

Construction Labor Productivity and its Improvement

Ms.P.Jeevitha(student)¹, Mr.T.Sathieshkumar(Guide)²

¹ Student M.E.,(CE&M),Gnanamani College Of Engineering, Namakkal -637018,Tamilnadu ,India

² Assistant Prof, Dept of Civil Engg, Gnanamani College of Engineering, Namakkal, Tamilnadu, India

ABSTRACT *The most challenging issue in Construction industry is to improving the production efficiency. Many research have been done in the past, however a deeper understanding is still needed to improve the labour productivity. The main outcome from the literature is that there is no standard definition of productivity. It covers the construction labour productivity definitions, aspects, factors affecting it. The productivity of labour is particularly important especially in developing countries, where most of the building construction work is still on manual basis. The aim of this study is to get the latest information and to identify the key factors that affect the labour productivity in and around Coimbatore. So survey is carried out through questionnaire and distribute to respondents who work at various projects in wide area in Coimbatore and the questionnaires are rated by project managers, experienced engineers and also with labours using their past experiences. And the data's are collected and analysed; using this the affected factors are identified and ranked, through this necessary steps are provided to improve the labour productivity.*

1.INTRODUCTON

1.1 GENERAL

Construction industry faces lots of challenges with regard to problems associated with productivity. Productivity is one of the most important factors affecting the overall performance of any organization, whether large or small and the problems are usually associated with performance of labour. The performance of labour is affected by many factors and is usually linked to the performance of time, cost, and quality.

Inefficient management of construction resources can result in low productivity. Therefore, it is important for construction managers to be familiar with the methods leading to evaluate the productivity of the equipments and the labourers in different crafts. To achieve the income expected from any construction project in general, it is important to have a good controlling hand on the productivity factors that contribute in the integrated production composition, like labour, equipment, cash flow, etc... While there are several input resources in a transformation process, labour productivity plays a particular role. A deeper comprehension of the factors influencing labour productivity can enable managers to more effectively allocate limited resources, provide workers with better support, or increase workers' motivation.

1.2 OBJECTIVE

The objective of this study focuses on views from the construction industry about various factors affecting labour productivity, Analyzes factors affecting the labour productivity, impact and suggests appropriate measures that can be taken to improve labour productivity. The aim is supported by the objective stated below.

- Study and discuss various factors affecting labour productivity in construction industry
- Analyze and calculate the Relative Important of those factors affecting labour productivity
- To statistically analyze the factors affecting labour productivity
- To make recommendations to improve labour productivity in construction

1.2 BACK GROUND OF LABOUR PRODUCTIVITY

Productivity can be defined in many ways. In construction, productivity is usually taken to mean labour productivity, that is, units of work placed or produced per man-hour. The inverse of labour productivity, man- hours per unit (unit rate), is

also commonly used. Productivity is the ratio of output to all or some of the resources used to produce that output. Output can be homogenous or heterogeneous. Resources comprise: labour, capital, energy, raw materials, etc. Productivity may then be defined as the ratio of output to actual hours. The problem with this concept is in establishing reliable, for setting standards. It also depends on the method used to measure productivity, and on the extent to which account is taken of all the factors which affect it. At a project site, contractors are often interested in labour productivity. It can be defined in one of the following ways.

Labour Productivity = (Output / Labour Cost)

Productivity measures can broadly be placed into two categories. Single factor, or partial, productivity measures relate a particular measure of output to a single measure of input, such as labour or capital. Multi-factor or total productivity measures (MFP) relate a particular measure of output to a group of inputs, or total inputs used. Productivity measures can also be distinguished by whether they rely on a particular measure of gross output or on a value-added concept that attempts to capture the movement of output. Of the most frequently used MFP measures, capital-labor MFP relies on a value-added concept of output while capital labor- energy- materials MFP relies on a particular measure of gross output.

Labour productivity, based on gross output: This productivity measurement traces the labour requirement per unit of output. It reflects the change in the input coefficient of labour by industry and is useful for the analysis of specific industry labour requirements. Its main advantage as a productivity measure is its ease of measurement and readability; particularly, the gross output measure requires only price indices on gross output. However, since labour productivity is a partial productivity measure, output typically reflects the joint influence of many different factors.

