

Improving Construction Labour Productivity on Building Construction Projects: A Comprehensive Review

Mr. Shubham Ganesh Shirolkar¹, Prof. A.S. Sajane², Prof. Dr. J. S. Lambe³, Prof. Dr. D. B. Desai⁴

¹M. Tech Student, Civil Engineering Department

²Associate Professor, Civil Engineering Department

³Head of Department, Civil Engineering Department

⁴Associate Professor, Civil Engineering Department

Dr.J.J. Magdum College of Engineering, Jaysingpur, Maharashtra, India.

Abstract

Labour productivity is a critical determinant of cost, time, and overall performance in building construction projects. Despite its importance, productivity remains influenced by multiple interrelated factors, including workforce skills and motivation, absenteeism, fatigue, material and equipment availability, site conditions, supervision, and management practices. This review systematically synthesizes findings from existing research studies, review articles, and case studies to identify the key determinants of construction labour productivity and examine effective improvement strategies. The reviewed literature indicates that workforce competency, resource planning, effective supervision, timely material availability, safety management, communication, and technological integration are significant contributors to productivity improvement. The review further highlights gaps in existing research, particularly regarding the integrated assessment of human, managerial, and technological factors. The findings provide a research-based perspective for developing effective productivity improvement strategies and support construction professionals in reducing delays, controlling costs, and enhancing project performance.

Keywords: Labour Productivity, Project Performance, Construction Management, Time Management, Cost Optimization, Workforce Efficiency, SPSS Analysis.

1. Introduction

The construction industry is a fundamental contributor to economic development through GDP generation, infrastructure development, and employment. It supports essential infrastructure such as residential buildings, transportation networks, industrial facilities, and public structures. However, the industry continues to face challenges including cost escalation, schedule delays, resource wastage, quality issues, and inefficient use of labour and materials. Among these, low and inconsistent labour productivity is a major factor affecting construction project performance. Labour productivity refers to the amount of construction work completed per unit of labour input, such as output per labour-hour. Since construction projects are dynamic and project-specific, productivity is influenced by factors such as site conditions, workforce skills, management practices, material availability, equipment performance, weather, and technology adoption. Low productivity can increase labour costs, extend project durations, cause delays, increase rework and material wastage, and reduce overall project efficiency. Although technologies such as BIM, prefabrication, automation, and digital project management have been increasingly

adopted, productivity improvements remain inconsistent due to continuing organizational, managerial, operational, and human-related challenges, including inadequate skills, poor supervision, ineffective planning, communication gaps, and unfavourable working conditions.

Therefore, systematic identification and measurement of productivity-related factors are essential for improving construction project performance. A better understanding of these factors can help project managers develop effective strategies for optimizing labour utilization and minimizing productivity losses. Regular monitoring and evaluation of labour performance can also support timely decision-making and improve resource allocation at construction sites. Furthermore, integrating worker training, safety practices, modern technologies, and efficient management techniques can contribute to sustainable improvements in productivity. Hence, studying labour productivity and its influencing factors is essential for achieving better cost control, timely project completion,

improved quality, and overall efficiency in the construction industry.



Figure 1: Multifaceted Approach to Enhancing Labour Productivity in Construction

2. Literature Survey

Previous studies have identified several factors that influence labour productivity in building construction projects. Thiyagu (2022) highlighted the lack of a standard definition of productivity and the need for better understanding of productivity improvement. Attar, Gupta and Desai (2021) identified significant factors affecting labour productivity and their impact on time, cost and quality. Gupta and Kansal (2021) studied construction productivity in the Chambal region and identified important productivity factors through a questionnaire survey. Thomas and Sudhakumar (2020), through an Indian case study, found that timely material availability, material delays, drawing revisions and site disturbances significantly affect productivity. Alinaitwe (2020) highlighted the loss of worker time through non-productive activities and the importance of effective labour management. Recent studies such as Jian et al. (2025) also emphasize worker skills, communication, management competence and environmental conditions. Overall, the literature shows that human, management, material, equipment, environmental, safety and technological factors collectively influence construction labour productivity. These findings indicate that construction labour productivity is influenced by a combination of interrelated factors rather than by a single variable. Poor coordination, inadequate planning, delays in resource availability and inefficient site management can reduce productive working time and affect overall project performance. Therefore, identifying and prioritising the critical

factors affecting labour productivity is essential for improving project efficiency. A systematic assessment of these factors can help construction organisations develop appropriate strategies for reducing productivity losses and improving time, cost and quality performance. Hence, further investigation of these factors in specific project and regional contexts remains important.

3. Problem Statement and Gap Analysis

3.1 Problem Statement:

Low labour productivity remains a significant challenge in building construction projects despite advances in technology and management practices. Factors such as unskilled labour, poor supervision, material shortages, equipment failure, fatigue, and inadequate planning can reduce productivity and affect project performance. Therefore, this study aims to identify the key factors affecting labour productivity and suggest practical measures for its improvement.

3.2 Gap Analysis:

Previous studies have identified several factors affecting labour productivity in building construction projects, including worker skills, motivation, absenteeism, fatigue, supervision, material availability, equipment performance, safety, site conditions, and management practices. However, most studies have examined these factors separately or within specific project types and geographical regions. Limited research has considered the combined influence of human, managerial, material, environmental, safety, and technological factors on labour productivity. In addition, many studies mainly rely on questionnaire surveys and descriptive analysis, with limited use of statistical techniques to measure the actual relationship between productivity factors and project performance. There is also a need to study the growing role of technologies such as BIM, Artificial Intelligence, IoT, automation, and digital project management in improving workforce productivity. Therefore, an integrated and data-based approach is required to identify the most influential productivity factors and develop practical strategies for reducing delays, controlling costs, improving quality, and enhancing overall construction project performance.

