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A Study on Impact of Labour Productivity on Construction Project Process

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Abstract
In the construction industry, labour productivity is the most important factor in construction projects. As construction work widely depends on labour. When labour productivity is maintained under the good management, the construction projects can be completed on time, with better quality and controlled cost. When the labour productivity is maintained under bad or low management, Construction projects face various problems such as delays, increased costs, and poor quality of work. This project study focuses on understanding the impact of labour productivity on the construction process. This project study was conducted through reviewing earlier research works relating to labour productivity and by collecting primary data through a questionnaire survey. The response data collected from the questionnaire survey were analysed to determine the main factors affecting labour productivity. The study found that the workers skill level, availability of materials, site conditions, supervision, and construction management practices have a major effect on labour productivity, which directly affects the project time, planning, cost, and quality. The findings of this study work will help the construction professionals to understand labour productivity issues and take the necessary steps to improve labour performance and overall construction project execution. The questionnaire survey was conducted using Google Forms and responses were collected from construction professionals, site engineers, supervisors, contractors, and workers from the Karnataka state region.

Keywords: Construction Projects, Labour Productivity, Manpower Management, Manpower Planning, Construction Management.

Introduction

The construction industry is one of the most important fields contributing to economic development and infrastructure growth. Construction projects include residential buildings, commercial buildings, industrial buildings, and infrastructure works such as roads and bridges. The construction projects require the effective coordination of various types of resources such as materials, machinery, financial budgets, and labour. Among all the resources, labour plays a major role in constructing the construction project because most construction activities are conducted sequentially and depend heavily on labour. The performance of labour directly effects on project progress, cost, quality, and on time project completion. Inefficient labour utilisation often leads to delays and increased costs, making the important aspect of labour productivity construction project management. To reduce these issues, proper labour management, effective

supervision, clear instruction and systematic plannings are necessary. The key indicator to evaluate the performance of construction projects is labour productivity, which refers to the amount of work completed by workers within a specific given time. It is measured by output per worker per day or per labour hour. some of the common labour productivity problems which occurs in construction projects are explained below:

1. **Improper planning and scheduling**
   Cause: Weak project planning and frequent changes in work sequence.
   Impact: Improper use of labour increases project duration.
2. **Poor site supervision and instruction**
   Cause: Improper monitoring and absence of experienced supervisors and instructors.
   Impact: Requires rework, mistakes, and reduces productivity.
3. **Delay in the material availability**
   Cause: Poor material planning and supply chain issues.
   Impact: Labour idle time and project delays.
4. **Unsafe working conditions**
   Cause: Improper site layout and lack of safety measures.
   Impact: Accident, worker fatigue, and reduced work efficiency.
5. **Low labour motivation**
   Cause: Delayed payment of wages, no incentive system, and long working hours.
   Impact: Absenteeism and low labour output.
6. **Low skill level of workers**
   Cause: Lack of proper training and use of unskilled labour.
   Impact: Slow progress in work and poor quality of construction.

Construction delays due to low labour productivity.

Construction delays occur due to when project activities are not completed within the project planned schedule. It is one of the major reasons for delays in construction projects. when the labour output is lower than expected, the progress of work slows down, which affects all the sequence of activities and overall project completion.

Reasons for low labour productivity

Low labour productivity in construction projects can occur due to the following reasons are:

- Shortage of skilled and trained workers.
- Poor supervision, instruction and site management.
- Delay in payment of wages.
- Non availability of materials at the right time.
- Poor communication between management and workers.
- Unfavourable weather conditions.

Impacts of low labour productivity

The major impacts of labour productivity on construction projects are:

1. Project delays: Slow work progress which leads to schedule overruns.
2. Increase in project cost: Extended project duration increases labour and overhead costs.

3. Quality control issues: Rushed work and rework effect quality control.
4. Labour dissatisfaction: low morale and high labour turnover.

