rate using their experience how all factors affect productivity with respect to time, cost and quality. The survey was carried out by a questionnaire and responses. The ten most significant factors affecting labour productivity for small, medium and large companies are identified.

I. INTRODUCTION

Productivity has been generally defined as the ratio of outputs to inputs. Construction projects are mostly labour based with basic hand tools and equipment, as labour costs comprise 30 % to 50 % of overall projects cost. Therefore, while numerous construction labour productivity research studies have been undertaken, only a few have addressed the productivity issue in developing countries factors affecting productivity in the construction. Productivity in economics refers to measures of output from production processes, per unit of input. Productivity may be conceived of as a measure of the technical or engineering efficiency of production (Saari, 2006).

There are many factors that influence the productivity in construction industry. Labour productivity is one of the most important factors that affect the physical progress of any construction project. Construction labourers are responsible to operate a variety of equipment. To perform their jobs effectively, construction labourers must be familiar with the duties of other craft workers and with the materials, tools, and machinery they use.

In India, one of the greatest challenging faced by the construction industry is to attract and to attain skilled labour. Low productivity among the labour will give impacts to the construction industry such as cost overruns and schedule delays. Besides that the foreigner labour which is estimated to constitute 70% of the

construction workforce were reported to be involved in such social problem, lack of skill and communication problem. In order to expand the economic growth and to compete globally, the construction industry has to continuously improving the standards of construction especially regarding quality of labor performance because productivity is part of a key performance indicator to determine the success of the project.

Methods for improving construction productivity among the workers are not possible without identifying factors that influence productivity among them. Therefore there are important to study about the labour productivity because this is important factor that contributes to the productivity which is affected the reputation of the Indian construction industry.

I. WHAT IS LABOUR PRODUCTIVITY?

Productivity can be defined in many ways. In construction, productivity is usually taken to mean labour

productivity, that is, units of work placed or produced per man-hour. The inverse of labour productivity, man- hours per unit (unit rate), is also commonly used.

Productivity is the ratio of output to all or some of the resources used to produce that output. Output can be homogenous or heterogeneous. Resources comprise: labour, capital, energy, raw materials, etc.

Productivity = Output/Labour cost

Horner and **Talhouni** stated “A popular concept in the USA, and increasingly in the UK, is the concept of earned hours. It relies on the establishment of a set of standard outputs or „norms“ for each unit operation. Thus, a number of „earned“ hours are associated with each unit of work completed.”

“Productivity may then be defined as the ratio of earned to actual hours. The problem with this concept is in establishing reliable „norms“, for setting standards. It also depends on the method used to measure productivity, and on the extent to which account is taken of all the factors which affect it.”

III. LABOUR PRODUCTIVITY IN CONSTRUCTION INDUSTRY

Construction labour productivity is a measure of work process efficiency. It can be defined as the ratio of the value labour produces to the value invested in labour. Productivity increases as needed labour resources are minimized and wasted efforts eliminated from the work process. This definition and the practice covered here treats productivity as a direct, absolute measure to be optimized (Picard, 2004).

3.1 Factors Influencing the Labour Productivity in Construction Industry

Management controls most of the constraints on all three categories. The “want to” factors are goals, which include job content, interpersonal atmosphere, compensation, working conditions, physical capability, and society. The “know how to” factors are

education and training. The “allow to” factors are organization, raw materials, tools, information, and time to act (Mei, 2006).

Table 1: Labour Productivity Factors

WANT TO	KNOW HOW TO	ALLOW TO
Goals		
Job content		Organization
Interpersonal atmosphere	Education	Raw materials
Working conditions	Training	Tools
		Information
		Time to act

(Source: Mei, 2006)

In order to improve productivity, a study of the factors affecting it, whether positively or negatively, is necessary. Making use of those factors that positively affect productivity and eliminating (or controlling) factors that have a negative effect, will ultimately improve productivity. If all factors influencing productivity are known, it will also be possible to forecast productivity (Lema, 1995).

There are some factors that affect the productivity of labour in construction industry: (1) Project Uniqueness; (2) Technology exploration; (3) Project Management skill; (4) Labour Organization; (5) Real wage trends; (6) Skill and development.

