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Review Paper on Improvement of Labor Productivity of Activities Using Crew Balance Chart

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A B S T R A C T

There are three basic planning elements occur in construction projects: cost, quality, and time. All these three elements are in close relationship with each other. Labor productivity is also a key concept in planning efforts for construction and has a clear approach to planning. Globally, many studies are made to reduce wastage of time and materials at the construction site by implementing lean construction techniques but a really few studies are administered in Indian scenario. Productivity improvement is the art of doing the proper things for better worth and makes it a part of the continuous process during a construction process. As a result, it's important to know where performance is often improved by generating benefit for both the company and the low-level members who work on the construction site. The efficiency of labour is determined by how they are used. The time taken by a worker working in a task is monitored and recorded. in this project to remove non-value added tasks, and variation between activity cycles would be analysed to see whether alternative processes will increase productivity rate or not. The crew balance chart will be used to set a standard time for the activity. The crew balance chart will be used to properly measure the work performed by the worker in order to set a standard time for the activity. Following the analysis, some suggestions for improving labour productivity on construction sites will be made.

Keywords: Crew Balance Chart, Labor Productivity, Construction Techniques, Productivity Improvement

1. Introduction

In every construction site, the financial benefit of the contractor depends on the execution of the job within the time frame and the productivity of labour is closely related to the cost analysis. In general, the factors influencing the performance of labour fall into three main categories.

- Human ability for work to be completed
- Competence and site operations of project managers
- Motivation of workers to carry out the activity

Lean construction is a technology that scarily followed in Indian construction sites. This system mainly focuses on the reduction of waste that arises while doing the construction project work. Some wastes that are mentioned in lean construction are wastage in transporting, inventory, motion, waste, overproduction and delay. By reducing of these waste, the time, money, manpower, energy are often saved to a greater extent which ends up in profit for both the contractor and to the labor.

Crew balance charts are used to compare the different work tasks involved with the project. These were performed with a cyclical activity that occurs at a construction sites. Any cyclical activities include concreting of slabs, plastering of walls and laying of bricks. In this chart, the vertical axis represents the total number of labors engaged in that task, while the horizontal activity represents the time taken to complete the activity. The existing chart can be created by the data that is obtained.

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2. Literature Review For Research Paper

John D. Borcherding, M.ASCE, (2006) has done the study on Improving Productivity in Industrial Construction. Electric utility executives ranked productivity, manual labor, union restrictions and overtime at the top of a list of 10 problem spots where major improvements would be needed.

Adnan Enshassi, et al (2007) described about Factors affecting labor productivity in building projects in Gaza strip. The goal of this study is to define factors that influence labor efficiency in construction projects and to rate those factors according to their relative importance from the point of view of the contractor. The study of the 45 factors considered in the survey reveals that the key factors that poorly influence labor productivity are: material scarcity, lack of work experience, lack of labor supervision, misunderstanding between the worker and the superintendent, and modification of drawings and specifications during implementation.

Serdar Durdyev (2011) analyzed onsite labor productivity of New Zealand construction industry and its improvement measures. The goal of this study is to identify specific key constraints at on-site labor productivity and improvement strategies. The five major categories of internal restrictions are rework, the level of expertise and skills of the staff, the adequacy of the construction method, building infrastructure issues, and coordination, supervision and performance tracking and control issues.

Aynur Kazaz, et al (2013) made a study on a different approach to construction labour in Turkey: comparative productivity analysis. An investigation of the efficiency of construction workers defined as numerical values is studied. the labor productivity rate of 82 work items was collected by means of a questionnaire survey applied to planning engineers, site managers, subcontractors, architects and consultants of 32 large-scale building 5rms in Turkey.

Anu V. THOMAS, et al (2013) made a study on critical analysis of the key factors affecting construction labor productivity. 44 factors were considered, material unavailability was listed as the most important factor influencing construction productivity. The factors were categorised into ten groups, they are: Tool and equipment issues, Poor worker motivation, Inadequate supervision, Poor material planning, Poor management of the site, Improper management of the site, Incompetence in project management, Problems of craftsmen, Lack of meetings and Lack of communication.