Labour productivity, based on value-added: Value-added based labor productivity is useful for the analysis of micro-macro links, such as an individual industry's contribution to economy-wide labour productivity and economic growth. From a policy perspective, it is important as a reference statistic in wage bargaining. Its main advantage as a productivity measure is its ease of measurement and readability, though it does require price indices on intermediate inputs, as well as to gross output data. In addition to its limitations as a partial productivity measure, value-added labour productivity have several theoretical and practical drawbacks including the potential for double counting production of benefits and double deflation.

Capital-labour MFP, based on value-added: This productivity measurement is useful for the analysis of micro-macro links, such as the industry contribution to economy-wide MFP growth and living standards, as well as, for analysis of structural change. Its main advantage as a productivity measure is the ease of aggregation across industries. The data for this measurement is also directly available from national accounts. The main drawback to the value-added based capital-labour MFP is that it is not a good measure of technology shifts at the industry or firm level. It also suffers the disadvantage of other value-added measures that have been double deflated with a fixed weight Laspeyres quantity index.

Capital productivity, based on value-added: Changes in capital productivity denote the degree to which output growth can be achieved with lower welfare costs in the form of foregone consumption. Its main advantage as a productivity measure is its ease of readability but capital productivity suffers the same limitations as other partial productivity measurements

1.3.1 Productivity and Labour

On any construction site the contractor's financial gain is dependent, amongst other things, on completion of the work in good time and at the least cost, and the productivity of labour has a direct bearing on this being achieved.

The factors affecting the performance of labour generally fall into three categories.

- i. The human capacity for work
- ii. The motivation of the workers

1.3.2 THE HUMAN CAPACITY FOR WORK

The various measures that may be taken to improve the physical work capacity or to motivate the workers will not be effective if site management is substandard. It is essential for the workers to have confidence in their supervisors. If the workers observe that site management is poor, unfair or corrupt, their morale, motivation and consequent productivity will be reduced. Examples of management shortcomings which reduce efficiency and productivity in this way include

- Delayed, unclear or inadequate instructions
- Delays in delivery of materials, tools or equipment
- Provision of poor tools and equipment
- Unbalanced work gangs
- Use of wrong methods
- Bad advance planning or allocation of work tasks

1.3.3 Motivation of Workers

Workers are motivated in their work by a variety of methods, all of which may be present in varying degrees. They include Fear Discipline Job Satisfaction Financial Incentives

Fear: This includes fear of the supervisor and fear of losing a job and being out of work and destitute, especially in a country where no form of social security exists. This is a negative and unsatisfactory form of incentive

1.3 VARIOUS FACTORS AFFECTING LABOUR PRODUCTIVITY

Identification and evaluation of factors affecting labour construction productivity have become a critical issue facing project managers for a long time in order to increase productivity in construction. Understanding critical factors affecting productivity of both positive and negative can be used to prepare a strategy to reduce inefficiencies and to improve the effectiveness of project performance.

Based on the study, Factors affecting construction labour productivity have been identified and are grouped into 15 categories according to their characteristics, namely