Projects in construction are never designed or built exactly in the same manner as previous projects due to environmental factors such as the landscape, weather and physical location and also aesthetic factors. While the most construction personnel find this uniqueness to be an attractive element for a career in construction, it can have adverse effect upon construction productivity. Project uniqueness requires modifications in the construction processes where workers are required to go through a learning curve at the beginning stages of each project activity(Tuckeretal.,1999).

According to Tucker et al. (1999), lack of technical and managerial skills is often identified as one of the major problems of contractors in developing countries resulting in poor competitiveness with their well developed and industrialized counterparts. Technology has a tremendous effect on overall productivity. Tools and machinery have increased both in power and complexity. These advances in technology can significantly modify skill requirements. This can create difficulties in separating the contributions of technology, management, and labour productivity. Innovation barriers such as diverse standards, industry fragmentation, business cycle, risk aversion, and other factors can create an inhospitable climate for innovations. In many regions of the country, labour costs for many skills are relatively low. There is less motivation to automate a task when the labour associated with the task is not expensive. Due to such impediments, firms are naturally reluctant to try a new technology, especially if it amounts to putting the entire company on the line. Should the new technology prove effective, the firm gains only a temporary strategic advantage. Once it is proven, other bidders can quickly begin to adopt the technology.

Management complicates progress in productivity within the construction industry. Past studies found that poor management was responsible for over half of the time wasted on a

job site. Good management is required for profitability and success (Tucker et al., 1999). Toor and Ofori (2007) have identified that labour morale is also affected by extensive numbers of changes.

Cross-training and multiskilling can reduce unit labour costs (Burlison, 1997). Contracts that create flexible work rules on the job site promise productivity benefits as well. Barriers between trades have historically been a source of problems in construction. Reduction in the percent of the workforce comprised of organized labour and improved project agreements with remaining construction labour organizations have reduced this problem (Tucker et al., 1999).

Low wages for construction jobs, for instance very few local labours want to work in construction industry. Based on studies conducted by Construction Industry Development Board (CIDB), the average wage rate in 2007 was RM 70.00 per day for skilled workers and RM 51.00 per day for semi-skilled. An increasing percentage of open and merit shop work partially drove this downward trend. Additionally, total compensation rates may compare with other industries even less favorably than wage rates suggest, since construction industry work is have retired, and younger entrants to the labour pool increasingly choose career paths other than construction, creating a skilled labour shortage which is plaguing the industry. Tucker et al., 1999 mentioned in his research that this trend has been compounded by the tendency of workers in the construction industry to retire at an earlier age than those in other industries.

Based on the research done by Ofori (1991), training for construction industry in developing countries is generally contributed to the performance and effectiveness of both employer and employees. Training is essential to developing countries because effective manpower planning and development plays a crucial role in support of a flexible and dynamic labour force coping with the fast technology transfer and industrial growth.

There is currently a lack of formal training in construction the lowest of any major sector of the economy .This lack of training is due to practical concerns such as employers completing the increased percentage of nonunion work. In general, the workforce of contractors is highly mobile. For this reason, contractors are often reticent to invest capital to train those who may soon be someone else's employees. The result may be a decrease in the construction workforce average capability level. It is unclear how this affects productivity. More effective utilization of large narrow- skilled and core multiskilled workforce's may even result in higher productivity on some projects (Tucker et al., 1999).

Impacts of Labour Productivity in Construction Work.

The construction process results in relatively high costs and labour becomes a more important input in the production phase. Moreover, the labour cost is somewhere between 20% and 50% of the total project cost and reduction of these costs can be best carried out by the productivity improvement.

At the same time, the success of a construction company in today's competitive market largely depends on accurate estimation of productivity, and a reasonably correct assessment of the labour cost is fundamental to the accuracy of any estimate might be obtained. In addition, the effect of the factors on productivity may vary from task to task. Although

some factors could have similar influences on the productivity of a number of tasks, their rate of impact on productivity may be different (Kazaz and Ulubeyli, 2003).

There are some ways to overcome the bad impacts of labour productivity in construction industry:

(1) Increasing skills and experience of workforce; (2) good management in construction work; (3) improve motivation among the labour; (4) reduce the lack of material availability; (5) decrease the number of foreign labour.

Mojahed and Aghazadeh (2006), suggested some ways to increase skills of workforce such as provide adequate training to workers at jobsites to help their understanding of details, overall operation of project, maintain a proper ratio of craft or skilled workers to common labors or helpers in the crew and etc.