Objectives

The objectives of this study are:

1. Determine the factors affecting labour productivity in construction projects.
2. Study the impact of labour productivity on the construction project performance.
3. Analyse the labour productivity issues using from questionnaire survey and literature review.
4. Suggest measuring for improving labour productivity in construction projects.

Literature Review

Nagaraju Kaja & Anupam Jaiswal. (2023) this study focused on the assessment of construction labour productivity and highlights the major reasons for productivity loss on construction sites. The observation found that material management, shortage of skilled workers, and improper planning were the main reasons for low labour productivity. Frequent changes in work and unorganized workflow were also found to reduce efficiency. The study found that better planning, timely availability of materials, and skilled labour are important to improve labour productivity in the construction projects.

Anu V. Thomas & J. Sudhakumar. (2014) this research studied that factors influencing labour productivity on construction projects in Kerala. The authors noticed that management related issues had a greater impact on productivity than technical issues. The study identified delays in decision making, improper scheduling, and improper supervision as major affecting factors to the labour productivity. The study suggested that improved coordination and effective site management can improve labour productivity in the construction project.

Mohit Suryakanth Jadhav. (2015) this research case study focused on construction projects in the suburban Mumbai region. The observation of study found that unorganized labour practices, poor safety practices, and poor coordination among workers resulted in low productivity. Migrant labour issues and adaptation challenges were also identified. The author noticed that structured site management and proper safety practices can significantly improves labour productivity.

Nitin Rane, Sampras Lopes, et al. (2016) this research study analysed the effects of labour productivity on construction project performance. The authors found that poor site management and delayed material supply resulted in increased project duration and cost overruns. The authors concluded that effective supervision and proper planning are necessary to maintain good labour productivity and achieve project targets on time.

Methodology

First, a literature review was carried out to understand the impact of labour productivity on construction projects. Based on the findings from the literature research papers, a questionnaire survey was conducted to identify the causes related to the labour productivity in Karnataka state. And achieving these goals require a research methodology. These are the main stages for conducting this research study.

- Identifying the problem
- Specifying research objectives
- Specifying research scope
- Data collection

- Literature research
- Questionnaire
- Data analysis
- Results
- Conclusion and recommendations

Designing and collecting data through a questionnaire survey

A questionnaire survey was conducted to collect primary data for this research project study. The questionnaire survey consists of 42 questions, out of which 35 questions were based on factors identified from the literature research paper review. And other remaining 7 questions were conducted to collect respondents about their professional information such as designation, experience, and type of organization. These issues were mainly related to the causes of labour productivity, The effects of labour productivity and to minimize the methods of low labour productivity in construction projects. The questionnaire survey was prepared with reference to previously reviewed and analysed research paper studies.

The purpose of survey was aimed to understand the perception of contractors regarding the related importance of factors that are affecting labour productivity and their overall impact on construction project process. A questionnaire survey method was used as the main source for collecting primary data. A cross-sectional survey method was selected due to limited time available for this study. Information obtained from the literature review was used to frame the questionnaire questions in a structured manner. The survey was conducted by using google forms, and the questionnaire was circulated to identified contractors through email and WhatsApp to save time and cost. Face to face interviews were also conducted with contractors who were interested to provide detailed responses and practical feedback. This approach helped in collecting the realistic data related to labour productivity issues in construction projects.

Data collection

The questionnaire was forwarded to 40 contractors across the Karnataka. However, responses were received the from only 30 contractors (75 %) regarding the impact of labour productivity on construction projects process.

Rating scale

Each statement in these questions should be rated on a scale from strongly agree to strongly disagree, starting with the rating system was given as follows:

Strongly agree – 5, Agree – 4, Can't say – 3, Disagree – 2, Strongly disagree – 1.