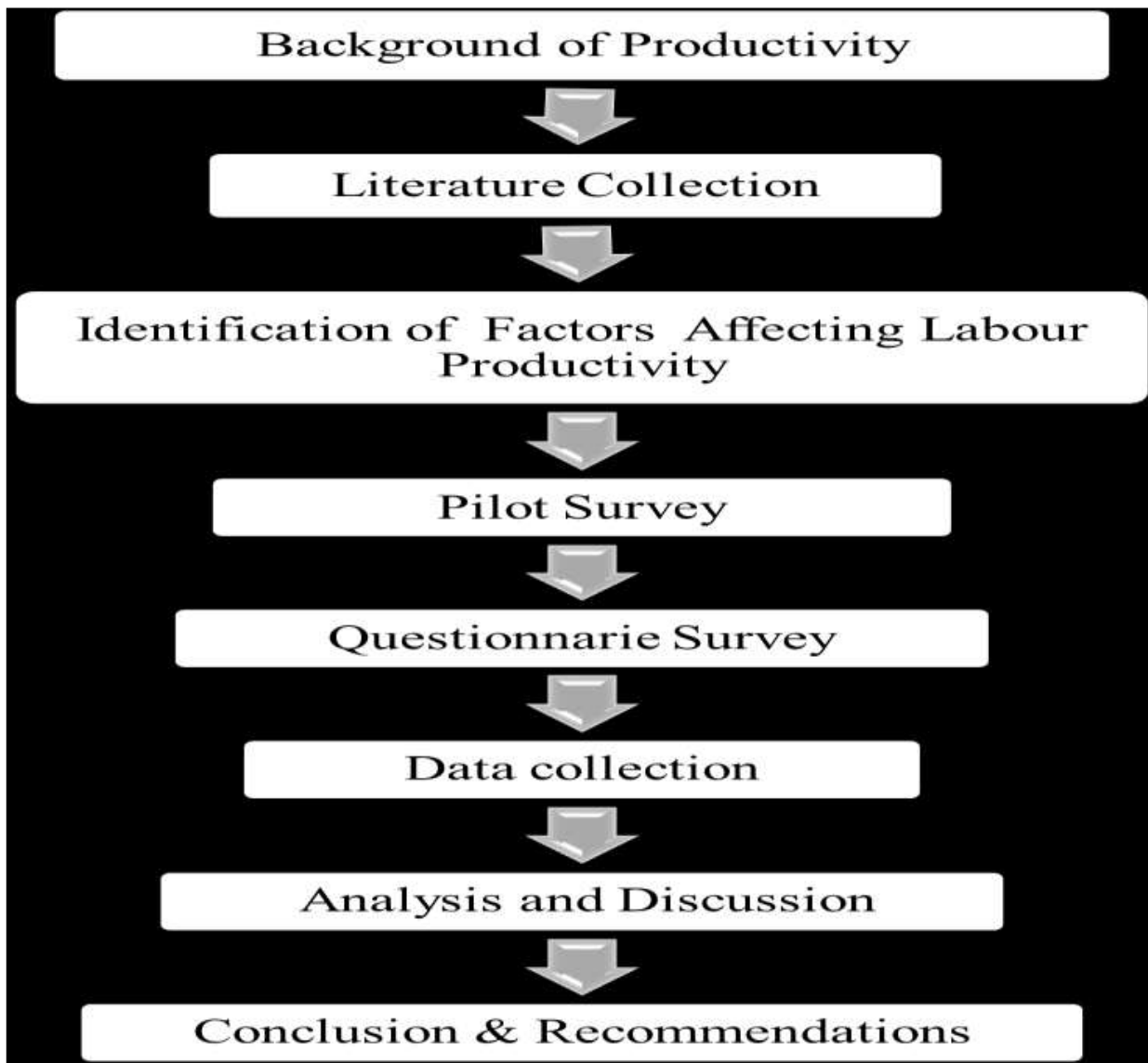
- Design factors
- Execution plan factors
- Material factors
- Equipment factors
- Labour factors
- Health and safety factors
- Supervision factors
- Working time factors
- Project factors
- Quality factors
- Financial factors
- Leadership and coordination factors
- Organization factors Owner/consultant factors
- External factors

2. METHODOLOGY Survey research is defined as collection of different data by asking people questions. The data collection process used in this research had the option of two basic methods: questionnaires and personal interviews. A questionnaire was preferred as the best effective and suitable data-collection technique for the study. It was concluded that the questionnaire was described as a self-administered tool with web-design questions, an appropriate response. A questionnaire in a web-survey format comparatively requires less duration and saves cost for the researcher while permits respondents to response the questionnaire at their personal ease. However, for this approach the reply rate is usually lower as compared to face-to-face interviews. Data was collected from literature reviews from books, journals, articles, seminar conferences, and websites which emphasize building construction's labour productivity

2.1 DESIGN OF QUESTIONNAIRE

The set of questions, was targeting the factors affecting labour productivity in the different groups. It included factors affecting labor productivity. Respondents simply furnished of factors affecting productivity for given typical condition. Hence, each respondent had a choice to select only one option for each factor. The responses were to be based on the understanding, knowledge and experience of the respondents and not related to any definite project. This simple and straight method was selected to establish a means of developing a list of factors affecting labor productivity in building construction.

