



# STUDY ON FACTORS AFFECTING LABOUR PRODUCTIVITY AT BUILDING CONSTRUCTION PROJECTS

M.Hari vignesh<sup>1</sup>

Sona college of technology, Salem, 636005 & Tamilnadu

Email: [hari93civil@gmail.com](mailto:hari93civil@gmail.com)

**Abstract** - Now a days Construction projects are facing many problems such as cost, duration, quality and safety. Construction sector is showing a great deal of variety as it contains contractors, consultants, designers, owners, and others. The main aim of this paper is to identify the major factors that affect labor productivity at construction project. A literature review and factors recommended by experts were considered to categorize the factors. Around 40 factors, categorized into 5 groups, will be analyzed and ranked considering Relative Importance Index. The questionnaires were distributed to various construction companies over tamilnadu and kerala. The main objective of this study is to find out the various factors affecting labour management which effects the overall labour productivity of the construction in construction sites.

## I. INTRODUCTION

Several studies related to labor productivity are performed for construction industry. Several of them were related to calculating the effect of productivity factors. Measureable calculations about the effects of factors that affect labor productivity are required for several purposes, such as estimation of the construction project, its planning and scheduling. Past studies shows that it is tough to calculate the impact, and at present there are no standard method to measure factors causing labor productivity loss. This lack of methods for measuring effects in labor productivity point out the need to enhance measureable assessments for the factors affecting productivity in building construction, and it is the topic of this study.

### Background about Productivity

Generally, productivity is defined as the average direct labor hours required to install a unit of

achieved if all the engineering drawings are 100% perfect and with a 40-hour work week, with people taking all the holidays and vacation days as planned and there would be no delays of any kind during construction; everyone would work safely; everything would fit perfectly the first time; the weather would be 70degree F; and there would be no litigation at the end of the project.

### Definition of Productivity in Construction Industry

"Productivity" is the relationship between inputs and outputs. From one industry to another the Output and input will be different. Also, the definition productivity differs when applied to different areas of the same industry. Labor is one of the basic and most important requirements in the construction industry. Labor productivity usually relates to the manpower in terms of labor cost and the quantity of outputs produced. In other words, the definition of labor productivity is the amount of goods and services produced by a productive factor in the unit of time.

### Problem Statement

Productivity loss is one of the greatest and severe problem is in the construction industry. Presently construction contracts lack enough to classify compensate for productivity loss due to field factors. Labors, materials and equipment's have role in the major part in project cost, labor is considered as the most risky factor. Other components (equipment and material) are based on the market price which are, consequently, beyond the influence of project management. In construction industry labour cost is estimated to be about 40%- 50% of the entire project cost. Labor is most variable and unpredictable than other project-cost components, and so it becomes very necessary to understand the effects of different factors on



a project's profit, making it of vital interest to the construction industry for its success.

## 2. LITERATURE REVIEW

**Sherif M. Hafez, Remon F. Aziz(2014):** One of the main factors that had influence in the construction industry growth is productivity which mainly associated with the labor performance. Labor in construction industry could be defined as all workforces involve in the process that had to carry out to accomplish and to achieve goal. The labor productivity insufficiency will affect the performance of the overall project. 27 productivity factors were classified under the following four primary groups: (a) Technological; (b) Management; (c) Human/Labor; and (d) External. Among the factors explored, the subsequent ten are discerned to be the most significant in their effects on labor productivity: (1) Payment delay; (2) Skill of labor; (3) A shortage of experienced labor; (4) Lack of labor supervision; (5) Motivation of labor; (6) Working overtime, (7) Construction managers lack of leadership, (8) High humidity, (9) Clarity of technical specification, (10) High/low temperature. labor cost comprises 30 to 50% of the overall project's cost.

**Nasiru Zakari Muhammad, Ashiru Sani(2015):** Assessment and the improvement in productivity is a crucial for labor intensive processes. Retarded economic growth and competition level compel the construction companies to look for ways of improving performance. Poor labour productivity plays a major contribution in the frequent delays of many projects, consequently these projects suffer a serious cost overrun. Labour productivity can be analyzed at different levels. These are industry level consisting clients organization, contractors organizations and consultants organizations. It can also be measured at company level which only focuses on either clients' organization, consultants' organization or contractors' organization. Project is another level at which productivity can be analyzed. Lack of skillful man power with specific scope of work was found to be the most important factor affecting labor productivity on site. The next important factor affecting labor productivity at the company management level is the motivation. based on the site level factors "lack of adequate skillful worker with specific scope of work" at site, delay in material supply, weather, access to the site, crew size and communication problems between foreign and local staff are the top six most significant factors affecting labour productivity.

