Review On Critical Study and Strategic Recommendations for Labor Productivity in Construction: Latur

Mr. Siddharth Sanjay Shinde[1], Dr. Pratibha M Alandkar[2], Dr. Sushma R. Awad[3]
[1]*Student, ME Construction and Management, Dept. of Civil Engineering, RMD Sinhgad School of Engineering, Warje*
[2,3]*Professor, Dept. of Civil Engineering, RMD Sinhgad School of Engineering, Warje*

Abstract— Labor productivity plays a vital role in the successful execution of construction projects, significantly influencing project time, cost, and quality. However, the construction industry continues to face challenges related to low labor productivity, leading to time overruns and increased project costs. This study focuses on the critical assessment of labor productivity in the construction industry and provides strategic recommendations for its improvement, with special reference to the Latur region. The primary objective of this research is to evaluate the current status of labor productivity, identify key factors affecting it, and analyze its impact on project performance. The study adopts a systematic methodology, including literature review and a structured questionnaire survey conducted among construction professionals and workers. The collected data is analyzed to determine the major factors responsible for productivity loss, such as poor project planning, inadequate supervision, and shortage of skilled labor, communication gaps, and delays in decision-making. The study examines the relationship between these factors and project delays and cost overruns. Based on the analysis, the most critical issues affecting labor productivity are identified. The research then proposes practical and effective recommendations, including improved planning and scheduling, proper site management, skill enhancement programs, and better communication practices.

Keyword: Labor Productivity, Construction Industry, Project Performance, Questionnaire Survey

I. INTRODUCTION

The construction industry depends on various internal and external factors that affect the overall cost and time of the project. Thus, productivity has to be evenly poised to save money and time for the project. This can be achieved by continuously working on planning, scheduling, and monitoring the project. In addition, major affecting factors of the productivity have to be considered at the project initiation stage to get the expected response of project planning and monitoring for the execution. These factors lead to continuous Changes in productivity. It is very important to ensure that decrease in productivity does not affect the plan as well as schedule of the project.

The term "Productivity" in construction is defined as the ratio of output and input. Output is the product that we construct any type of structure and input is the resources that we used for construction i.e., workers, material, or any type of machine we can use for construction.

$$Productivity = Output / Labor\ Cost$$

In any industry productivity loss is one of the serious as well as greatest problems. Different project costs, for example labor, material, and equipment, labor components are considered as of more risk. Whereas other equipment and materials are controlled by market cost and are beyond the control of project management. About 30% - 50% cost of the entire project is consider as Labor cost. Because they are most unpredictable than other project cost components, it is very important to study the effect of various factors on the L.P. labor Productivity is directly proportional to the labor cost. Previous research indicates that Productivity decrease results from various factors which is beyond bad weather condition, changes in Drawings, and poor management. Due to above listed factors disturbance is produced which affects labor productivity, and it is not in the hand of contractor produces productivity loss

The construction industry is the second largest employer after the agriculture sector, employing more than 35 million people. It is categorized as follow-

- Industrial Construction,
- Commercial construction,
- Residential Construction,
- Infrastructure,
- Energy and Utility constructions,
- Transportation Construction

The Indian construction industry is an important sector of the national economy, contributing a major part of the Gross Domestic Product (GDP). The share of the construction sector as part of Indian GDP has reached up to 9% in thefinancial year 2017-2018. The Indian construction industry is expected to register a growth of 13% in the real term in 2021 following a decline of 12.4% in 2020. It is expected to be 1 trillion US$, by the year 2030 India would be the third-largest construction market globally, as India's urban GDP is expected to reach 7.5 trillion US$.

Following are some of the reasons, due to which construction market in India is on the Rise

- Rapid urbanization increases the demand for infrastructure.
- Rising household income
- Investment purpose
- The rise in the number of nuclear families

As per CEIC labor productivity growth data is updated yearly from December 1992 to December 2019, averaging at 5.23%. In December 2019 labor productivity dropped by 2.63%. It is high in December 2010 the value is 7.89% and low in December 2002 value is 1.29%. They calculate labor Productivity from GDP per person employed.

II.. STATE OF DEVELOPMENT

Construction projects involve an interdisciplinary work environment. This includes architects, contractors, vendor managers, project managers working on a different level platform to complete the project. However, the efficiency of interdisciplinary work is completely linked to labor management. H Randolph Thomas et al. (1991) described the relationship between labor productivity and direct work report in work sampling. The conclusions made were based on three assumptions- Reducing wait time leads to an increase in direct work, increased direct work leads to the improvement of labor productivity, and improved productivity is accomplished by reduced time spent on waiting. William lbbs et al. (2005) affirmed that the construction project is disrupted and detrimental to labor productivity. Data from 162 construction projects were statistically analysed, and three curves were represented. The curves were Early, Normal, and Late timing situations on labor productivity affecting project was analyzed. In addition to that, a residential building site was considered, where labor productivity of major activities directly affecting the project duration was employment improvement (expanding the things that fulfill laborers about work) and by diminishing the demotivators (the things that laborers dislike). Workers are persuaded by completing quality productive work, creating or building something, and improving productivity.

