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Impact of Quality Supervision on Rework in Indian Construction Industry

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***Abstract*— The quality of supervision play very important role in the construction projects. Unskilled and improper supervision is believed to be one of the major causes of rework. Therefore, experienced and skilled supervisors play an important role in optimizing the amount of rework due to construction defects.**

This paper focuses on the quality of site supervision in India as it is directly related to the supervisor's level of experience and skill. Hence, the paper attempts to explore the relationship between the quality of site supervision and rework in construction industry.

Based on site data collection considering eight building construction sites in India, this paper suggests that unskilled site supervision is the principal cause of rework during construction.

Keywords—Unskilled supervision, Rework, Training, Cost

INTRODUCTION

The Indian construction industry is facing a serious problem of skilled labours. Young people are not interested to join the construction industry. Even when they join, most of them are unskilled and do not receive proper training before entering the construction industry. This unskilled supervision leads to poor workmanship and cause rework. Rework results in failure of completion of project on time and cost is also increases.

WHAT IS REWORK ?

Rework the name itself indicate that an action must be performed more than once in order to achieve the specified work, which results in the unnecessary consumption of additional resources in the form of labour, materials, and facilities beyond what would have been used if the action had been performed only once. In construction activities, in addition to overruns in the schedule and cost, rework has the further effect of causing potential risk with respect to quality and safety. Many existing studies have quantified the impact of rework on a project primarily in terms of cost and have also focused on classifying and measuring the causes of rework. In the construction industry, rework is widely regarded as an obvious factor that prevents improvement in productivity, although the hours and cost for rework represent only a small portion of the fieldwork as a whole, if fieldwork is considered to consist of the time and cost associated with direct work, support, rework and delays. However, a common belief is that reduction in rework is a cost-effective approach to improving productivity because most rework could be minimized by improving the management of the process and employing skilled labours neither of which is as expensive as adopting technical innovation in order to improve productivity.

SUPERVISION IN INDIA

India is largest developing country in the world and numbers of people are engaged in construction projects. However, most of the workers are unqualified and unskilled. The success of completing any construction project depends heavily on the quality of supervision. Naturally, the quality of supervision is dependent upon the supervisor's skill. A supervisor is usually given authority and responsibility for planning and execution of the work. Supervisors are managers, whose major activities focus on leading, coordinating and directing the work of others in order to achieve group goals.

In addition, they argue that a successful supervisor has to deal with several skills such as management skills, human relation skills and skills in leadership, motivation, communication and organization behavior. In India, construction site supervision is a crucial element. The inability of many supervisors to plan work, communicate with workers, and direct activities adequately is fundamentally linked to increasing amount and cost of rework. These abilities can be improved by providing different trainings to the supervisors.

Most of project managers agree that formal training can improve the supervisor's skills. But most of the supervisors learn the job by trial and error method i.e. they make mistakes and then learn from it. Although this system of trial and error is considered to be an essential part of training, practical experience must be supplemented by formal training to form a sound working basis of supervisors.

CASE STUDY

To determine the relationship between supervision and rework, eight large building constructions in Pune and nearby area, were targeted with a focus on the quality of supervision. In addition, data regarding the cause and the quantity of rework was collected. This study was limited to inspecting the building line out, formwork set-up, steel bars fixing and concrete casting.

RESEARCH METHODOLOGY

The first stage of this research was to conduct a survey targeting large contracting organizations in Pune and nearby area. The questionnaire set is given to the contractors, designers, clients.The questionnaire was designed to solicit information from contractors regarding the causes and impact of rework. In the second stage, interviews held with eight project managers and supervisors in order to supplement the findings of the questionnaire survey.

RESPONSIBILITIES OF SUPERVISOR

The respondent agrees that following are the role and responsibilities of a supervisor on site-

- Read and understand the drawings came from either Designer or architect;
- Help foremen and labours to understand the problem and give solution to them;
- Reading and writing reports for inward and outward of material as well as maintain labour muster;
- Planning of activities as well as labours;
- Understand quality specifications;
- Mediator between designer and worker;
- Maintain co-ordination between other supervisors and managers;

Therefore, the supervisor must be familiar with all the activities that are carried out on site. Supervisors must be able to plan, organise, lead, monitor, motivate and control. They also must have basic technical skills.

Every project managers accept that some sort of supervisory training is essential, and show interest towards this topic when it is discussed, but only few of them are ready to take any practical step. Some managers directly denied that the training is required for supervisors. Others ignore the facilities offered, possibly because they think the subject is unimportant.

QUALITY SUPERVISION

Quality supervision is nothing but how well a person utilizes available resources (men and material) effectively and efficiently. All project managers agree that the effectiveness of supervisors' efforts is judged by how well they manage every activity during the construction phase.