Mistry Soham, et al (2013) analyzed the critical factors affecting labour productivity in construction projects: case study of south Gujarat region of India. Five of the most important considerations in the descending order of Relative Value Index Methodology are Delay in payments, Ability of labor, Consistency of technological Specification, Lack of supplies, and Motivation of labor.

Abu Bakar Muzamil, et al (2014) analyzed labour productivity of road construction in Pakistan. This study is to recognize the crucial factors that are responsible for the poor productivity of road construction work. The top three established critical factors affecting the labour efficiency of road construction in Pakistan are low incomes, inadequate implementation planning and inefficient machinery.

Serdar Ulubeyli, et al (2014) studied on planning engineers' estimates on Labor Productivity: Theory and Practice. Questionnaire survey applied to planning engineers, site or project managers and chief executive officers of approximately 82 general contractors at the construction industry. The findings were evaluated by one sample t-test. The value of labor productivity in the assessment and scheduling of construction was illustrated by the investigation of numerical rates, i.e. man-day values.

A. A. Attar, et al (2014) has analyzed various factors affecting the labor productivity. The survey was carried out by means of a questionnaire and a response. The factors that are massively effective are: supervision, material, implementation plan and design.

Michael J. Horman, M.ASCE, et al (2014) made a study on improving labor flow reliability for better productivity as lean construction principle. By the data from three projects covering 137 working days, 58% of the overall inefficient working hours attributed to inefficient flow control were attributed to inefficient labour flow.

Anurag Sangole, et al (2015) has done a study on identifying factors affecting construction labor productivity in Amravati. A questionnaire survey was carried out in Amravati to determine the factors that significantly affect construction labor productivity. 52 sites were visited to collect responses on the questionnaire. The top five important factors influencing construction labor productivity that emerged from the survey were Clarity of technical specification, the extent of variation, lack of labour supervision, coordination level among design disciplines and design complexity level.

H. Randolph Thomas, et al (2015) investigated on Quantitative effects on construction changes on labor productivity. A total of 522 working days of data were collected. On average, there is a 30 percent loss of efficiency when changes are being performed, although it is possible to perform many changes without a loss of efficiency. The most important forms of disruption are the lack of materials and data and the need to do out-of-sequence work. These disturbances result in a daily lack of productivity in the range of 25-50%.

H. Randolph Thomas, et al (2015) described the crew performance measurement via activity sampling. Three methods: work sampling, group timing technique, five-minute rating of measuring the performance of construction crews are described and compared. The five-minute rating is shown to be a quick estimator of the crew delay time. It is seen that the efficiency of the five-minute rating is not as high as that of the group timing technique. The advantage of the five-minute rating is its simplicity and ease of application.

Jeremiah Chinnadurai, et al (2015) studied on Influence of occupational heat stress on labour productivity in chennai. Productivity estimates using the PMV index are shown to be statistically significant for three categories of building works.

Prachi R. Ghate, et al (2016) investigated the importance of measurement of labor productivity in construction. The top ten factors affecting labor productivity are Labor Supervision, Skilled Labor, Work Schedule, Work Training, Payment, Communication between site management and Labor force, Climate condition, Labor performance expectations, Unplanned extra work, Construction method, Resource availability, Tool availability, Labor numbers on location, Temperature on location, Safety conditions on location, Work contractor meetings Motivation to worker, leadership of project manager, miscommunication between site managers.

Mohammed A. Hiyassat, et al (2016) made a study on factors affecting construction labour productivity. A questionnaire survey consisting 27 questions were made. The top three findings were Productivity rises as knowledge increases, Financial benefits improve productivity, and Confidence and interaction between management and staff increase productivity.

3. Conclusion

In construction field, construction tasks are highly labor-intensive, and further human errors can occur without the worker's knowledge. Each construction activity takes longer time and costs more money. Apart from performing work development studies on any task or activity, it appears that the activity requires a lot of physical labour because each worker is working manually. A crew balance chart is a visual or graphical illustration of the work that is currently being done on a construction site. This chart should be completed by project managers ahead of time because it is a perfect way to identify non-value adding activities that waste time and resources. Project managers must prepare ahead of time what activities will take place the next day, as well as organise labour and materials. The project manager must schedule what activities will take place the following day and arrange the labour and materials required for the following day's work. The analysis of this graph provides further insight into how to improve labour efficiency.

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