Importance of Labour Productivity in construction projects: A Review

Deeksha Bahubali Tone 1, Rohit R. Salgude 2

1 M. Tech Research Scholar, Construction Engineering and Management, Dr. Vishwanath Karad MIT World Peace University, Kothrud, Pune, India-411058.

2 Assistant Professor, School of Civil Engineering, Dr. Vishwanath Karad MIT World Peace University Kothrud, Pune, India-411058.

Abstract-- Construction is the world's largest and most difficult industry; also, the construction industry contributes greatly to the nation's development. The three M's such as Material, Machine, and Manpower are the most important resources in building projects. Labor management is a vital aspect of any construction project. As a result, the purpose of this article is to identify various labour management challenges in construction projects, and the purpose of this study is to identify various techniques or tools that will enhance labour productivity through a review of the literature. Various labour management issues in building projects were identified by a thorough analysis of the literature. Although it is a review article, this research shows several tools and techniques for increasing labour productivity, such as motion and time studies, work sample methodologies, and shift work. In addition, it focuses on Bluetooth Low Energy (BLE) technology, which is excellent for real-time labour tracking and the creation of a presence index on a construction site.

Keywords-- Labour productivity, motion and time studies, Bluetooth Low Energy (BLE) technology, real-time tracking, work sample methodology.

1. INTRODUCTION

The construction industry contributes significantly to the nation's development by providing infrastructure and other services. The rise of the building business over the previous few decades has been extraordinary. The government is focusing on infrastructure development through constructing highways, airports, seaports, and power facilities such as hydroelectric plants, thermal plants, and nuclear plants.

It is a difficult task to take on a construction project. Aside from internal problems like process delays, building projects must also account for external elements like weather constraints, price volatility, temporary contractors, and so on. All of these factors can have an impact on the project's progress in various ways. Construction resource management is a complete process that comprises proactive planning, scheduling, and managing enterprise-wide resources for the construction sector. It assists in completing each assignment precisely and meeting project objectives on time. It enables project managers to successfully complete projects by meeting project resource requests on time.

In construction projects 3 M’s that is Material, Machine and Manpower are the main resources. Heavy-duty vehicles intended specifically for construction jobs, most commonly earthwork operations, are referred to as construction equipment. Building construction equipment and construction machinery are both employed in construction projects. They are also referred to as heavy types of machinery, heavy trucks, construction equipment, engineering equipment, heavy vehicles, or heavy hydraulics. Any construction process requires the use of construction equipment. It is not always desired or feasible for the Contractor to own all of the Construction Equipment required for the Project. Excavation, digging enormous quantities of soil, moving them relatively long distances, placement,
compacting, leveling, dozing, grading, hauling, and so on are the basic processes done by the machines in the construction of any Project. The second useful resource is the most frequent types of building materials used in construction are wood, cement, metals, bricks, concrete, clay, and so on. Selection parameters such as cost-effectiveness and quality are important. The third resource is labour, which is the most important component of the construction resource stream. Because labour is such an important component of the construction industry, good labour management cannot be overlooked. Labor management is the process of channeling humanity's vitality and abilities toward the achievement of commercial goals. Thus, labour management is concerned with both the efficiency and effectiveness of labour, i.e. how quickly the job is completed as well as how helpful the task is.

Labor productivity is one of the key factors influencing the progress of any construction project. Improving productivity is the number one priority for any profit-oriented organization. The ratio of input to output can be used to define labour productivity. Labor is an essential component of any construction company, and efficient labour management can result in increased production. The labour's work is critical to the success of any building project. Because labour productivity has a direct impact on construction productivity, it is critical to understand the elements influencing labour productivity.

2. Research Objective

1) To identify various problems of labour management in construction projects.
2) To identify various techniques or tools which will increase the labour productivity through literature review.

3. Method Adopted for this Review

Literature review-

Awad S. Hanna1, Chul-Ki Chang2, Kenneth T. Sullivan3, Jeffery A. Lackney4 (2008) - The correlation between shift duration and labour efficiency has been quantified. According to the study's findings, shift work has the potential to be both beneficial and detrimental to construction labour productivity. The productivity loss estimated by the quantification methodology developed for this study ranges from -11 to 17%, depending on the length of the shift work used.

Chandra Prakash, B Prakash Rao, Dheeraj Vishwanatha Shetty and Vaibhava S (2020) - Time and motion studies were used in construction projects. The article addressed its applicability to several phases of steel structure erection such as purlin installation, primary beam installation, and secondary beam installation on an airport's arrival slab. All efficiency, productivity, tool time, support time, and idle times are tracked. There is a 37.95 percent gain in performance, a 218.03 percent rise in productivity, and a 93.25 percent increase in tool time after implementing motion and time corrections. Idle time was cut by 40.24 percent. And demonstrated that it is possible to maximize work, standardize work, and accomplish proper human resource distribution, which ultimately improves manpower economics.

Miss. Rajshri Shrishirmala, and Prof. R. R. Salgude (2015) - Time and motion studies and work samples were used to quantify productivity in various construction activities, and the observation data sets created for various construction processes on the construction site were statistically examined. Determined their productivity and developed the equation using statistical analysis, concluding that the Work sampling technique minimized rework. The use of statistics by software reduces the time, allowing samples of various construction operations to be examined and graphs to be created more quickly, so assisting in the improvement of the quality of construction of the labours on site.
Nasiru Zakari Muhammad*, Ashiru Sania, Ahmad Muhammad, Saeed Balubaidb, Egba Ernest Itumac, Jibrin Hassan Suleimand (2015) - To compute the mean score for each component that affects labour productivity, a questionnaire survey was conducted and analyzed using SPSS software. The mean score value of these factors was then used to rank them. According to the findings based on management level factors, the most important factors influencing labour efficiency are "lack of motivation and opportunity, lack of facilities, interruption of power and water supply, and inspection delay," with mean score values of 0.79, 0.44, 0.38, and 0.35, respectively. The top six most important factors influencing labour productivity at the site level are "lack of sufficient skilled workers with a specific scope of work at the site, delay in material delivery, weather, access to the site, crew size, and contact issues between international and local workers," with mean score values of 0.77, 0.75, 0.66, 0.61, and 0.53, respectively, according to the site level factors.