2.2 METHODOLOGY FLOW CHAT



3. STATISTICAL PACKAGE FOR THE SOCIAL SCIENCES

Statistics included in the base software:

- ☑ Descriptive statistics: Cross tabulation, Frequencies, Descriptives, Explore, Descriptive Ratio Statistics
- ☑ Means, t-test, ANOVA, Correlation (bivariate, partial, distances), Nonparametric tests

Prediction for numerical outcomes: Linear regression

- ☑ Prediction for identifying groups: Factor analysis, cluster analysis (two-step, K-means, hierarchical), Discriminant

3.2 RELATIVE IMPORTANT INDEX (RII):

The questionnaires are collected and analysed using statistical software package SPSS v 21. The ranking of factors was calculated based on Relative Importance Index

$$RII(\%) = \frac{\sum a \cdot n}{N} \cdot 100$$

Where;

RII=Relative Important Index

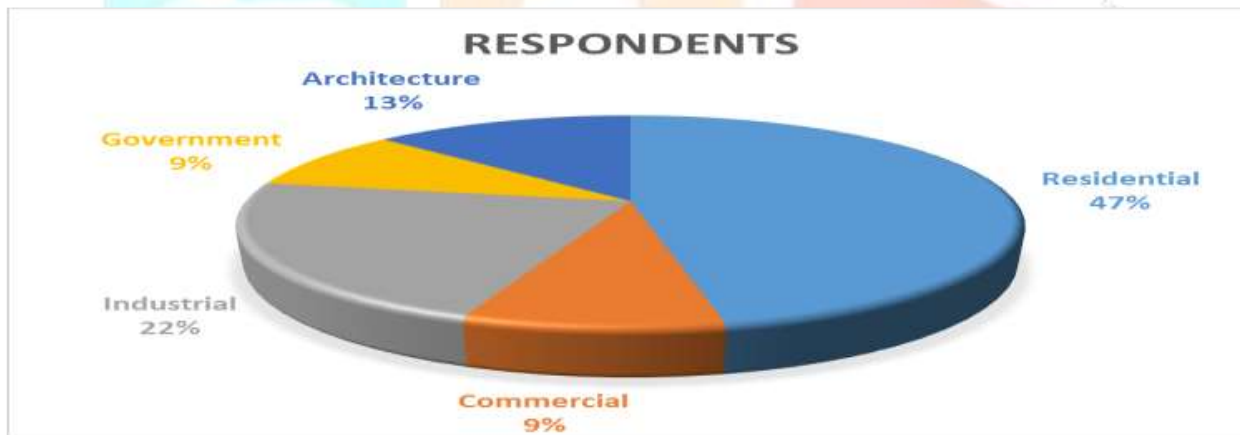
a=Constant expression weight

n=Frequency of response

N=Total number of response

3.3 Type of Construction Projects

The type of construction organizations that responded is shown in Table- 3.2 Only building construction project were considered.



3.4. Typical Size of Projects

The size of the projects in Indian rupees undertaken by the respondents' companies is shown in Table 4.3. Only building construction projects were considered for the study. Table 4.5. Typical Size of Projects, Research was performed considering, 40 factors affecting labor productivity for building construction were identified, and their RII was calculated. These factors were classified into five groups: manpower factors, external factors, communication factors, resources factors, and miscellaneous factors. Different groups used in the study are discussed in detail.