Table 1: Questions asked to contractor

Q. No	Questions designed only for the contractors
1	Materials are available on time
2	Equipment and tools are maintained and accessible
3	The site layout helps smooth workflow
4	Weather conditions often affect work progress
5	Site safety practices are properly followed
6	Workers are provided with necessary safety PPE

7	Adequate sanitation and welfare facilities are available
8	Site space congestion reduces efficiency
9	Delays in wage payments affect worker motivation
10	Workers are satisfied with their wage structure
11	Safety audit is conducted at the project site
12	Safety drill is conducted at the project site
13	Shortage of skilled labour affects project progress
14	Absenteeism among workers is a frequent issue
15	Proper supervision increases productivity
16	Communication between engineers, supervisors, and workers is effective
17	Frequent design changes reduce productivity
18	Delay in material supply causes idle time
19	Labour migration impacts work continuity
20	Rework due to poor quality control affects productivity
21	Teamwork and coordination are strong at your site
22	Incentives and rewards improve labour performance
23	Daily task planning is done at your site
24	Productivity monitoring methods are used (like work sampling)
25	Supervisors regularly track labour output
26	Safety training programs are conducted for workers on regular basis
27	Mechanization (use of equipment) increases labour output
28	Digital tools (attendance tracking, material logs) are used effectively
29	Subcontracting affects productivity positively
30	Delay in management decisions causes site idle time
31	Construction schedule software (Primavera/MS Project) is used for planning
32	Project delays usually result from poor resource management
33	Labour productivity directly affects project cost
34	Labour productivity directly affects project completion time
35	Improving worker satisfaction can enhance project success

