

# Study on Labours Productivity Management in Construction Industry

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**Abstract**— Productivity remains an intriguing subject and a dominant issue in the construction sector, promising cost savings and efficient usage of resources. Productivity is one of the most important issues in both developed and developing countries. The developed countries are aware of the importance of economic growth and social welfare. The developing countries which face unemployment problems, inflation and resource scarcity seek to utilise resources and in such a way as to achieve economic growth and improve citizens lives. The aim of this thesis is to identify factors which are affecting labour productivity and also to study causes i.e. labour problems on site and its effects on the construction projects. Some of the important factors affecting labour productivity are: quality of site management, labour experience, misunderstandings between labour and superintendent etc. The problems faced by the labour on Indian construction sites are dealt with in detail. Problems like non-availability of proper accommodation, basic amenities, low wages, safety related problems etc. dominate on almost all Indian construction sites. The small firms in India are not able to fulfil labours requirements, and that is why labour is not able to raise their productivity. In fact it is found that actual labour productivity ratios are reducing day by day, which in turns harms organization's profitability. In this study we will try to relate the ill effects of falling labour productivity with the productivity of other resources such as material, equipment and capital. This thesis restricts itself to the survey and research in the Indian context. Analysis of obtained data was done using different statistical methods.

**Key Words**— Productivity, Labours Productivity, Hypotheses ,Statistical Analysis, RII, Five Point Likert Scale Rating.

## 1 INTRODUCTION

MODERNIZATION and industrialization has helped the construction industry grow in leaps and bounds. Small towns and cities have become more urbanized and, the construction sector too has got a boost. Irrespective of occasional slumps in the economy or in construction works, the sector is going through a faster growth. Apart from old / traditional urban/ industrial centers, new industrial/urban centers have appeared on the map where construction works are going on Expanding and fast growing construction sector and, in general, lack of greater employment opportunity elsewhere has drawn large number of workers in this sector. There are more than 25 million of construction workers in India at present. Cities, like Delhi alone have around more than 700 thousand of them. Apart from metros other cities, like Jamnagar in Gujarat, Guwahati & Shillong in the Northeast are also expanding at fast rate.

Migration from different states to other states in India has now become so rampant that its impact is felt in every aspect of life Migration becomes a way of life to many, who are unskilled and semi skilled and find it difficult to get better jobs within their native and locality. These migrant workers are spread across the width and length of the country.

Most of the construction labourers migrate to cities and metros are from poor families and are illiterate. Their lack of education and skill make their choices very limited. When they come to big cities, they have to face a number of problems because of their inexperience and lack of skill. They become easy victims of exploitation and have to work for their day-to-day sustenance.

This study has been focused on primary data search by obtaining views from labourers as well as contractors/owners/managers. The study identifies factors affecting productivity at construction sites and to study and analyses the consequential impact of labour productivity on other resources of construction.

## 2 DEFINITIONS

### 2.1 Productivity

It is an economic measure of output per unit of input Also productivity is a ratio of quantity and quality

### 2.2 Labour productivity (work force productivity)

Labour productivity measures the amount of goods and services produced by one hour of labour.

