

Factors Affecting Labor productivity in Bangalore

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Abstract— Construction is a labor intensive industry. Labor productivity combines all the other resources namely: materials, plant equipments, management and finance leading to construction productivity. Labor cost consist 30-50% of the overall project cost and all other factors are either directly or indirectly related to labor factor. The objective of this research is to identify and rank the relative importance of the factors attributing to labor productivity in Bangalore, Karnataka. To achieve this objective , questionnaires were prepared that comprised of most of the relevant factors affecting labor productivity. The factors were classified into six primary heads: Labor ,Management ,Design / build ability ,Tools and equipments ,Natural and Miscellaneous . The sixty one factors were identified, ranked and based on the ranking suitable measures were taken to provide guidance to construction managers and contractors for complete utilization of the labor force.

Keywords—Bangalore,construction productivity, labor productivity, Ranking, Relative Importance Index.

I. INTRODUCTION

Construction productivity and labor productivity are two important words that determine the profit and loss of construction business. Labor productivity is a sub domain of the overall construction productivity at the same time construction productivity is highly dependent on labor productivity as construction is a labor intensive industry. In most countries , experience and literature showed that the labor cost alone will account for 30-60% of the total cost of the project (Gomar et al 2002;Hanna et al 2002)[1]. Since labor productivity determines the economy of a project ,having a control over labor productivity and the related factors will increase the overall productivity. In construction industry numerous activities are involved which relies only on human resource ,so an effective use and proper management of labor for each activity is very important. In spite of all the technological advancements and education , improved construction materials , advanced tools and equipments, most of the projects are outrunning the planned budget and time. In spite of all these labor productivity is still overlooked

I. OBJECTIVES OF THE STUDY

This study is made to achieve the following objectives

- To identify the factors affecting labor productivity in the field of construction

- To rank the factors based on Relative Importance Index
- To suggest methods to improve on factors based on RII

II. LITERATURE REVIEW

Thomas et al 1990[2] defined productivity as the ratio of units of output per work –hour. Lim and Alum (1995)[3] identified seventeen factors that affect labor productivity in Singapore in which difficulty in recruiting the supervisors and labor turnover topped the list. Zakeri et al (1996)[4] identified 13 major factors in Iran, material shortage and site / weather condition was ranked first and second respectively. Enshassi et al (2007)[5] made a study and identified forty five factors affecting labor productivity in Gaza strip. Materials shortage and lack of labor experience were found to be highly significant. Abdul Kadir et al (2005)[6] found out that material shortage at site and nonpayment to the suppliers topped the list of fifty factors that affected labor productivity in Malaysia.

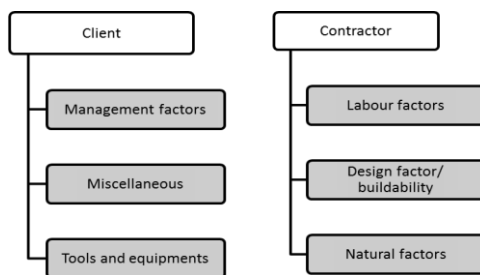
Alinaitwe et al (2007) [7] identified thirty six factors affecting labor productivity in Uganda .incompetent supervision and lack of skills among workers were the most significant ones. Durdyev and Mbachu (2011)[8] identified fifty six factors affecting labor productivity in New Zealand and the important factors found out were rework and skill and experience of the labor force. El Gohary and Aziz (2014) [9] identified thirty factors and classified them into three categories: human/ labor, industrial and management in Egypt. Homyun Jung et al (2009) [10] identified twenty five variables and they were characterized into four groups : work management, work technique, work characteristics and worker component. Jarkas and Bitar(2012)[11] identified forty five factors and RII was carried out, clarity of technical specifications had the highest RII followed by extent of variation/ change orders during execution.

From the above literature it can be seen that material shortage at site is a major problem faced by the construction industry. incompetency of supervisors and rework were also found to be major factors affecting labor productivity.

III. RESEARCH METHODOLOGY

The methodology used for this study consists questionnaire survey which is designed to receive the necessary information regarding labor productivity. Based on the previous literature reviews maximum possible factors were identified and listed. From the list, those factors that are relevant to Bangalore construction environment were considered with inputs from professionals and practitioners and the other factors were discarded. Sixty one identified factors were divided into two questionnaires, one for contractors and second one for the client.