Lack of competency by management at construction jobsite may lead to poor direction of workforce, demotivation of workers, and poor coordination of subcontractors which results in poor productivity (Mojahed and Aghazadeh, 2006). Tucker et al., 1999 suggested four primary ways of increasing productivity through management include planning, resource supply and control, supply of information and feedback, selection of the right people to control certain functions.

These are some suggestion from Mojahed and Aghazadeh (2006), to improve motivation among the worker. It can be done by maintain a safe work environment, set goals and recognize the goal directed behavior in workers, utilize pay increases, incentives, and bonuses to stimulate productivity and reward workers who are more productive while adhere to quality standards and maintain a safe work environment.

Using appropriate materials and tools also has a positive effect on the quality of work, which consequently improves labour productivity. Extensive multiple handling of materials, improper storage of materials, waste due to negligence, obstruction of access to material storage area, extensive traveling time between material storage area and active worksite, long fabrication time and late deliveries are a few instances of how material arrived late to active construction jobsites and influenced productivity of construction projects. These problems can be improvised by properly manage the material with a good and the best planning.

The recruitment and employment of foreign labour is one aspect of international construction which has received little attention to date. Malaysia already has too high foreign labour population. There are an estimated one million legal foreign workers in the country. Increases the number of foreign labour will contribute too many problem either in construction industry or in country. The most effective ways to minimize the impacts on employing foreign labour in construction industry is through the Government where they have to tighten hiring rules of foreign labour to avoid over supply. Besides that, implementing Industrialized Building System (IBS) to reduce the wet trade labour whereas increase the use of mechanism and prefabrication to help construction industry move towards new technology.

IV. Methods of Measuring Inefficiency

Measuring inefficiencies on construction projects has been done numerous ways over the years:

- Measured Mile
- Comparison to other projects
- Comparison to contractor's bid, estimate, or plan
- Use of expert testimony to establish inefficiency
- Published inefficiency factors or studies
- Bureau of Labor Statistics
- Business roundtable
- National Electrical Contractors Association
- Mechanical Contractors Association of America
- The U.S. Army Corps of Engineers Modification Impact Guide
- Practical exercises and case studies

Many of these have been used for construction claims, such as the "Measured Mile". It gauges inefficiency loss by comparing a measurable period of time on a project impacted with inefficiencies against a period of the same length with no inefficiency impact.

It is important to use known and accepted industry sources whenever possible to establish and build inefficiency tables. Reliable industry standards, practices, surveys, historical data, and case studies can all prove to be excellent sources for developing a table of factors for labor inefficiency for use in construction planning.

Another consideration in developing a table of factors with reliable and known sources is the established credibility in helping to support or defend a construction claim and change orders as a result of impacts caused from inefficiencies.

V. BARRIERS TO IMPROVING LABOUR PRODUCTIVITY

The countries economy has become increasingly more dynamic and complex. As a result, economic measurement

and analysis, particularly relating to productivity, have become more difficult and complicated. The main problem involves properly defining units of measurement, evaluating qualitative changes and obtaining reliable data for both inputs and outputs. This process is further complicated by the need to price - deflate this data in order to evaluate changes in productivity in real terms.

Measurement of inputs is problematic. Variations in the rate of input utilization are at best partially picked up in data series. In particular, the rate of capital equipment utilization, i.e. the measurement of machine hours, is rarely accomplished.

VI. CONCLUSION

The productivity growth in the construction industry may have considerable effects on the economic development and stability. Project management skills were acceptable as the most important factor that influenced the productivity among the labour a part of the other factors such as technology exploration, skill and training, labour organization, project uniqueness and wage trends. Project management skill is a major factors influence the labour

productivity. So that, proper planning is really need to make sure that the project completed successfully. The project manager should train themselves to be more leadership, more innovative, and creative. As a good leader, they should being a good role model to their employees. Try to make good relationship between employee and employer.

The impacts on labour productivity was identified where it is strongly agree that technology exploration will increase the productivity while low labour productivity will cause delaying of project. Explorations of new technology or transfer technology are very essential to develop better performance of project in line with globalization in construction industry. Company can send their labour to other develop country to learn more about the technology from them.

Hence, the new technology knowledge and skills can be shared and fully practiced in our country and consequently our construction industry players would compete globally.

He significant drawn from this study could be used by the project managers to take into account of these factors at an early stage. Consequently, it can increase the productivity of the project besides minimising the time and cost overrun.

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