

# A Study on Quantified Impacts of Construction Labour Productivity Towards Project Performance

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## ABSTRACT

The construction sector plays a vital role in all developing countries. The main factors that affects the construction growth is labour productivity and its performance. The main and precious resources of construction are labours. This research mainly deals with the study on construction labours, identifying the critical factors influencing labours and suggestions to overcome the same. Several research papers have been collected and reviewed. The Factors affecting labour productivity in construction industries are collected from both literature review and direct inspection. The questionnaire survey was conducted among various labours in construction projects. Then the collected data are analyzed using statistical package for the social science (SPSS) and the appropriate solutions are given for all impacts.

**Keywords:** Labour productivity, Critical factors, Construction sector, Data collection and Analysis.

## I. INTRODUCTION

Labours in construction sector can be renowned as all workforces required for the process that has to be carried out to fulfil and to accomplish goal. Labour Productivity in construction is often defined as labour output per labour time. Since labour comprise a major part of the construction labour cost and also the quantity of labour hours in executing a task in construction is more vulnerable to the impact of management than materials or capital and so this productivity is frequently referred to as construction labour productivity. The labour productivity inadequacy will influence the performance of the overall project ultimately. Labour productivity constitutes a crucial part of production input for construction project. It is essential to make certain that the diminution in productivity does not modify the plan and schedule of the work and does not cause detainment. The consequences of these delays could result in severe capital fatalities. Further, substantial cost can be saved if productivity is enhanced because the similar effort can be done with less manpower, therefore reducing overall labour cost. Classification and assessment of complex factors influencing construction labour productivity have become an important issue in facing project managers

for a long time. Understanding critical factors affecting productivity of both favourable and adverse situation can be used to develop a policy to reduce inefficiencies and to improve the competence of project performance. The scope of this research study is to identify the factors affecting construction labour productivity at building projects.

## II. RESEARCH OBJECTIVE

The objectives of this research are stated below

- To identify the critical factors affecting labour productivity in the construction projects
- To statistically examine the impact of factors influencing labour productivity
- To suggest recommendations in order to improve construction labour productivity towards project performance

## III. SCOPE OF WORK

- To improve the overall efficiency of the Project
- To enhance the knowledge of labours and workers
- To minimize the overall cost of the project
- To accomplish the project within stipulated time

## IV. LITERATURE REVIEW

**Dheenadhayalan et al** (2016) signifies that this study is to get the latest information and to identify the critical factors that affect the labour productivity in Coimbatore.

**Benviolent et al** (2014) identified and ranked according to relative importance, factors affecting labour productivity on building projects.

**Mahamid Ibrahim** (2013) aims at identifying the factors affecting labour productivity in building construction projects in the West Bank. Contractors working in building construction completed a structured questionnaire survey and the factors were categorized according to their levels of influence.

**Nurulzatushima et al** (2013) identified the factor that affects the labour productivity in construction industry and to discover the impacts of labour productivity in construction.

**Mostafa et al** (2012) describes proper management of resources in construction projects can yield substantial savings in time and cost.

**Abdul Kadir et al** (2005) states Construction labour productivity is of great interest to practitioners and researchers because it governs project cost and time overrun. This study analyzes and ranks the importance, frequency and severity of project delay.

## V. METHODOLOGY

The methodology of this research study is represented and explained systematically based on the objectives of the project and it is commenced by reviewing the admissible literatures. Finally, from the consolidation of the literature study the factors affecting construction labours are identified. Depending upon the factors, the questionnaire is framed and the questionnaire survey is conducted among various officials in different construction companies.

### Factors Affecting Labours

From several reviews of literature, the factors influencing labours in construction are categorized.

### A. Personal Factors

The Personal Factors that affect labours in construction are Gender, Disloyalty, Age, Educational Qualification and Alcoholism.

### B. Construction Factors

The factors come under Construction Factors are Lack of experience, Rework, Supervision delays, Accidents at site, Place of material storage, Working time and Absenteeism.

### C. Management Factors

It includes following sub factors such as Implementation of government laws and Payment delays.

### D. Resource Oriented Factors

Resource Oriented Factors includes Lack of required construction materials, Lack of tools and equipment's, Violations of safety laws, Improper transportation facilities and Training sessions.

### E. Technical Factors

The factors come under Technical Factors Variations in the drawings, Incomplete drawings, Work Quality, Design Changes, Improper construction method and Hike in price of materials.

### F. Communication Factors

It includes following sub factors such as Communication of change orders from the owners, Disputes among owner and contractor, Flow of information and Miscommunication.

### G. General Factors

General Factors that affect labours in construction are Water and/or power supply, Poor site conditions, Weathering conditions and Basic Amenities.