TABLE I. CLASSIFICATION OF THE FACTORS



Random sampling techniques is used to ensure the sample size by using the equation Eq(2) (Hogg and Tanis 2009)[12]

A minimum of forty five responses were to be collected for each of the 2 questionnaires.

The data collected were analyzed using Relative Importance Index which is calculated by the formula shown in Eq(4)(Lim and Alum 1995[3]; Jarkas and Bitar 2012[11] ;El Gohary and Aziz 2014)[9]

Higher the RII, higher will be its effect on labor productivity.

A. Questionnaire design

The basic rule for a questionnaire is that the questions should be simple, clear and understandable. All the factors identified based on the previous literature , with inputs and revisions by the experts. All the sixty one identified factors were classified into six heads labor, management, Design / buildability, Tools and equipments, Natural ,Miscellaneous. These six categories are further classified into client and contractor factors which are shown in table I. The questionnaire has three parts

(1) Personal information

(2) Questions.

A 5-point Likert scale is used to rate the response. The respondents had to rate the questions from “1” to “5” that is the level of importance, where “1” represents not affected ,”2” less affected, ”3” moderately affected, “4”highly affected, and “5” extremely affected.. These numbers are not an indication of absolute quantities.

(3) Suggestions by the respondent on improving labor productivity

B. Pilot study

To ensure the validity of the questionnaire a pilot study was carried out to validate the questionnaire the questionnaire was given to six experts / professionals with more than twenty years’ experience and based on their response reliability test was carried out. It was done to

- check the clarity, comprehensiveness, and appropriateness of the questions
- to check the range of responses
- to check the efficiency with which the questionnaire is completed by the respondents.

IV. RESULTS AND DISCUSSION

The two questionnaires comprising of twenty three and thirty eight questions ,each for client and contractor is analyzed for RII. In the first RII analysis all the sixty one factors are taken into account and is ranked from one to sixty one regardless of classification. Only first fifteen ranks are taken into consideration It is shown in Table 2.

TABLE 2. RELATIVE IMPORTANT INDICES IN GENERAL OF ALL THE FACTORS

| FACTORS | RII % | RANK |
|---|--------|------|
| Poor work planning & Scheduling | 85.217 | 1 |
| Unclear Project goals / milestones | 84.348 | 2 |
| Poor co-ordination between different departments (contracts, finance etc) | 83.478 | 3 |
| Stoppages due to disputes with stake holders, consultants etc | 82.609 | 4 |
| Health & safety factors | 81.739 | 5 |
| Equipment selection specific to job | 80.870 | 6 |
| Quality due to lack of labor experience | 80.000 | 7 |
| Accidents during construction | 79.130 | 8 |
| Old & inefficient equipment or call it equipment condition /performance | 78.261 | 9 |
| Adverse / severe weather conditions | 78.095 | 10 |
| Contractual conflicts | 77.391 | 11 |
| Tool & equipment shortage | 77.143 | 12 |
| Safety violations | 77.143 | 12 |
| Level of Management control | 76.522 | 13 |
| Obtaining approvals (legal/jurisdictional) | 76.522 | 13 |
| No clear directives | 76.522 | 13 |
| Economic slowdown/Recession | 76.522 | 13 |
| Availability of Drawings | 76.190 | 14 |
| Drawing errors | 76.190 | 14 |
| Design Complexity | 76.190 | 14 |
| Poor soil conditions | 76.190 | 14 |
| Poor terrain conditions | 76.190 | 14 |
| Design Changes | 75.238 | 15 |

From table 2 it can be seen that “poor work planning and scheduling” with an RII of 85.217% topped the list followed by unclear project goals/milestones, poor coordination between different departments, stoppage due to disputes with stake holders/consultants etc., health and safety factors with RII of 84.348,83.478,82.609,81.739 respectively. The top ranking factors are all management related factors. It is the management factor that affects labor productivity more than labor factor itself. Previous research shows that improper planning and unrealistic goals will have a negative impact and will lead to disputes between clients and contractors. Health and safety has an RII of 81.739 and is ranked fifth. Equipment selection specific to job categorized under tools and equipment ranked sixth has an RII of 80.870. Labor experience is an important factor that affects productivity and the quality of work. It has an RII of 80% with a ranking of seven. Rank 13 is shared by mostly management factors and has an RII of 76.522, the sharing factors include Level of management control, Obtaining approvals, no clear directives and economic slowdown or recession. Availability of drawings, drawing errors, design complexity are the design factors with RII 76.190 and ranked 14. Poor soil conditions and poor terrain conditions also share the same RII and rank.

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