## 3 METHODOLOGY

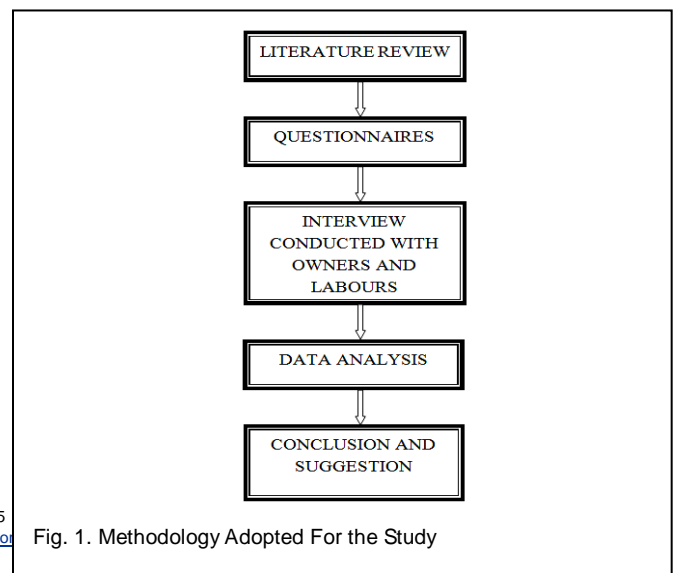


Fig. 1. Methodology Adopted For the Study

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This section discusses methodology of the research. The major processes which are involved in conducting this study are shown in Figure 1. The preliminary insight of the subject data for this study has been collected through a literature review followed by the use of a questionnaire survey targeted at contractors, subcontractors and labours. The literature review was conducted through books, internet and leading construction management and engineering journals. In this stage, factors contributing to the reduced labour productivity and the impact of reduced labour productivity on other resources of construction industry are studied. On the basis of literature study, definition of productivity and different problems which contributes in lowering the productivity was derived.

After deriving the productivity and related problems of labour, two different questionnaires for employer and workers were prepared. The details about labour's working conditions, wages, expenses, timing, facilities provided to them, training etc are included in these questionnaires. Some of the questions are kept such that it can offer an opportunity to find the degree of variance between the two (employers and workers). One more survey also required to know the relative importance of different factors which contributes to lower productivity from the employers suggested in this report.

Interview will be conducted from medium to large size construction sites of Chennai, Trichy, Coimbatore, and Madurai with in Tamilnadu. Different types of sites like residential, commercial, industrial etc will visit to get variety of data. As labours are migratory, random sampling are found to be appropriate to represent the community. After collect required number of samples, data analysis will do to arrive at different factors which lower the productivity. These factors are then analyses to find its effect on different aspects of the project. The survey will carried out using convenient random sampling. The data from this survey will analyses and then most important factors are further study and discussed detail.

#### 4 HYPOTHESES

Prior to design of the questionnaires following hypotheses were assumed, Construction labour breeds informality due to migration this informality lowers productivity growth. Technical, social, physical, psychological, economic and security problems lower labour productivity on construction sites. Construction firms engage little in technology adoption, have high labour turnover and do not invest in training workers, Indian construction industry is facing problems of improper handling and inefficient utilization of resources like material and equipment which reduces profitability due to low and decreasing labour productivity.

### 5 ANALYSIS METHOD

To obtain the data required for the study, a questionnaire was prepared. Different factors which were found from earlier works in book and journals were listed in the questionnaire. To analyse the data obtained by survey, statistical methods were used. The first was to acquire percentage values based upon the frequencies of the answers received. The other was to calculate a relative importance index (RII). For this purpose, a rating scale of 1 to 5 was adopted with 1 representing the lowest level of effect and 5 representing the highest level. The RII was evaluated by the following expression

$$RII = \frac{\sum_{i=1}^5 W_i X_i}{\sum_{i=1}^5 X_i}, \quad (1 \leq RII \leq 5),$$

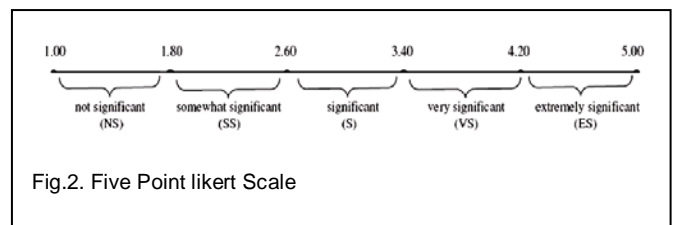
Where,

$W_i$  = The rating given to each factor by the respondents ranging from 1 to 5, with 1 representing 'not significant' and 5 representing 'extremely significant'

$X_i$  = The percentage of respondents scoring;

$I$  = The order number of respondents.

The numerical values calculated by the above formula were then differently classified as can be seen in Fig 2, because a single point or number changing from 1 to 5 in questions no longer symbolizes each verbal scaling expression in the evaluation phase. Namely, since the results are obtained as decimal numbers instead of integer numbers, a specific scale should be established. Thus, 5 expressions are defined by the intervals of 0.8. In addition to calculating the relative index scale, the percentages of respondents scoring 2 or fewer, 3, and 4 or more, on the significance scale were also evaluated for each factor. These were used to rank the factors in which relative importance indices were the same.



