ANALYSIS OF FACTORS AFFECTING LABOUR PRODUCTIVITY IN CONSTRUCTION

Shree Raja Gopal T G and Murali K

THE OFFICIAL PUBLICATION OF
INTERNATIONAL JOURNAL OF RECENT SCIENTIFIC RESEARCH (IJRSR)
http://www.recentscientific.com/recentscientific@gmail.com
**INTRODUCTION**

Construction is a labour intensive industry and productivity of the labour is one of the most significant factors which affect the overall performance of any organisation, since labour cost comprises 30-50% of the overall project’s cost (Yates and Guhathakurta 1993; Metcague and Jergeas 2002). The output of the construction sector constitutes one half of the gross capital investment, constituting major part of production in construction projects, many factors are varying at immeasurable rate and are difficult to foresee. It is inevitable to make sure that reduction in productivity does not affect the scheduled work and cause delay in the project. Thus, identification of the factors affecting labour productivity at micro level is important, since considerable cost can be reduced if productivity is improved because the similar work can be done with less manpower, thus reducing the overall labour cost (Thomas 1991). The main objective of this paper is to identify and rank the relative importance of factors recognized to affect the labour productivity on construction sites.

**REVIEW OF LITERATURE**

**Definition**

In 1950, the organization for European Economic Co-operation (OEEC) introduced a formal definition of productivity as quotient obtained by dividing output by one of the production factors (Sumanth 1984). The United States Department of Commerce defines productivity as “dollars of output per person-hour of labour input” (Adrian, 1987). Handa and Adballa (1989) defined productivity as the ratio of outputs of goods or services to input of basic resources. Arditi and Mochtar (2000) referred productivity as the ratio between total outputs expressed in Dollars and total inputs expressed in Dollars as well. In 1883, Littre defined productivity as the faculty to produce (Jarkas 2005).

**Factors affecting labour productivity**

Lim and Alum (1995) classified various factors impacting the construction productivity in Singapore and shortlisted the following as most significant: (1) Lack of qualified supervision; (2) Shortage of skilled labours; (3) High rate of labour turn over; (4) Labour absenteeism and (5) Communication with foreign labours.

In a survey geared towards identifying the constraints on Iranian construction productivity, Zakari et al (1996), using the...
relative index ranking technique, ranked the five following factors as major impacts: (1) Material shortage, (2) Weather and site condition, (3) Equipment breakdown, (4) Drawing efficiency/change orders and (5) Lack of proper tools and equipment.

Makulsawatudom et al (2004) researched the influence of 23 factors on the productivity of the construction industry in Thailand and deducted that lack of material, incomplete drawings, incompetent supervisors, lack of tools and equipment, labour absenteeism, poor communication, instruction time, poor site layout, inspection delay and rework, are the most critical.

Alnaitwe et al (2007) studied the impacts on the productivity of craftsman in Uganda and concluded that, (1) Incompetent supervisors, (2) Lack of skill, (3) Rework, (4) Lack of tools/equipment and (5) Poor construction method, are among the most influential.

Aynur Kazaz et al (2008), moreover surveyed 82 firms on factors affecting labour productivity in Turkey and identified the following nine factors as most important to labour efficiency: (1) Quality of site management; (2) Material management; (3) Amount and on payment; (4) Planning; (5) Supervision; (6) Site layout; (7) Work discipline; (8) Occupational education and training; (9) Working at similar activities, based on relative importance index method.

Soekiman et al (2011) explored various factors affecting labour productivity in Indonesia and shortlisted the following as most significant: Lag of materials, Delay in arrival of material, Unclear instruction to labour, Labour strikes, Financial difficulties, Higher absenteeism of labour, No supervision method, Supervisors absenteeism, Lag of equipment and design change.

Grouping of factors affecting labour productivity

Herbsman and Ellis (1990) reported two-group main divisions of influencing factors: (1) Technological and (2) Administrative.

Talhouni (1990) grouped four categories responsible for affecting productivity on construction sites: (1) Management; (2) Site; (3) Design; (4) Weather.


Brent and Ellis (2014) classified productivity factors into four major groups: (1) Management, (2) Human/Labour, (3) Technological and (4) External. Nearly 24 factors were accounted in management factors, the most significant factors based on relative importance index were lack of labour supervision, unrealistic scheduling and expectation of labour performance, lack leadership, payment delay and communication. Human and labour factors include, shortage of experienced labour, skill of labour, motivation of labour and physical fatigue. 12 factors were included in technological group and ranked on RII, the five most significant factors were; delay in responding to request for information, rework, extent of variation/change order during execution, clarity of technical specification and co-ordination level among design disciplines. Rain and high temperature were grouped under external factors.

Robles et al (2014) grouped a set of 35 factors to identify factors affecting labour productivity in Spain with respect to their relative importance. Factor explored were grouped in five different categories according to the nature of each factor namely, (1) Project, (2) Human, (3) Management, (4) Material and tools, (5) Environmental. Based on RII the five categories were ranked as: (1) Material and tools, (2) Management, (3) Human, (4) Project, (5) Environmental.


METHODOLOGY

Online survey was carried out among the various construction professionals such as Project Manager, Project Engineer, Assistant Project Manager, Assistant Project Engineer, Site Engineer, Architect and other who work on project from management level to operational level. The questionnaire consists of three parts. First part consists of the general information of the company. Second part consists with set of questions targeting the factors affecting labour productivity in the nine different groups that is the (1) workforce group; (2) management team; (3) psychological group; (4) material/equipment group; (5) supervision group; (6) schedule compression; (7) material/equipment group; (8) supervision group; (9) external group. Third part consists of the respondent’s information. The responses collected were based on the understanding, knowledge and experience of the respondents and not related to any particular construction project. Table 1 shows the list of factors considered for the study.

