Study on Assessment of Factors Improving Jobsite Productivity
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Abstract—Construction productivity trends carry immense consequences for the economy as a whole. Job site productivity is one of the most important factors affecting the overall performance of any organization whether large or small organization. The study assesses the factors that affect job-site productivity in consideration on recruitment policy, types of training and factors that affect quality of workers and their contribution to the various organizations surveyed. This is done through the self-administration of structured questionnaires to elicit information from the respondents using convenience sampling method. Jobsite productivity is mainly concerned with the labour. The continuous productivity improvement process help the management to identify the productivity inhibitors affecting site labour in order to reduce or eliminate these issues, and to measure improvements. Job-site productivity is influenced by many factors such as labour related factors, management related factors, efficiency, project related factors, resource factors. Questionnaire was prepared for engineers, contractors and the survey has been carried out. Survey design will give a quantitative description of phenomenon such as trends, attitudes, or opinion. From the collected data it is concluded that the project related factors (79%), labour related factors had a strong impact on improving productivity whereas the factors such as management related factors (67%), resource related factors (62%) and efficiency factors (48%) affects the growth of productivity. So these factors are to be improved to enhance the growth of productivity in construction.

Key words: Job Size and Complexity, Local Climate, Productivity at Jobsite

I. INTRODUCTION

Productivity translates directly into cost savings and profitability at jobsite. A construction contractor stands to gain or lose, depending on how well his company’s productivity responds to competition. It is 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. However, it is important to note that labour productivity is a measure of the overall effectiveness of an operating system in utilizing labour, equipment and capital to convert labour efforts into useful output, and is not a measure of the capabilities of labour alone. Construction companies may gain advantage over their competitors by improving upon productivity to build projects at lower costs; yet, most contractors do not systematically and properly address this strategic issue or evaluate its impact on the project’s profit. A company has the ability to increase its competitiveness through enhanced jobsite productivity by raising the level of value-added content in products and/or services more rapidly than competitors. The concept of jobsite productivity is importantly linked to the quality of input, output, and process.

A. Definition:

Productivity is generally defined as the average direct labour hours required to install a unit of material. The term “productivity” expresses the relationship between outputs and inputs. Output and input differ from one industry to another. Labour is one of the basic requirements in the construction industry.

B. Productivity at Jobsite:

Contractors and owners are often concerned with the labour activity at jobsites. For this purpose, it is convenient to express labour productivity as functional units per labour hour for each type of construction task. However, even for such specific purposes, different levels of measure may be used.

In order to develop industry-wide standards of performance, there must be a general agreement on the measures to be useful for compiling data. Then, the job site productivity data collected by various contractors and owners can be correlated and analyzed to develop certain measures for each of the major segment of the construction industry.

C. Need for Productivity Improvement at Jobsite:

– Job-site productivity is influenced by many factors which can be characterized either as labour characteristics, project work conditions or as non-productive activities.

– For example, one aspect on labour that improves the impact of any new technology is an innovation that decreases the investment and maintenance costs along with a comprehensive understanding of how the technology can be most effectively utilized to improve those productivity.

D. Labour Relations in Construction:

The market demand in construction fluctuates greatly, often within short periods and with uneven distributions among geographical regions. Even when the volume of construction is relatively steady, some types of work may decline in importance while other types gain. Under an unstable economic environment, employers in the construction industry place great value on flexibility in hiring and laying off workers as their volumes of work wax and wane. On the other hand, construction workers sense their insecurity under such circumstances and attempt to limit the impacts of changing economic conditions through labour organizations.

There are many crafts in the construction labour forces, but most contractors hire from only a few of these crafts to satisfy their specialized needs. Because of the peculiar characteristics of employment conditions, employers and workers are placed in a more intimate relationship than in many other industries. Labour and
management arrangements in the construction industry include both unionized and non-unionized operations which compete for future dominance.

E. Labour Characteristics:
Performance analysis is a common tool for assessing worker quality and contribution. Job-site productivity is influenced by many factors which can be characterized either as labour characteristics, project work conditions or as non-productive activities.

The labour characteristics include:

- Age
- Skill And Experience of Workforce
- Leadership and Motivation of Workforce.

F. Project Work Conditions:
Job-site labour productivity can be estimated for each type of construction (residential housing, processing plant, etc.) under a specific set of work conditions. A base labour productivity may be defined for a set of work conditions specified by the owner or contractor who wishes to observe and measure the labour performance over a period of time under such conditions.