### 6 SURVEY ANALYSIS

#### 6.1 SURVEY I

Survey 1 targeting to employer of construction workers revealed following information.

- ↳ In our samples we found that 68% are more than 3 year duration projects, 20% are in between 1 to 3

years and remaining 12% are less than 1 year duration projects.

Entire project cost break up is as followed

Materials	: 35%
Labour	: 30%
Equipments	: 15%
Profit	: 10%
Indirect Cost	: 05%
Over Head	: 05%

- ↻ 15% labour is employed labour, 55% is sub-contracted labour and 30% is independent labour. As departmental labour are least, labour do not feel like working for their own organization which contributes in lowering labour's productivity.
- ↻ 80% contractors said they worked in single shift, 15% are working in 2 shifts, 5% said they work in 3 shifts and none of them are working more than 3 shifts. Worker working in single shift are forced to produce more each day, due to higher work load everyday labour tend to reduce their capacity of work day by day.
- ↻ 40% of sites are working for 8 to 9 hours/day, 35% are working for 9-10 hours/day, and 15% for 10 to 11 Hours/day and rest of them are working 11-12 hours/day. Section 3.6 explains relation between shift timing and efficiency of labour. If applied here, more than 50% of labour are working for more than 10 hrs a day and hence this tend to reduce labour productivity.
- ↻ 57% contractors pay wages on monthly basis, 17% pay wages basis, 13% pay project wise and rest 13% pay on daily basis. When same was asked by the labourers on site they said wages paid are not regular and their leader decides the pattern in which wages will be paid. Hence, labours are not able to plan and utilize their earnings in efficient manner.
- ↻ 61.66 % contractors are not satisfied with current productivity of the labour and 38.33% contractors are satisfied with the current productivity of the labour. Due to this impression of employers they do not give much importance to labour and do not provide ways and means to them by which they can be motivated to produce more.
- ↻ 72% are planning to go for more mechanised work while 28% contractors are satisfied with current work. This can be directly related to above figure 6.7.

As employers are not satisfied with labour productivity they tend to go for more mechanized work.

- ↻ 38% of contractors find high difficulty in handling the labour, 40% find it at moderate level while only 22% contractors find less difficulty in handling the labour. A majority of the sample found handling labour on site difficult. This implies that worker discipline problems are very high in construction industry.
- ↻ 43% of labours are working less then a year for a particular organization, 39% are working for 1 to 3 years and where as only 18% are working for more than 3 years. As 68% projects are greater than three years duration but labour working greater than 3 years on a particular site is only 18% which results in huge continuity problems and production problems If we compare this with project duration than we can say that very less number of labourers work for at least a single whole project. Hence, labour are highly migrated and do not find their permanent employment

## 6.2 SURVEY II

Survey 2 targeting to employees of construction workers revealed following information (analysis of labour data)

- ↻ Labour sample consists of 71% males and 29% females.
- ↻ Samples were collected in such a way that labours from all age groups are covered. Sample comprises of 8.5% below age of 18 whereas 38.5%, 34.5% and 18.5% respectively are from age groups 18 to 30, 30 to 50 and above 50 years. Labour in the bracket of 18 to 30 years of age can work harder as compared to other labour.
- ↻ Similarly labour with age between 30 to 50 years are having experience in the field so they can work making less mistakes and also can suggest solution to some of the onsite problems. Labour with more than 50 years generally work as mason. They try and 30% of the labour has been working in construction industry from last 2 to 5 years where as 24%, 21%, 18% and 7% of labour are working from last 5 to 10 years, 1 to 2 years, less than 1 year and more than 10 years respectively. Work experience always help person to do work more efficiently and can find solutions to the problems. Majority of labour are having work experience more than 5 years. Still they are not grown

much in the responsibility that they have to carry. This is just because they inculcate informality while working on sites.