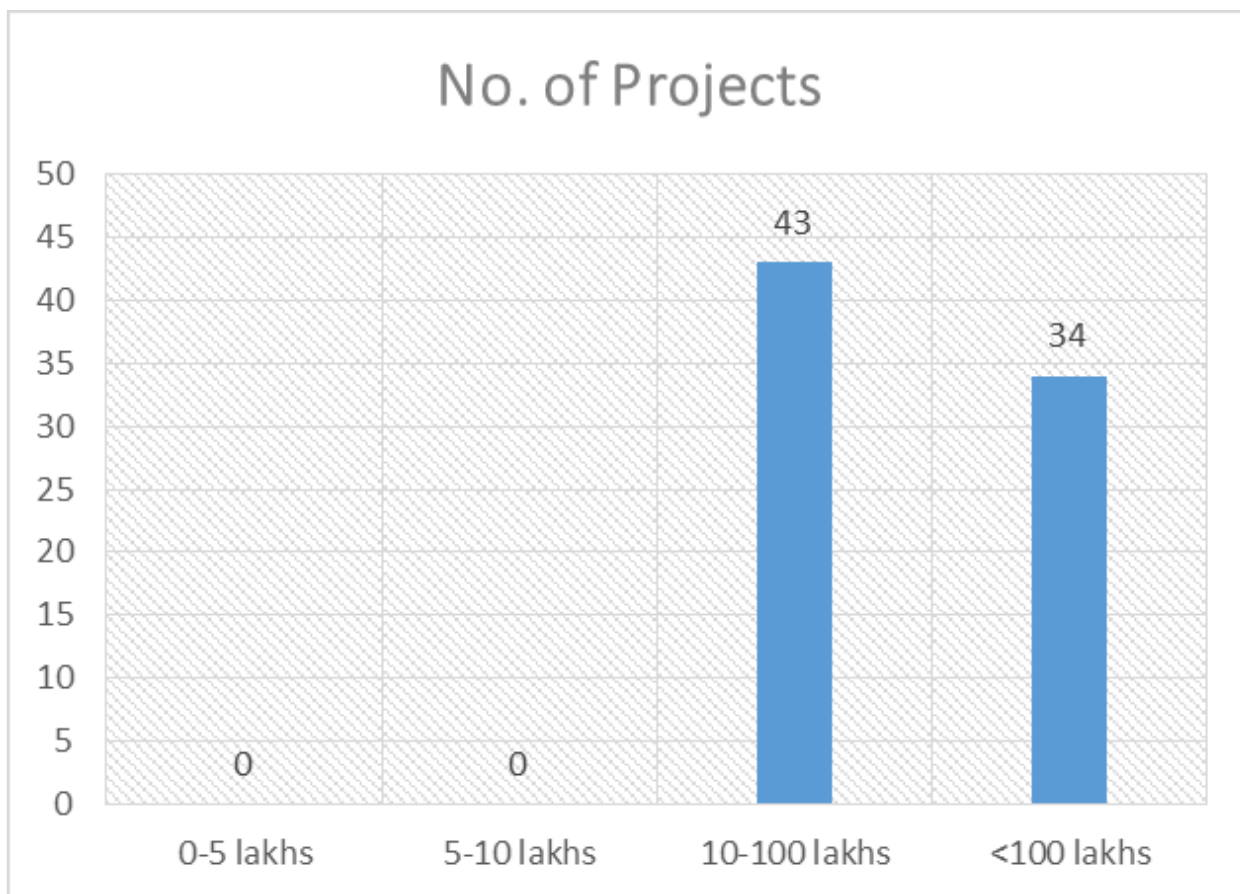


Fig:3.2. Typical Size of Projects

4.CONCLUSION:

The theoretical model of this study proposed fifteen independent groups affecting the variation of Labour Productivity in the construction projects namely Labour factors , Supervision factors , External factors , Owner/consultant factors , Execution plan factors , Designer , Working time factors , Equipment factors , Financial factors , Quality factors , Project factors , Organization factors , Leadership and coordination factors , Health and safety factors. This research is intended to identify the causes of probable factors affecting labour productivity in building construction. This study investigates all possible factors through a structured questionnaire administered all over Coimbatore. The survey results are subjected to analysis, and the ranking of factors is calculated using the Relative Important Index. The basic ideas of the research is to study various factors affecting labor productivity on construction. The target groups in this study were construction professionals. Total of 125 questionnaires were distributed, and 83 questionnaires (66.4 % response rate) were returned. Because project engineers, project managers have vast experience in construction, their adequate experiences were a proper suggestion to study about the various construction factors affecting labor productivity.

So we have to recommend some ideas to develop the labour productivity from this research.

REFERENCES

1) COMPARATIVE STUDY OF LOCAL AND MIGRANT LABOURS FOR PRODUCTIVITY ENHANCEMENT IN CONSTRUCTION FIELD by Mr.S.S.Janagan, Prof K.Thirumalairaja-International Journal of Innovative Research in Science, Engineering and Technology,-

(Feb 2014)

2) STUDY ON THE FACTORS AFFECTING THE PERFORMANCE OF LABOURS IN INDIAN CONSTRUCTION INDUSTRY by B.Vijay Antony Raj, Mrs.P.S.Kothai - International Journal of Innovative Research in Science, Engineering and Technology-

(Feb 2014)

3) LABOUR PRODUCTIVITY AND POSSIBILITIES OF ITS EXTENSION BY KNOWLEDGE MANAGEMENT ASPECTS by Vladimir Bures, Andrea Stropkova - Procedia - Social and Behavioral Sciences 109

(2014)- PP :1088 - 1093

4) FACTORS AFFECTING THE PRODUCTIVITY OF BUILDING CRAFTSMEN - STUDIES OF UGANDA by Henry Mwanaki Alinaitwe , Jackson A. Mwakali , Bengt Hansson- Journal of civil engineering and management-(March 2007)

