

A Comparative Study of Skilled vs Unskilled Labor Productivity in Construction Projects in Nagpur Region

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Abstract—Labor productivity is a critical factor influencing the success of construction projects, particularly in developing economies like India where construction activities are labor-intensive. This study compares the productivity levels of skilled and unskilled labor in construction projects in the Nagpur region. A quantitative research methodology was adopted using structured questionnaires distributed among engineers, contractors, and site supervisors. Statistical tools such as mean score analysis and hypothesis testing were applied. The findings indicate that skilled labor significantly enhances productivity, improves quality, and reduces project delays, while unskilled labor contributes to inefficiencies when not adequately trained or supervised. The study recommends skill development programs and improved labor management practices to enhance productivity in the regional construction sector.

Index Terms—Labor Productivity, Skilled Labor, Unskilled Labor, Construction Projects, Nagpur, Project Performance

I. INTRODUCTION

The construction industry is one of the largest contributors to economic growth and employment in India. However, it continues to face challenges related to low labor productivity. Labor productivity refers to the efficiency with which labor inputs are converted into outputs and is a key determinant of project success.

In regions like Nagpur, where rapid urbanization and infrastructure development are taking place, the role of labor productivity becomes even more significant. The industry relies heavily on both skilled and unskilled labor, making it essential to evaluate their comparative performance.

Studies indicate that construction in developing countries is largely manual, and improving labor

productivity directly impacts cost, time, and quality outcomes. Therefore, understanding the productivity differences between skilled and unskilled labor is crucial for effective project management.

II. LITERATURE REVIEW

Previous research highlights the importance of labor skills in construction productivity:

Labor productivity remains a critical determinant of construction project success, particularly in labor-intensive economies like India. Recent studies emphasize that the skill level of workers significantly influences productivity outcomes. According to Hussain et al. (2020), skilled labor has a positive and statistically significant effect on project performance, while unskilled labor tends to reduce efficiency due to higher error rates and rework. The study further highlights that skilled workers contribute to improved quality, timely completion, and better resource utilization.

The importance of human capital in construction productivity has been widely discussed in recent literature. Jarkas and Radosavljevic (2021) argue that labor productivity is strongly linked to worker education, training, and technical expertise. Their findings suggest that investment in workforce development leads to substantial improvements in construction output and efficiency.

In addition, Bajjou and Chafi (2021) identified that inadequate training and lack of skilled labor are among the primary causes of productivity loss in construction projects. They emphasized that structured training programs and skill enhancement initiatives are essential for improving labor efficiency and minimizing project delays.

Pan and Zhang (2022) highlighted that digital tools and smart construction practices improve coordination and reduce inefficiencies. However, unskilled labor often struggles to adapt to these technologies, limiting their productivity and increasing dependency on supervision.

III. RESEARCH OBJECTIVES

1. To compare productivity levels of skilled and unskilled labor in Nagpur construction projects
2. To evaluate the impact of labor type on project cost, time, and quality
3. To identify key factors affecting labor productivity in the Nagpur region
4. To suggest strategies for improving labor productivity

IV. RESEARCH HYPOTHESES

- H0: There is no significant difference between skilled and unskilled labor productivity in construction projects in Nagpur.
- H1: Skilled labor has significantly higher productivity than unskilled labor in construction projects in Nagpur.

V. RESEARCH METHODOLOGY

5.1. Research Design

Quantitative and Comparative Research

This study uses a quantitative approach, and is also comparative in nature.

• Survey-Based Approach

The research is conducted using a survey method, where data is collected through a structured questionnaire from respondents such as engineers, contractors, and site supervisors.

5.2. Study Area

- The area selected for the study is Construction projects in Nagpur region

5.3. Data Collection

Primary Data: Structured Questionnaire

Primary data for the study was collected using a structured questionnaire. The questionnaire included questions related to labour productivity, efficiency, quality of work, and factors affecting performance in

construction projects.

Secondary Data

Secondary data was collected from sources such as research journals, books, conference papers, government reports, and online databases.

5.4. Sample Size

The study is based on a sample size of 100 respondents

5.5. Tools & Techniques

• Mean Score Analysis:

Used to calculate the average responses of respondents and assess the level of labor productivity for both skilled and unskilled workers.

• Chi-square Test / t-test:

Applied to test the research hypothesis and determine whether there is a significant difference between the productivity levels of skilled and unskilled labor.

• Correlation Analysis:

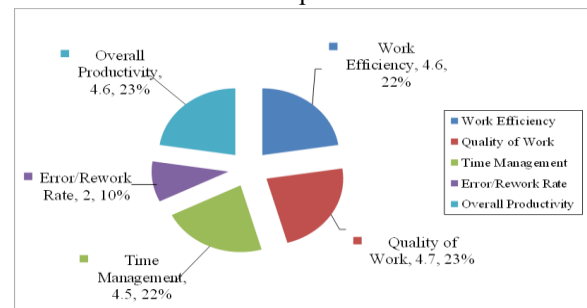
Used to examine the relationship between labor productivity and factors such as efficiency, quality, and time management.

VI. DATA ANALYSIS AND INTERPRETATION

Table 1

Factor	Skilled Labor (Mean)	Unskilled Labor (Mean)	Interpretation
Work Efficiency	4.6	3.3	Skilled higher
Quality of Work	4.7	3.1	Significant difference
Time Management	4.5	3.2	Skilled better
Error/Rework Rate	2.0	3.9	Unskilled higher
Overall Productivity	4.6	3.4	Skilled superior

Graph 1



Interpretation-

- 1) Work Efficiency: Skilled labor (Mean = 4.6) demonstrates higher efficiency compared to unskilled labor (Mean = 3.3),
- 2) Quality of Work: A notable difference is observed, with skilled labor (4.7) producing higher quality output than unskilled labor (3.1),
- 3) Time Management: Skilled workers (4.5) manage time more effectively than unskilled workers (3.2), leading to timely completion of tasks.
- 4) Error/Rework Rate: Unskilled labor shows a higher mean (3.9) compared to skilled labor (2.0),
- 5) Overall Productivity: Skilled labor (4.6) significantly outperforms unskilled labor (3.4),

VII. HYPOTHESIS TESTING (CHI-SQUARE EXAMPLE)

- Calculated Value = 11.8
- Table Value = 5.99 Since $11.8 > 5.99$,
Reject H_0 and Accept H_1
✓Skilled labour has significantly higher productivity than unskilled labour

VIII. CONCLUSION

The study concludes that skilled labour significantly improves construction productivity and overall project performance in the Nagpur region. While unskilled labour is essential for basic operations, reliance on it without proper training reduces efficiency. Enhancing workforce skills is essential for achieving timely, cost-effective, and high-quality construction outcomes.

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