- ↪ Only 17% of Labourers have got some training before starting the work. If proper training is provided to workers, they can work efficiently which increases their productivity.
- ↪ In the sample collected there are 54% skilled labour, 13% semi-skilled and 33% are unskilled labour.
- ↪ 60.5% of labourers are working for 11-12 hrs in a day, 17% for 9-10 hrs, 14% for 8-9 hrs and 8.5% for 10-11 hrs a day. More than 60% labour says they work for 11 to 12 hrs a day whereas the employers say that the maximum labour is working only 8-9 hrs a day.
- ↪ 63% labourers are partially satisfied with their work, 26.5% are not satisfied with their work, 9% are satisfied with their work and 1.5% is fully satisfied with their work. This indicates a very high degree of work related dissatisfaction.
- ↪ Out of the sample size 31.5% labourers are generally working for concreting work, 26% are helpers, 19.5% are carpenters, 12% are bar benders, 3% are welders and rest 9% are employed for other works.
- ↪ 54% labourers feel that they are getting good working environment, 15% feel that they are working in an excellent environment, 22% feel that they are getting average working conditions and 9% feel that they are working in poor conditions. The contradiction is because they come from very poor background and they do not care about the working conditions. As majority of labour are young they can work in any condition given to them. The only concern for them is earning enough money for their family.

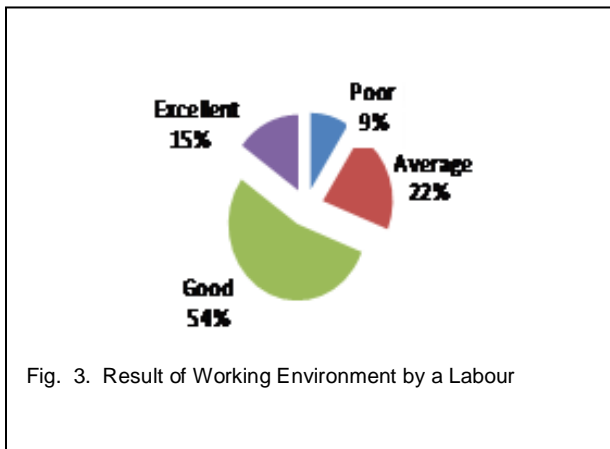


Fig. 3. Result of Working Environment by a Labour

↪ Above graph shows that labour are most productive in first 2 to 3 hrs in the morning followed by night hours.

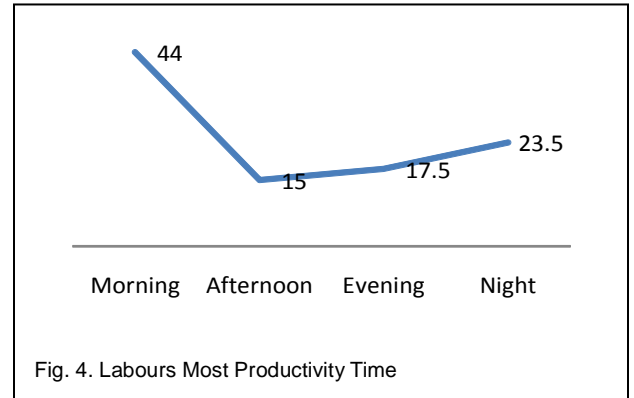


Fig. 4. Labours Most Productivity Time

## 7 OBSERVATION

TABLE 1  
 FACTORS WITH THE VALUE OF VARIANCE WHICH ARE OBSERVED

Factors	Contractor's view	Laborer's view	Variance
Work Experience	Worker with more experience are given priority on work. More responsibility is given to worker with more experience.	More work experience, faster the work	Zero
Training	Generally workers learn while they Work. So training is not that important.	Training gives them confidence and motivation to work.	High
Types of Labour	Working as a departmental labour is more preferable than any other types of labour.	Departmental labour is advisable for the better productivity. Independent labours are not flexible as compare to departmental & sub contract	Zero
Working Environment	Some of the basic amenities are provided by the contractor.	Productivity can be improved if better working conditions are provided.	High
Medical Aid	First aid kit is kept on all sites for everybody, Most of the contractors have taken group insurance for the labour.	They do not care about minor injuries. For major injuries firm takes care if any accident occurs on site.	Low
Wages	Wages are generally given depending on the market price.	More wages will motivate them to work more.	Very high