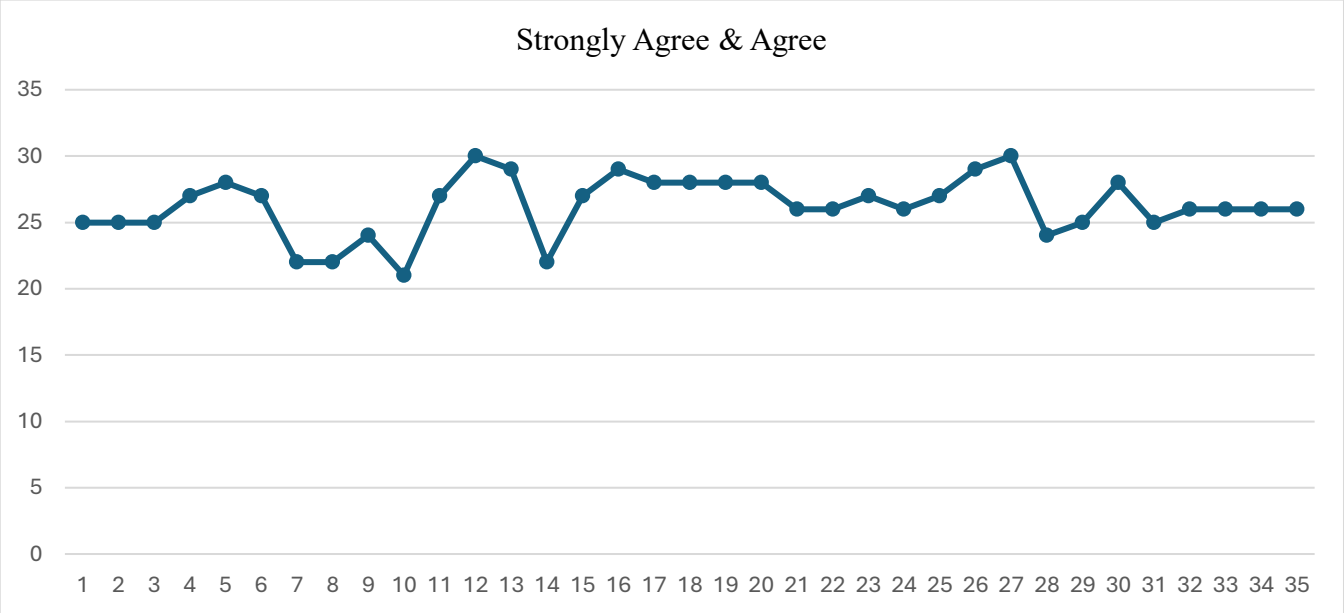
Result and Analysis

Table 2: Result and Analysis Chart

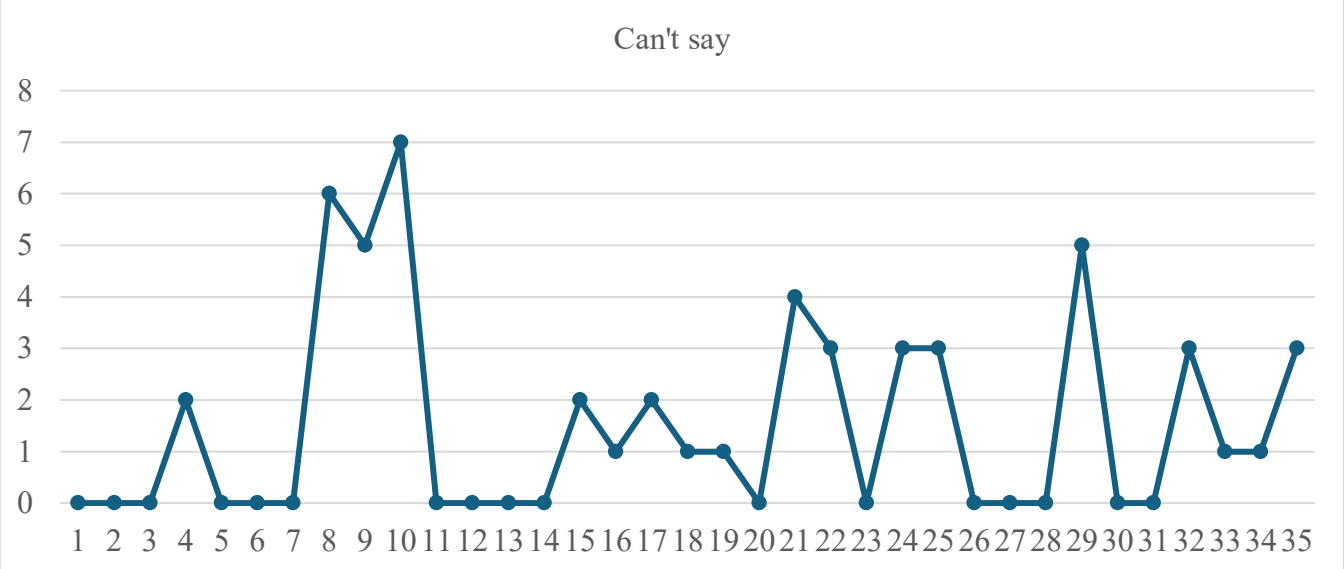
Q. No	Number of contractors 5 & 4 (Agree)	Number of contractors 3 (Can't say)	Number of contractors 1 & 2 (Disagree)
1	25	0	5
2	25	0	5
3	25	0	5
4	27	2	1
5	28	0	2
6	27	0	3
7	22	0	8
8	22	6	2

9	24	5	1
10	21	7	2
11	27	0	3
12	30	0	0
13	29	0	1
14	22	0	8
15	27	2	1
16	29	1	0
17	28	2	0
18	28	1	1
19	28	1	1
20	28	0	2
21	26	4	0
22	26	3	1
23	27	0	3
24	26	3	1
25	27	3	0
26	29	0	1
27	30	0	0
28	24	0	6
29	25	5	0
30	28	0	2
31	25	0	5
32	26	3	1
33	26	1	3
34	26	1	3
35	26	3	1