P. Dayakar, P. JothiKrishnan (2014) - Identified and investigated elements that influence labour productivity. Workplace issues and their implications for building projects. Quality of construction management, shortages of resources, prompt wage payment, work experience, misunderstandings between the workforce and the superintendent, and other factors all have an impact on labour productivity. The difficulties that construction workers encounter are described in depth here. Problems such as a lack of suitable housing, basic equipment, low wages, safety issues, security, and so on plague the construction business. The focus of this research has been on labour productivity rates that are decreasing day by day, which has an impact on the company's profitability. It has been attempted to link the negative effects of worker productivity declines to the productivity of other resources such as materials, equipment, and capital. MS Excel and SPSS software were used to record the data analysis.

R.chitra, Ruchi Kumara (2018) - The key determinants affecting labour productivity in various construction industries have been identified, and the RII technique has been utilized to measure the impact of the most impacted components. Finally, a number of recommendations have been made to minimize the factors that influence labour productivity. Manpower, managerial, motivational, environmental, schedule, safety, equipment, and quality are the eight groups that have a significant impact on labour productivity, according to the research.

Jianyu Zhaoa, Olli Seppanena, Antti Peltokorpia, Behnam Badihib, Hylton Olivieric (2019)- The goal of this study was to see if a real-time tracking device might be used to control the production in various types of building projects. On three case projects, such as a residential project, a workplace facility, and a plumbing restoration, they used Bluetooth Low Energy (BLE) technology to follow workers in real-time. Based on the data acquired, they examined alternative approaches for locating monitoring devices and analyzed the proportion of workers who were present at work for an extended period of time. The results confirmed that the suggested system can acquire real-time time and location-related data on workers. However, there is a considerable requirement to overcome difficulties linked with accuracy and coverage while developing the information gathering plan for accuracy and coverage issues. Researchers found that real-time tracking technologies are ready for use by using heuristics in information analysis rather than investing in more complex tracking technology. Deployment it is possible to calculate a presence index in real-time on a building site if installation guidelines and statistics are followed.

Erez Dror 1, Jianyu Zhao, Rafael Sacks and Olli Seppänen (2019) – The efficacy of Bluetooth Low Energy (BLE) beacons for indoor resource monitoring was investigated using two methodologies: mobile beacons and fixed gateways versus fixed beacons and mobile gateways. Two systems were compared in terms of configuration, direct cost, feasibility, and accuracy: mobile beacons and fixed gateways against fixed beacons and mobile gateways. Each method's effectiveness was evaluated in order to give the data needed to evaluate the lean construction workflow. Both systems are excellent for tracking the position of resources, but they differ in terms of their applicability on building sites and the value of the data they give for locating value-added activities.
4. Discussion

Comprehensive literature reviews gives a complete picture of labour management issues in construction projects, as well as many techniques and tools that can boost labour productivity and help in labour management.

Researchers conducted a questionnaire survey and analyzed the results using SPSS software and RII technique to identify various labour management problems in construction projects such as lack of motivation and opportunity, lack of services, disruption of power and water supply, and monitoring delay, lack of sufficient qualified workers with a precise scope of work on the site, delay in material delivery, and climate conditions, accessibility to the site, workers capacity and language barriers between multinational and local workers Construction management quality, resource constraints, timely salary payment, misunderstandings between the workers and the superintendent, lack of acceptable housing, essential equipment, poor salaries, safety hazards, security, and other issues afflict the construction industry.

According to the literature review Shift work has the potential to be both advantageous and detrimental to construction labour productivity, with productivity losses varying according to the length of the shift work performed.

By applying motion and time studies, it is feasible to raise productivity, increase tool time, decrease idle time, maximize work, standardize work, and achieves optimum human resource distribution, which eventually improves manpower economics.

The work sampling technique decreases the number of reworks. The use of statistics by software saves time by allowing samples of various construction processes to be studied and graphs to be made more rapidly, so contributing to the improvement of the quality of construction of the labours on site.

Bluetooth Low Energy (BLE) technology is a part of the Internet of Things. It collects real-time and location data about workers. If installation rules and statistics are followed, it is feasible to generate a presence index in real-time on a construction site by using Bluetooth Low Energy (BLE) technology. It is ideal for tracking the location of workers.

5. Conclusion

1. Identified various problems of labour management in construction projects such as lack of motivation and opportunity, lack of services, disruption of power and water supply, monitoring delay, lack of sufficient qualified workers with a precise scope of work on the site, delay in material delivery, and climate conditions, accessibility to the site, workers capacity and language barriers between multinational and local workers Construction management quality, resource constraints, timely salary payment, misunderstandings between the workers and the superintendent, lack of acceptable housing, essential equipment, poor salaries, safety hazards, etc.

2. Motion and time studies, work sampling techniques, Shift work can boost productivity, decrease the number of reworks, increase tool time, decrease idle time, maximize work, standardize work, and achieve optimal human resource distribution, all of which improves manpower economics.

3. Real-time labour tracking and the development of a presence index on a construction site are both achievable with the use of Bluetooth Low Energy (BLE) technology.
REFERENCES