## VI. QUESTIONNAIRE DESIGN

A questionnaire was designed based upon the fact that they had to be simple, obvious and understandable for the respondents and at the same time they should be able to be interpreted well by the researcher. Also the questionnaire was designed as per linkert scales running from Not applicable, Does not affect it, somewhat affects it and directly affects it. These four positions were given weights of 1, 2, 3 and 4 for scoring purposes. Questionnaire consists of two sections, first section includes the respondents demographic profile and the second section includes the set of questions based on the factors influencing labours in construction projects.

## A. Questionnaire Survey

In this research study, the respondents are nominated for the distribution of the questionnaire form. Managing Directors, Site Engineer, Design Planners and Quantified Surveyors are selected as the targeted respondents in construction industry. The prepared Questionnaire regarding 'Study on Quantified Impacts of Construction Labour Productivity towards Project Performance' was distributed to 105 engineers and their responses have been extracted.

## VII. DATA ANALYSIS

The collected data are analyzed using SPSS software. The software name originally stood for Statistical Package for the Social Sciences (SPSS). Also SPSS Statistics is a software package used for statistical analysis. It was mainly acquired by IBM in 2009. It is also used majorly by Health researchers, market researchers, Education Researchers, Survey companies, Marketing organizations, Data miners, Government. It is one of the most extensively used software programs for analyzing data in construction management and the most essential factors affecting the labour productivity are identified.

### A. Reliability Analysis

This type of analysis was conducted for each cluster in order to evaluate the reliability of the questionnaire. It is called as Cronbach's alpha method and it was used for reliability analysis. Cronbach's alpha obtained for respondents are given in Table I. Cronbach's alpha value obtained is 0.838. The value must be in the range between 0.6 to 1.0 only then the data will be reliable. Hence the resulted data values are reliable.

TABLE I. Reliability Statistics

Cronbach's Alpha	N of Items
.838	41

The coefficient alpha value for Personal Factors, Construction Factors, Management Factors, Resource Oriented Factors, Technical Factors, Communication Factors and General Factors were well above the

criterion of 0.60 as recommended by Nunnally (1978) for assessing reliability scale.

### B. Principle Component Analysis

Principal components analysis is one of the variable-reduction techniques that share many similarities to exploratory factor analysis KMO determination. Its aim is to lessen a larger set of variables into a smaller set of variables called 'Principal Components', which account for most of the variance in the original variables. The outcome obtained from the principle component analysis is given in Table II, which denotes the number of variable in every factor, Eigen values of the factors affecting labours, percentage of variation and cumulative percentage of variance. Using the principle component analysis all 41 factors affecting labour productivity are grouped under 7 main factors.

TABLE I. PRINCIPLE COMPONENT ANALYSIS

Factors	No. of Variables Included	Eigen Value	Percent of Variance Explained	Cum. Percent of Variation
Personal factors	6	2.987	10.688	10.688
Construction factors	8	2.745	10.322	21.01
Management factors	2	2.588	9.189	30.199
Resource oriented factors	7	2.311	9.374	39.573
Technical factors	6	1.865	8.147	47.72
Communication factors	7	1.684	8.688	56.408
General factors	5	1.321	8.521	64.929
<b>KMO Measures of sampling Adequacy:</b>		<b>Bartlett's test of sphericity:</b>		
<b>0.782</b>		<b>Chi-Square Value : 820</b>		

### C. Descriptive Statistics Analysis

The descriptive statistical analysis is executed to attain the mean value, standard deviation and coefficient of variation for 7 foremost key factors which are given in Table III. The frequency analysis method was performed for descriptive statistical analysis. Also in descriptive statistics, the frequency analysis is based upon the number of occurrences selected by the respondents and then followed by measure of central tendency and dispersion analysis.

TABLE I. Descriptive Statistics Analysis

S.No	Factors	Mean	Standard deviation	coefficient of variation
1	Personal factors	2.45	0.648	0.38
2	Construction factors	3.12	0.844	0.77
3	Management factors	2.94	0.837	0.71
4	Resource-oriented factors	2.77	0.692	0.44
5	Technical factors	2.14	0.626	0.36
6	Communication factors	1.97	0.55	0.23
7	General factors	2.68	0.673	0.42

### VIII. CONCLUSION

From the present study, a total of 41 factors affecting labour productivity are acknowledged. Project manager should mainly focus on these factors to enhance the construction labour productivity and its performance which eventually leads to elevated profit from the construction projects. The end result specifies that the most remarkable factors affecting construction labour productivity are Personal Factors, Construction Factors, Management Factors, Resource Oriented Factors, Technical Factors, Communication Factors and General Factors. Personal Factors and Construction Factors

include Lack of competition between the labourers and Lack of experience. The Management Factors, Resource Oriented factors and Technical Factors include Payment delays, Training Sessions and Improper construction method. The Communication Factors and General Factors include Misunderstanding between owner, contractor and labourers and Basic Amenities. Therefore, it is understood that the outcomes of this research study can assist in achieving high labour productivity by focusing and acting upon the most significant factors.

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