**Brent G. Hickson(2013):** This study highlights the factors affecting labour productivity of the Construction industry in Trinidad and Tobago. Construction labour constitutes the largest unit of human resource on any given project. Human resources represent the most variable, uncontrollable, and important element in production. The battle to complete construction projects on time and within budget is ongoing, being fought when faced with the rising cost of labour and material. The top ten factors affecting construction labour productivity in T&T are: the lack of labour supervision, unrealistic scheduling and expectation of labour performance, shortage of experienced labour, construction manager's lack of leadership skills, skillset of laborers, delay in responding to requests for information (RFI), payment delay, communication problems between site management and labour, rain and late arrival, early quitting, and frequent unscheduled breaks.

**Shashank K(2014):** Productivity in construction is often broadly defined as output per labour hour. Since labour constitutes a large part of the construction cost and the quantity of labour hours in performing a task in construction is more susceptible to the influence of management than are materials or capital, this productivity measure is often referred to as labour productivity. in summary the overall factors which affect labour productivity is classified in to 8 groups according to their characteristics, namely: Manpower, Managerial, Environmental, safety, Material/Equipment, Schedule, Motivation, and Quality. The six independent groups were ranked based on the impact strength on labour productivity variation are as follows: Motivation group, Manpower group, Material/Equipment group, Safety group, Managerial group, Quality group.

## 3. OBJECTIVE OF THE STUDY

This study focuses about various factors affecting labor productivity, analyzes factors affecting the labor productivity, and suggests appropriate measures which can be taken to improve labor productivity. The aim is stated below:

- i. To Study and discuss various factors affecting labor productivity.
- ii. To Analyze and calculate the Relative Important Index (RII) of those factors and finding the ranking.
- iii. To statistically analyze the factors affecting labor productivity.

### **Different Factors Affecting Labor Productivity from Previous Studies**

Productivity is the final outcome of several



below are various factors affecting labor productivity which are reviewed from past studies are discussed below.

**Time:**

There are many tasks which causes a loss of productivity during construction projects. Studies show that productivity decreases with overtime working. Due to the reasons such as fatigue; increased absenteeism; decreased morale; reduced supervision effectiveness; poor workmanship, resulting in higher rework; and which increase accidents. Initially working overtime result in increased output, but continuing overtime will lead to increased costs and reduced productivity. The average time used by the laborers on productive activities is 30% of the total time. In the field an employee can work effectively for 3.5 hours only out of his 8-hour shift. [6] analyzed microwave waveguides and components such as microwave T junctions, circulators, attenuators and Isolators.

**Schedule Compression:**

The Compressions of the overall time frame for a later activity are often the way to compensate interruptions when there are early delays in a project, by utilizing float in the project's overall schedule compression may be possible without accelerating individual work activities. Schedules are not fully resource loaded on many projects. A properly updated schedule reflecting the delays may show the project finishing on time without shortening individual activities as a consequence. Allowing the contractor to complete the total remaining work schedule compression may result to force extra labors for the desired task by the contractor because of the shortening the overall duration. When linked with overtime, Schedule compression often results in major productivity losses due to shortages of material tools or equipment to support the extra labor's, which result in difficult for planning and coordinating the task, and unavailability of experienced labors.

**Type of Project:**

For accomplishing substantial productivity. Every member of a crew requires adequate space to perform task without being affected with/by the other crew members. When in a fixed amount of space, when more labors are allotted to perform particular task it is probable that interference may occur, thus decreasing productivity. The probability of interference rises and productivity may be reduced when multiple trades are assigned to work in the same area. Mismanagement on construction sites led to interference among the various crews and laborers.

**Safety:**

occur at the site, which causes death and resulting in a total work stoppage for many of days. If a person is injured in an accident and got hospitalized results in a work decrease of the crew for which the injured employee worked. Small careless accidents from nails and wires can also stop work and, thus, productivity decrease. As because insufficient lightening has negative effect sufficient lighting is required to work efficiently. Employing a safety officer is good to make labors recognize the required safety regulations at a site and to follow them.

**Quality:**

Factors which cause low productivity are inefficiency of equipment and poor quality of the raw material. Inefficient equipment has a low productivity rate. It takes a long time for the laborers to complete the work if old equipments are using for work, because will be subjected to a great number of breakdowns, thus reducing productivity. Other factor is the using of poor quality materials for work because poor materials generally lead to unsatisfactory work and can be rejected by supervisors.

**Managerial Factors:**

The skill and attitudes of managers have a crucial affect on productivity. Productivity is low even though the latest technology and trained manpower are made available. In many organizations due to poor supervising skill. A skilled and committed manager can obtain surprising results from average labors. Job performance of employees depends on their ability and willingness to work. Management is responsible to create both. Optimum utilization of human and technical resources can be secured only through sound management.

#### 4. RESEARCH METHODOLOGY

One among the best effective and suitable data collection technique for this study is a questionnaire survey. The questionnaire was described as a self-administered tool with many selected questions based on factors, and an appropriate response rating. A questionnaire survey comparatively requires less duration and permits respondents to response the questionnaire at their personal ease.