Dozzi and S.M. AbouRizk et al. (1993) described different types of methods like Work Sampling, Foreman Delay Survey method, Craftsmen Questionnaire method, Field rating method for measuring labor productivity on site. Nariman Ghodrati, Tak Wing Yiu, Suzanne Wilkinson and Mehdi Shahbazpour et al. (2018) aimed to quantify the effective implementation of management strategies, i.e., labor management, training, communication, supervision, resource scheduling in improving labor productivity. The complete body of research depends on the statistical analysis of the high-level and low levels of implementation of management strategies.

[1] Ameh Oko John, Osegbo Emeka Emmanuel, (2011)

This paper highlights the relationship between the time overrun and low labor productivity in Nigeria. In this study, they analyze 18 causes of project overrun and 14 factors of low labor productivity in the construction industry. Ranked that factor which affect the productivity most in that use of wrong construction method, inadequate construction material, inaccurate drawing, inadequate tool and equipment, and poor supervision of operatives these are the top 5 factors cause low labor productivity in Nigerian construction site and it is inversely proportional to the time overrun. The project concluded that proper management of both the material and human resources improve the productivity of labor and minimize time overrun.

[2] Gupta Vaishant, R. Kansal (Oct 2014)

The author has attempted to summarize the top 10 factors that affect labor productivity in the Chambal

region. for this work they consider the 15 factors from the following four groups as1) Human/labor 2) technological 3) management 4) External. they ranked the top 10 factors in decreasing order to know the importance of factor that affects the most for this the Relative Importance Index method is used. Also, they can define 5 definitions of productivity and classify productivity into two types, 1) Total Factor Productivity (TFP) and 2) Partial Factor Productivity (PFP).

[3] Ibbs, W., & Nguyen, L. D. (2012).

Affirmed that the construction project is disrupted and detrimental to labor productivity. Data from 162 construction projects were statistically analyzed, and three curves were represented. The curves were Early, Normal, and Late timing situations on labor productivity. The research showed that the major disruptive change is in the Late timing situation. These data and curves can be used by practitioners for forwarding pricing or retrospective changes of pricing.

[4] Jamadagni Sneha, Birajdar B. V. (2015)

This paper deal with the factors affecting the labor productivity of the construction industry in the Kolhapur region. To collect the data questionnaire survey is conducted a total of 38 factors were consider to check Productivity. That 38 factors are classified into 4 groups; External, management, human/labor, and technological group. For this, they used the Relative Importance Index method also the Chi-square test. In that calculation, a degree of freedom and Two-tailed P-value for all factors and factors were ranked. concluded with top 10 factors that affect the most and Lastly recommendations are suggested to improve the productivity of the construction industry.

[5] Mohammed Salleh Hammad, Abdelnaser Omran, Abdul Hamid Kadir pakir (2011)

This paper deals with some ways to improve productivity in the construction industry in Libya. For this interview were carried out with the owner,contractor, and consultant. This paper concluded that the Contractor has the best knowledge and best industry practice to improve productivity. Also, the contractorcan provide the training to the labor and provide supervision which helps to improve the labor productivity they state that interview is the best method for collection of data. For improvement they suggest the following points 1) Regular Meeting 2) Safety Planning 3) Training for crew 4) Analyze process in detail 5) Provide better planning

[6] Nazarkoa Joanicjusz, Chodakowska Ewa, (2015)

In this research, they use the Data Envelopment Analysis and Tobit regression to calculate the labor productivity of the construction industry in Europe. They discuss the similarities and differences between construction sectors in different European countries. For the calculation of labor productivity, the main method used is Data Envelopment Analysis. As the result, they can reveal that there is a huge difference in the labor productivity of the construction industry across Europe. Also, they explored Trends in productivity change. Based on regression analysis it was proven that the interpretation of the efficiency scores without taking into account the general economic conditions of a country may lead to false conclusions.

[7] Paul Riya, Prof. Mrs. Adavi P. R. (Aug. 2013)

Examined on-site labor productivity for this the factors classified into two groups 1st one is the labor characteristics include Quality of work, Job Knowledge, Dependability, analytical ability, communicative ability, ability to work under pressure and leadership. 2nd one is the Project work conditions, which include project size and complexity, job site accessibility, labor availability, equipment utilization, contractual agreements, local climates, etc. From the above factors, they can analyze and conclude the ways to improve productivity which contain the following solution 1)Analyze the construction process in detail 2)Proper planning 3)Communication 4)Train supervisors 5)New Technologies 6) Health 7) Safety 8) Housekeeping 9)avoid overtime 10)core workforce.