A labour productivity index may then be defined as the ratio of the job-site labour productivity under a different set of work conditions to the base labour productivity, and is a measure of the relative labour efficiency of a project under this new set of work conditions. Job-site accessibility often may reduce the labour productivity index if the workers must perform their jobs in round about ways, such as avoiding traffic in repaving the highway surface or maintaining the operation of a plant during renovation. Labour availability in the local market is another factor.

The project work conditions include among other factors:

- Job size and complexity
- Job site accessibility
- Labour availability
- Equipment utilization
- Contractual agreements
- Local climate.

II. METHODOLOGY
After reviewing different literatures, a simple methodology has been developed based on the availability of data. The proposed methodology of the study is dramatically represented through the following flow chart.

III. PRODUCTIVITY FACTORS
The following factors mainly affect the productivity at the jobsite. These are identified based on personal analysis and literature study:

- Labour related factors
- Management related factors
- Resource factors
- Efficiency
- Project related factors.

Based on this above given main factors a detailed questionnaire was prepared and the replies were

<table>
<thead>
<tr>
<th>Factors</th>
<th>Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in material price</td>
<td>3.86</td>
</tr>
<tr>
<td>Participation of engineer</td>
<td>3.57</td>
</tr>
<tr>
<td>Availability of power &amp; water supply</td>
<td>3.47</td>
</tr>
<tr>
<td>Substance abuse</td>
<td>3.38</td>
</tr>
</tbody>
</table>

Collected from various companies through direct interview from contractors and engineers.

IV. RESULT

A. Result From SPSS Analyses:
The following are the factors which are identified as risk on productivity. According to the response obtained from the survey the ratings are calculated.
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Delay due to disputes 3.22
Competition 3.21
Rework 3.12
Employing site supervisor 3.00
Labour turnover 3.00
Compensational package 2.98
Unavailability of tools/materials 2.60
Safety violations 2.52
Wages 2.52
workforce 2.33
quality of site management 2.29
experience 2.26
engineer's inspection 2.16
transportation 2.03
sufficient lightening 2.03
Workload 1.91
Efficiency 1.52
Management 1.33
Resource 1.33
Labour 1.29
poor supervision 1.24
Project 1.21
inadequate tools .93
other workers .91
process changes .86
work environment .83
Poor planning .74
machine malfunction .60

Table 1:

<table>
<thead>
<tr>
<th>Factors</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour related factors</td>
<td>71</td>
</tr>
<tr>
<td>Management related factors</td>
<td>67</td>
</tr>
<tr>
<td>Resource related factors</td>
<td>67</td>
</tr>
<tr>
<td>Efficiency</td>
<td>48</td>
</tr>
<tr>
<td>Project related factors</td>
<td>79</td>
</tr>
</tbody>
</table>

Table 2:

V. CONCLUSION

From the survey, the following factors are analysed,

1) Among the entire factors project related factors has 79% from response whereas the efficiency factors has 48% from response which in turn majorly affects the jobsite productivity.

2) The labour related factors have more impact on productivity. Many factors are considered in that substance abuse and similar problems among workforce greatly affect productivity which has 3.38 ratings out of 5. The high rate of labour turnover which has 3 ratings also affect the labour productivity.

3) The efficiency factor has low impact but because of the work environment (55.2%) from response, poor planning (81%), poor supervision (48%) from response which stands in the way of doing their job more efficiently.

4) The management related factors have (67.2%) from response which has 1.33 ratings. The major factor such as Engineer's effective participation on planning and scheduling has 3.57 ratings at which 32.8% respondent strongly agree and 31% of respondent somewhat agree.

5) The delay in construction has 3.22 ratings and difficulty in employing site supervisor has 3 ratings which also affects the management productivity.

6) The resource factors also had 67.2% as respondent rate which has 1.33 ratings from those factors, the unavailability of tools sometimes affect the site work majorly.

7) The project related factors has 79.3% of respondent as it includes rework process which had a respondent ratings as 3.12, availability of power supply and water had 3.47 ratings which have a great impact on construction.

8) The increase in material price has 3.78 ratings where 43% of respondents strongly agree that they affect the productivity of a project.
VI. SUGGESTIONS

The following suggestions are made from the above results,

- A stock should be made (i.e.) a preplanned material purchase and stocking.
- Good work monitoring is to be maintained by supervisors and a better inter relation between co-workers to reduce disputes between them.
- A strict clause should be engaged against substance abuse in the construction site.
- Effective reduction in site accidents will reduce compensational packages.
- Labours working stress are reduced so that labour turnover are enhanced.

REFERENCE