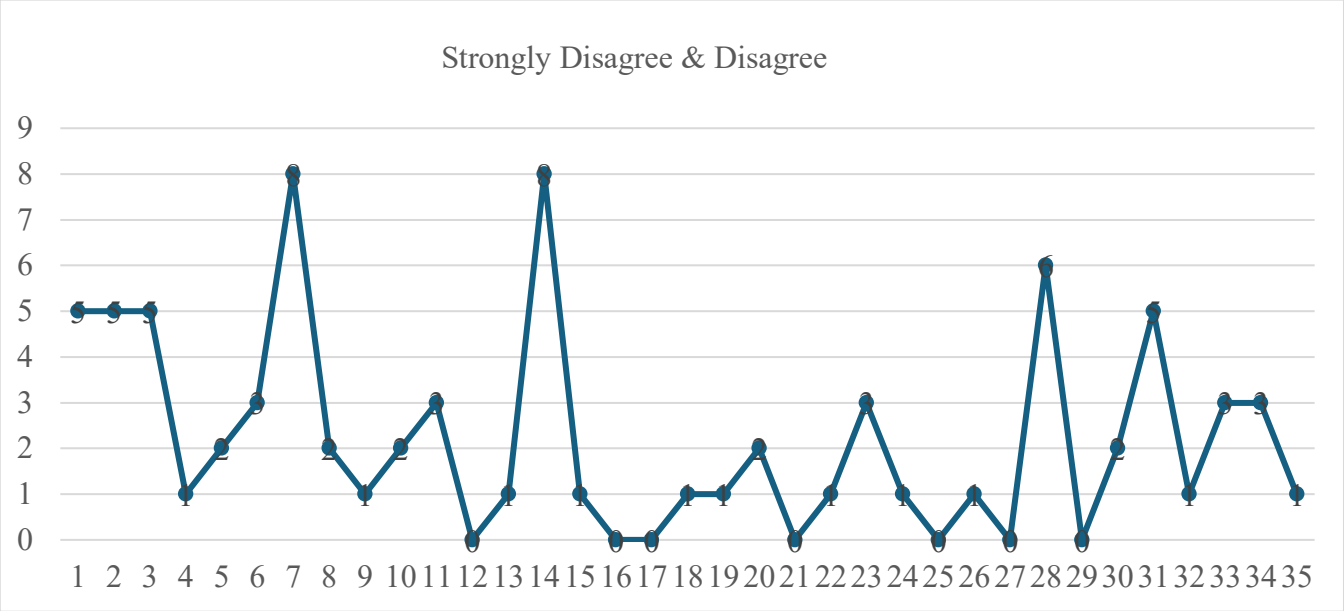
Graph No.1: Number of Contractors agreed.