**Considerations for the Survey**

The main consideration of this survey is it should be easily understandable for respondents. If questions are too complicated, there chances for good response are less. Proper care should be taken so that questions did not negatively influence the results of subsequent questions. Logic-based





### Organization of the Questionnaire

Following criteria was used to begin the questionnaire design process:

#### Questionnaire Response Rate

Exactness Duration  
Applicable Ease of Completion  
Completeness

Understanding by examining the accuracy and completeness of the related questions Carefulness and productivity were achieved, taking into consideration the previous studies. Duration of one month was assigned to complete and submit the survey questionnaire. Questionnaires were kept simple for the respondents.

#### Questionnaire

The questionnaire was in two sections. In the first sections the personal details of the respondent such as name of the company, experience etc.. are asked. In the second section total of 37 various factors which effect labor productivity is consolidated to three different groups. Each factor is given an influence ranges from the scale of 1 to 5. Which indicate very low, low, moderate, high and very high.

#### Questionnaire Distributions

The target groups in this study were professionals from the construction industry. Data were collected from a total of 25 questionnaires.

### 5. RESULT AND ANALYSIS

In successfully achieving main objective of the study, one of the most important phase is collection of accurate data. Data collection is a procedure of collecting crucial data records for a certain sample or population of observations. The population targeted was professional working on construction projects. With an experience of more than 3 years. The respondents were approached through offices and site meetings depending upon the availability and location of the projects. The questionnaire is distributed to around 25 companies and the data is collected. The respondents are mainly from private sector and having satisfactory working experience. Among them major of the engineers are having a bachelor degree in engineering. Some of the respondents also have additional post graduate qualification.

#### Analysis Method Used

Two different ways were used to analyze the survey results.

- Ranking of the various factors according to their significance, and calculating their Relative Importance Index (RII)
- Analyze the factors in the questionnaire are significant or non-significant.

#### W

W is the weight given to each factor by the respondents and ranges from 1 to 5.

N is the total number of responses collected for the ordinal scale.

To assess the likelihood of each identified factor in the construction projects five point likert-scale of 1-5 was used, where scale of 1= very low, 2= low, 3 = moderate, 4= high and 5 = very high.

The top 5 factors which effect the labour productivity in construction sites through this study are: Lack of labor experience, Availability of materials at sites, Availability of tools and machinery, Drawings and specifications are alternated during execution, Inefficiency of equipment

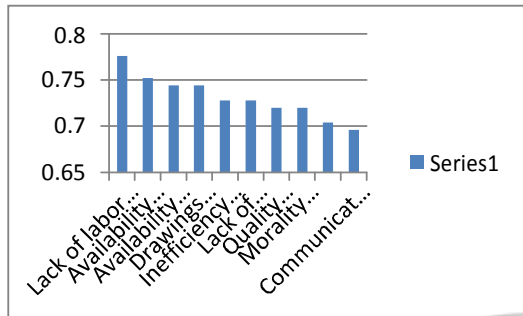
The following table shows the ranking of each factors:

|   |      |
|---|------|
| Lack of labor experience                      | .776 |
| Availability of materials at sites            | .752 |
| Availability of tools and machinery           | .744 |
| Alternation of drawings and specification     | .744 |
| Inefficiency of equipment                     | .728 |
| Lack of financial motivation system           | .728 |
| Quality experience and training of worker     | .72  |
| morality                                      | .72  |
| Disturbance faced by the workers              | .704 |
| Communication breakdown between workers       | .696 |
| Availability of work force                    | .696 |
| Absenteeism                                   | .696 |
| Frequent changes in labor at particular works | .696 |
| Lack of competition between workers           | .688 |
| Communication problem among workers           | .68  |
| Rework  | .68  |
| Professionalism of design team                | .672 |
| Access facilities to sites                    | .664 |
| Late inspection of completed work             | .656 |
| Change in sequence of work                    | .656 |
| Financial problems                            | .656 |
| Level of management control                   | .64  |
| Lack of information about sites               | .64  |
| Overtime working                              | .64  |
| Methods and machinery used for working        | .632 |
| Congestion at site to work                    | .624 |
| Specification of particular work              | .624 |
| Project particular design requirement         | .616 |
| Incompetence of site supervisor               | .608 |
| Weather problem at sites                      | .592 |
| Work planning and scheduling                  | .576 |
| Quality control                               | .576 |
| Coordination of sub contractor                | .56  |
| Project characteristics                       | .544 |
| Difficulties in employing site supervisor     | .536 |



|                     |      |
|---------------------|------|
| Location of project | .472 |
|---------------------|------|

The following bar chart shows the influence of top 10 factors in graphical way.



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