Data Analysis

On completion of the online survey, 108 professionals from the various construction industries have responded. Some researchers, i.e. (Assaf et al 1995, Faridi and Sayegh 2006, Kumaraswamy 1998) are of the opinion that mean and standard deviation of individual factor is not a suitable measure to assess global ranking as they do not reflect any relationship between them. So the technique used for analysing data was the relative importance index (RII). The analysis involves the computation of weighted average or representative rating point for the collective rating made for each variable in the subset (Durdyev and Mbachu 2011). Table 1 represent the scale used for representation of effect of different factors on labour productivity used in the questionnaire

In order to facilitate the study, after a number of literature reviews and personal interviews with field professionals, a plan was formulated for collecting field information and creating an evaluation process and numerical values. Relative Importance Index (R.I.I) method used for analysis of the survey results.
RESULT AND DISCUSSION

Based on the Relative Importance Index (R.I.I) top ten factors affecting labour productivity in construction are presented in table 2.

Table 2 Top 10 factors affecting labour productivity

<table>
<thead>
<tr>
<th>Rank</th>
<th>Factor</th>
<th>R.I.I.</th>
<th>Related group</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lack of skill and experience of the workers</td>
<td>86.48</td>
<td>Workforce group</td>
</tr>
<tr>
<td>2</td>
<td>Late payment</td>
<td>86.41</td>
<td>Psychological group</td>
</tr>
<tr>
<td>3</td>
<td>Poor health of the workers</td>
<td>85.98</td>
<td>Workforce group</td>
</tr>
<tr>
<td>4</td>
<td>Low amount of pay</td>
<td>85.79</td>
<td>Psychological group</td>
</tr>
<tr>
<td>5</td>
<td>Lack of empowerment</td>
<td>84.67</td>
<td>Workforce group</td>
</tr>
<tr>
<td>6</td>
<td>Poor work planning</td>
<td>83.77</td>
<td>Schedule compression</td>
</tr>
<tr>
<td>7</td>
<td>Design changes</td>
<td>83.55</td>
<td>External group</td>
</tr>
<tr>
<td>8</td>
<td>Lack of labour safety</td>
<td>83.20</td>
<td>Safety group</td>
</tr>
<tr>
<td>9</td>
<td>Poor condition of equipment/tools</td>
<td>83.01</td>
<td>Material/ equipment group</td>
</tr>
<tr>
<td>10</td>
<td>Ignore safety precautions</td>
<td>82.96</td>
<td>Safety group</td>
</tr>
</tbody>
</table>

The lack of skill and experience of the worker factor ranked 1st among the 54 factors, having a R.I.I 86.48%. So it is the most important factor affecting the labour productivity construction. Lack of skill and experience of the worker became a cause disturbance in the work progress. Specialization and expert in work define a worker to be skilled. Increasing demand of skilled labour due to the use of technology at construction sites such as computerized machines and plant will increase labour productivity.

Late payment factor ranked 2nd among all 54 factors with R.I.I of 86.41%. Without smooth financial flow we can’t imagine good performance of the project. A time to time payment will motivate the labour and improve productivity.

Poor health of the worker factor ranked 3rd with 85.98% R.I.I. The exhaustion of the worker is due to long working hours. Poor health decreases the concentration on work, which directly reduces the productivity.

Low amount of pay factor ranked 4th. With proper and suitable amount of pay psychologically motivates the worker. A monetary pay further promotes the objective of operatives and creates a high level of motivation and satisfaction among them, as a result higher efficiency can be achieved.

Lack of empowerment factor with 84.67% R.I.I ranked 5th. Empowerment is the act of identifying the task on which a labour is trusted to act independently versus those tasks the labour must get approval before proceeding. Empowering labours requires a great deal of trust by the Project Manager.

Poor work planning factor ranked 6th with 83.77% R.I.I. Poor work planning may lead to lack of business support, poor estimates, poor scope control. Before actual work of project begins, spend time to define project objectives, scope, assumptions, risk, budget, timeline and overall approach.

Design changes factor ranked 7th. Recognized significant impact of this factor on labour productivity are, insufficient duration imposed upon designers to develop and review design alternatives. Finalization of design should be made to avoid these constraints.
Poor condition of equipment/tools ranked 9th with 83.01 R.I.I. The continuous fetching can waste labour energy and may cause physical fatigue to the workers, which could otherwise be productively used in the other activity under progress.

Lack of labour safety factor and ignore safety precautions factor ranked 8th and 10th with R.I.I of 83.20 and 82.96. Lack of labour safety negatively impact the productivity of labour and performance of the project. By providing aids and following safer construction practices improves the productivity.

CONCLUSION

Fundamental knowledge about the labour productivity during the execution of the construction project can yield substantial saving in time and money. Investments and risks involved in construction industry are very high due to the complexity and long duration of the projects. Major drawbacks of the construction industry are cost and time overrun. The basic reason for these drawbacks is low labour productivity. Currently all the possible factors which may affect labour productivity in construction are identified. Ranking of factors is done using the Relative Importance Index method. Proper management of factors affecting labour productivity in construction can improve the productivity.

Reference

20. Shree Raja Gopal T G and Murali K, Analysis of Factors Affecting Labour Productivity In Construction