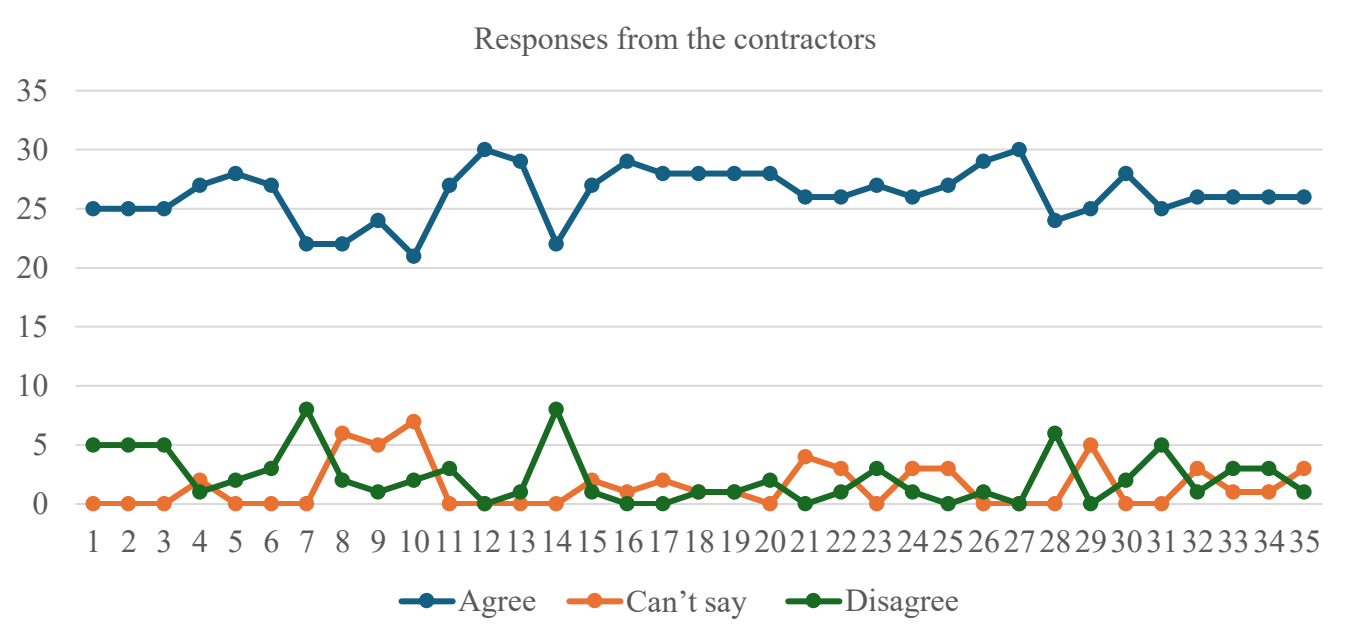
Graph No.2: Number of contractors mentioned as Can't say.



Graph No.3: Number of contractors disagreed.



Graph No.4: Graph showing pattern of agree, can't say disagree as mentioned by contractors.



Conclusion

In this project work 40 contractors have contacted out of which 30 have responded. The main focus of the project is to study the impact of labour productivity on construction process. Some of the key areas focused on the research work are skill level of workers, poor site supervision, delay in the availability of materials, unsafe working conditions, motivation of labour and quality of planning and scheduling.

After collecting the data and analyzing the inputs received for the 42 questions designed in the questionnaire. It was observed that more than 75% of the contractors have responded positively.

- 84% of the contractors said that material equipment and tools were available and maintained in good condition.

- 94% of the contractors have said that safety practices and safety manual were followed as per the standards and labour were provided with the safety personal protective equipment.
- 74% of the contractors said that site space congestion reduces worker output efficiency and hence focus was given in this aspect.
- All the contractors said that they have conducted safety drill at the project site.
- 74% of the contactors highlighted the absenteeism of labour as key issue in the work output and productivity.
- 94% of the contractors said that frequent changes in the design reduce the continuity of work and rework due to poor quality control affecting productivity.
- 87% of the contractors have said that incentives and rewards will improve the labour performance and this practice is adopted in their organization and at the work site.
- All have said that mechanization of construction work increases labour output / productivity.
- 80% of the contractors use digital tools for tracking the attendance of labour and using software to maintain material storage yard.
- 94% of the contractors said that delay in management decision causes site idle time.
- 84% of the contractors are using Primavera / MS project for preparing planning and scheduling and to monitor the work progress.
- 87% of the contractors have said that project delay results from poor resource management.
- 87% of the contractors have said that labour productivity affects project, cost, and project completion time.
- 87% of the contractors have given focus on improving workers satisfaction, which enhances project success by reducing overhead cost.

Recommendations

- Labours should be encouraged not to avail a greater number of leaves which will affect the sequence and speed of the work.
- Site congestion should be avoided and site should have comfortable access for the entry, exit and spacious circulation area for both people and construction machines.
- As the market is moving towards Artificial Intelligence and Digital World, people involved in the construction work should be trained in the application of digital tools for day-to-day operations and construction activities.
- Focus should be given for the improved welfare facilities and basic amenities for the Labours working and staying at the construction site, which will boost the labour confidence and hence increase the productivity of labours.

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