## 8 CONCLUSION AND RECOMMENDATION

Construction labourers are migratory in nature and therefore geographically mobile searching for employment. Thus their employers keep on changing it is impossible for both the parties to develop long-term relationships and loyalty to their employers. It also affects the seriousness with which they approach their work which is the major prerequisite for high productivity. Also most of the construction labour is also

engaged in some other profession like farms, factory, domestic servant etc. and hence they do not give full importance to construction work and tend to work informally. Due to this labour cultivates informality, and Informality lowers productivity growth. Preference analysis survey reveals that technical, social, physical, psychological, economic and security problems lowers labour productivity on the construction sites. Here suggest following to improve labour productivity:

### **8.1 Use of Modern Management techniques**

The construction firms are slow in accepting and using modern management methods to plan and execute projects. Every actor should improve their performance by developing project goals and working towards their fulfilment. Use available management systems and techniques to make construction managers more effective.

### **8.2 Proper Planning**

Planning begins from the day a project is conceived. Managers should try to plan the project in such a way that there are no repetition of work, no emergency and less number of overtime in the project. For this, manager should develop an overall plan providing a general outline of work using bar or flow charts. He should also develop contingency plans if the original plan fails. He should prepare a detailed planning for work execution at the task level.

### **8.3 Provide skills training**

Labour should be knowing what kind of work he is doing and what is the best method to do it. It improves labour productivity in a big way. It can be understand that labour are not permanent employees to any organisation but then if training will be provided to them, they will be motivated to work for the same organisation for longer duration. Government should also look into this issue as employer do not spend much on training due to insecurity of loyalty from labour.

### **8.4 Enough tools in working order**

Labour should not sit idle just because of non availability of tools. Labour should be provided with enough number of tools those are required by them to carry out the work. For this supervisor should be asked about the requirements of all the tools well before any specific activity starts.

### **8.5 Motivation through incentives and other programs**

Incentives always motivate your people to work for you. Labour should also be given incentives as they are the actual executer of any successful work. It also attracts labour to work for longer time for an organisation.

### **8.6 Proper amenities to be provided**

Labour should be provided with all their basic requirements like permanent shed, appropriate bathrooms and toilets on sites, transportation etc. All above things may not be

demanded by them as they come from very poor background and hence they do not care for all those things but, if these things are provided they tend to concentrate more on work. Hygienic accommodation and toilet keep them healthy to work for you.

### **8.7 Good supervision**

Good supervision is very much essential to get maximum output from the labour. Good supervision avoids mistakes and in turn rework. Supervisors should have good interpersonal skills to get work done through labour.

### **8.8 Safety program**

Accidents on sites are now common phenomenon in complex and congested site locations. Labour should be provided with full safety training and required PPEs to safeguard themselves from dangerous accidents. Apart from losing on man-hours, an accident on site can spoil all the reputation of the company in the mind of all the stakeholders including labour. Labour feel secured at safe sites and tend to produce more.

### **8.9 Departmental work force**

It is found that departmental labour tend to work more efficiently and qualitative as compared to other type of labour. Try to hire more and more labour for longer duration. It will give confidence of availability of labour with organisation and will also help in qualify for bigger projects.

### **8.10 Governments involvement**

Huge numbers of labour are working for different infrastructure project which are going on now a days. Infrastructure projects always have perspective of employment of labour into these projects. The contracting companies working for these projects are not satisfied with labour productivity and hence, are planning to go for mechanised work. More mechanized work will increase unemployment in labour. Government should look into training and development of labour. There should be special budget allotment for training and development of construction labour. Trained labour can be more productive and employer may find themselves satisfied with the work. Employer can also be asked to help and support the initiative to allow their labour to attend such training. The expense of training can be recovered from labour themselves by loan system, as their wages will be increased with more skills and they will be able to take out extra money from their wages to train and upgrade their own selves.

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