[8] Shashank K, Dr. Sutapa Hazra, Kabindra Nath Pal (May 2014)

Identify and ranked the factors that affect labor productivity in Bangalore, India. The research used data from 53 questionaries. The researcher conducts a reliability analysis, factors analysis, KMO and Bartletts Test, Multiple Regression Analysis, Hypothesis Testing, these tests help to researcher concluded that the 6 groups out of 8 i.e., Quality, Managerial safety group, Material and equipment, Manpower, and motivation group. The Environmental and schedule group does not affect that much labor productivity. Also, they provide the Recommendation from which the construction industry can improve productivity.

[9] Shehata M. E., El-Gohary K. M. (3 March 2012)

The Construction industry is a labor-intensive industry so this researcher studied about the productivity of labor and overall project performance. In this research, they state that there is no standard definition for labor productivity. In this research they guide us for improvement of labor productivity and for the improvement of the project performance also they state the loss of productivity in the construction productivity. In this paper, they talk about the definition of labor productivity, factors affecting productivity, measurement, aspects, and different techniques to measuring it.

[10] Shinde V. J. and Dr. Hedaoo M. N. (November 2017)

Conduct a survey in the construction Industry. For this prepare a questioner of 69 questions. In this questioner, Factors are added from management, labor, and external group. In the methodology, they can calculate baseline productivity, performance ratio, time study (timesheet), coefficient of variation, And relative importance factor, and last, the result and conclusion obtained filled the gap, helps to improve Kuwait labor productivity. Concluded that baseline gives the actual position of productivity with the help of survey find out the most impacting factors and perfect remedies are provided to minimize their effect. This helps to save time andcost for the construction industry.

[11] Soekiman, A., K. S. Pribadi, B. W. Soemardi, and R. D. Wirahadikusumah. (2011)

The big challenge face by the construction industry is productivity which is associate with the performance of labor which affects the Time, Cost, and Quality of the project. The researcher identified and ranked the factors that affect labor productivity in Indonesia. The author survey's wide range includes 113 factors classified into 15 groups. After that collect, a total of 63 responses, from that classify the construction project into an area and also in the type of project and calculate the Relative Importance Index. The research concluded that the Relative Importance Index is a more reliable method to forecast Labour Productivity.

[12] Subramani T., P. T. Lishitha, M. Kavitha (June 2014)

Identify the time overrun and cost-affectiveness in the Construction Industry using the primavera software. They state that scheduling and planning projects using devices and tools are very helpful. Also, Resequencing the project will be cost and time-affective. It gives the on-point concept of productivity loss and its effect on the time and cost of the project. To overcome these 7 methods are listed in the project and they are arranging skilled labor, providing quality management system, overtime on-site, implementing inventory control system, on-point planning and scheduling of work, ABI requested additional storage for material and reducing the time of critical activities.

[13] Thomas, H. R., & Sakarcan, A. S. (1994)

Used two approaches for forecasting labor productivity. The research used data from 22 masonry projects to compare the approaches. The first approach was to divide the present work-hour total by the percent completion of the activity. The second approach involved the factor model in developing a forecast labor curve. The research concluded that the factor model is a more reliable method to forecast labor productivity.

III. CONCLUSION

- Despite the vast growth of the construction industry and its significant contribution to economic development, labor productivity continues to remain a persistent challenge. Numerous studies have highlighted the importance of productivity improvement, yet there is a noticeable lack of systematic approaches that directly focus on identifying the real-time factors affecting labor performance on construction sites.
- Existing literature primarily addresses broad issues such as project management inefficiencies, technological adoption, and material management. However, there is comparatively limited focus on labor-centric productivity analysis, particularly in the context of multi-storied and industrial building projects where complex working conditions prevail. Many past studies generalize productivity factors without considering the contextual differences such as project type, site conditions, skill levels of workers, and socio-economic challenges.
- Furthermore, while time and cost overruns are recognized as major consequences of low labor productivity, there is an evident research gap in linking these overruns directly to labor-related variables. Few studies establish a clear cause-effect relationship between productivity loss and

project delays/cost escalations, leaving a gap in actionable insights for industry practitioners.

- Another critical gap is the absence of practical recommendations and suggestive measures grounded in empirical data collected from real project sites. Existing improvement strategies are often theoretical or generic, failing to provide industry-specific solutions tailored to current labor conditions.

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