4. Aim and Objectives

4.1 Aim:

To identify, study, and analyse the major factors affecting labour productivity in building construction

projects and to suggest practical measures for improving labour efficiency, reducing delays and costs, and enhancing overall construction project performance.

4.2 Objectives:

- To identify the major factors affecting labour productivity in building construction projects.
- To review previous studies related to construction labour productivity and understand the main causes of low productivity.
- To classify productivity factors into human, management, material, equipment, environmental, safety, and technological factors.
- To suggest practical improvement measures for enhancing labour productivity, reducing project delays, and improving overall construction project performance.

5. Methodology

The methodology of this review paper follows a systematic literature review approach to investigate the major factors influencing labour productivity in building construction projects and to identify suitable strategies for productivity improvement. Relevant literature was collected from reliable academic databases and research sources, including Google Scholar, ResearchGate, ScienceDirect, Springer, ASCE Library, IRJET, IJRET, and peer-reviewed construction management journals. The literature search focused on studies related to construction labour productivity, workforce management, site management, time and cost control, material and equipment management, safety practices, and productivity improvement techniques. Studies were selected based on their relevance to the research objectives, with greater emphasis given to peer-reviewed journal and conference papers published between 2021 and 2026. Earlier significant studies were also considered where they provided important theoretical background. Studies unrelated to construction labour productivity, duplicate papers, incomplete articles, non-academic sources, blogs, general websites, and research without a clear methodology were excluded. After the screening process, 25 research papers were selected for detailed analysis. The selected studies were examined to identify major productivity factors, research methods, findings, limitations, and research gaps. A thematic analysis approach was used to classify the identified factors into major categories, including human, management, material and equipment, environmental, and safety-related factors. The findings were then compared to

identify common trends, differences, and opportunities for improving labour productivity in building construction projects.

6. Future Outcomes

The future outcome of this study is expected to provide a more systematic and measurable understanding of labour productivity in building construction projects. By using statistical techniques such as correlation, regression analysis, and hypothesis testing, future research can determine the actual influence of individual productivity factors on project time, cost, quality, and overall performance. The study can also help construction managers identify critical factors such as worker skills, absenteeism, fatigue, supervision, material availability, equipment efficiency, safety, and communication that require greater attention. The integration of modern technologies such as Artificial Intelligence, Internet of Things, Building Information Modelling, automation, and digital project management tools may further improve productivity monitoring and decision-making. Future studies can develop productivity prediction models and practical performance indicators that can be applied directly at construction sites. Comparative studies across residential, commercial, and infrastructure projects may also provide a broader understanding of how productivity varies according to project conditions. In addition, greater emphasis on worker training, welfare, safety measures, and incentive systems can contribute to improved workforce performance.

The findings may also support the development of standardized productivity measurement frameworks that can be used by construction organizations to regularly assess and improve workforce performance. Real-time monitoring of productivity using digital technologies can help managers identify performance gaps at an early stage and take appropriate corrective actions. Furthermore, the study may contribute to better workforce planning by helping organizations allocate skilled labour, materials, equipment, and other resources more efficiently. The collected data can also serve as a valuable reference for future researchers and construction professionals in developing industry-specific productivity benchmarks. Overall, the expected outcomes include reduced construction delays, better resource utilization, improved cost and time control, enhanced work quality, and more effective management of construction projects.

7. References

1. Thomas, A. V., & Sudhakumar, J. (2013). Critical analysis of the key factors affecting construction labour productivity—An Indian perspective. *International Journal of Construction Management*, 13(4), 103–125.
2. Gupta, V., & Kansal, R. (2014). Improvement of construction labour productivity in Chambal Region. *International Journal of Research in Engineering and Technology*, 3(10), 34–37.
3. Jarkas, A. M., & Bitar, C. G. (2012). Factors affecting construction labour productivity in Kuwait. *Journal of Construction Engineering and Management*, 138(7), 811–820.
4. Jang, H., Kim, K., Kim, J., & Kim, J. (2011). Labour productivity model for reinforced concrete construction projects. *Construction Innovation*, 11(1), 92–113.
5. El-Gohary, K. M., & Aziz, R. F. (2014). Factors influencing construction labour productivity in Egypt. *Journal of Management in Engineering*, 30(1), 1–9.
6. Mahamid, I. (2013). Contractors perspective toward factors affecting labour productivity in building construction. *Engineering, Construction and Architectural Management*, 20(5), 446–460.
7. Jarkas, A. M. (2015). Factors influencing labour productivity in Bahrain's construction industry. *International Journal of Construction Management*, 15(1), 94–108.
8. Durdyev, S., & Mbachu, J. (2018). Key constraints to labour productivity in residential building projects: Evidence from Cambodia. *International Journal of Construction Management*, 18(5), 385–393.
9. Gunduz, M., & Abu-Hijleh, A. (2020). Assessment of human productivity drivers for construction labor through importance rating and risk mapping. *Sustainability*, 12(20), 8614.
10. Hamza, M., Shahid, S., Bin Hainin, M. R., & Nashwan, M. S. (2022). Construction labour productivity: Review of factors influencing productivity and improvement strategies. *International Journal of Construction Management*, 22, 413–425.
11. Jian, F., Liu, Q., Feng, C., Hu, Q., Yu, Q., & Guo, Q. (2025). Critical factors affecting construction labor productivity: A systematic review and meta-analysis. *Buildings*, 15(14), 2463.