The success of supervision does not depend on the number of supervisors in a project, but on how well he inspects all the activities. The rework can take place at any stage of activity. Supervisor has to keep a close eye on each and every activity. Since causes of rework are generated during the construction process, supervisors need to be more active in finding these causes.

QUALITY SUPERVISION AND TRAINING

Training is required for betterment of supervisor as well as for project. Many project managers and supervisors agree that formal training is one of the best method used for improving supervisors' skills. However, some of them argue that it is quite difficult to quantify such improvement. Project managers describe that training programs are needed for:

- To improve self-confidence;
- To improve work efficiency;
- To develop motivational skills;
- To develop leadership skills;
- Improving operational efficiency; and
- Encouraging continuous development.

TRAINING

When it is decided that training has to be given to all supervisors, the project managers suggested that the subject of the training programs have to be specific and according to site requirements. Training should fulfill the needs of both the project and the individuals involved in it and, the preliminary analysis is to be done to decide the type of training. Project managers suggested some of following points on which training should be based and they are given figure 1.

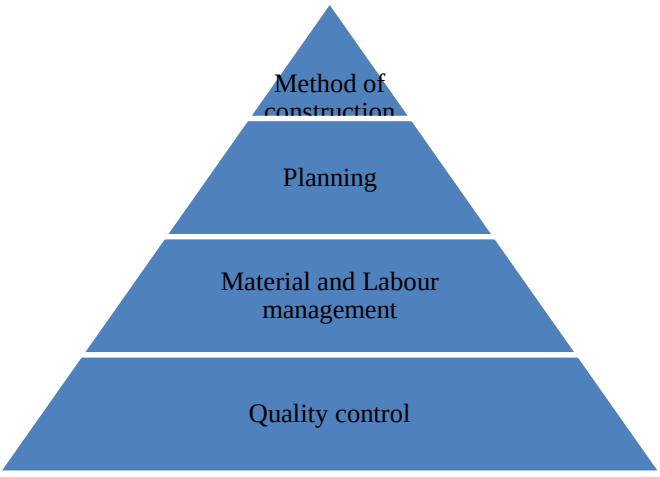

Figure 1. Objectives of training

OUTCOMES OF SURVEY

The survey which is carried out has some outcomes from it and they are-

1. When training is given for a particular activity it is more effective.
2. The training should consist of both theory and practical work.
3. The training programs may be arranged by contractors, local association, Institutes or Universities.
4. Now many companies have developed their own training centers and evaluation process and generally they do not share their programs with others.
5. Contractors should finance the training within their company overhead budgets.
6. Training costs range between 0.5% and 2.25% of the total rework cost (see Figure 2).

According to the survey and interviews, all the rework have been categorised qualitatively and quantitatively. The findings gave a clear description of rework causes. They are:

- Unskilled supervisor;
- Labour skills shortage;
- Faulty site-drawing;
- Construction method;
- Shortage of material; and
- Changes by owner, Environmental conditions, etc.

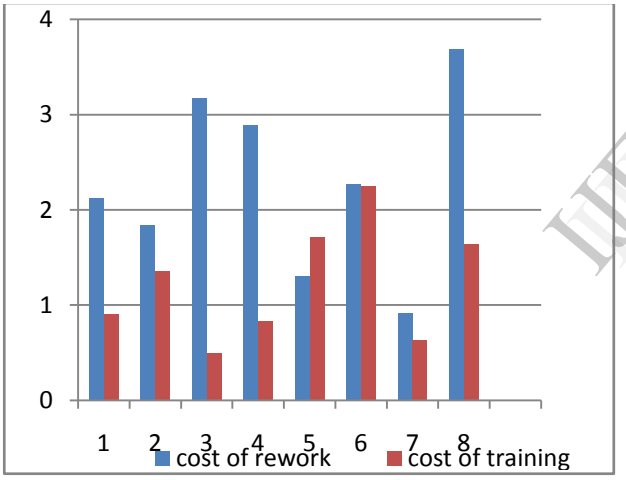

Figure no. 2 - Rework cost and training cost

Table 1- Survey data

%Rework cost	2.12	1.84	3.17	2.89	1.30	2.27	0.92	3.69
%Training cost	0.91	1.36	0.5	0.83	1.71	2.25	0.63	1.64

The above table shows that average value of % rework cost is 2.27 and that of % training cost is 1.22.

CONCLUSION

This paper conclude that the supervisors have a important role in optimising the amount of rework in the Indian construction industry. They need to be properly trained and to be able to detect and deal with rework causes. The supervision is more likely to be dependent on the experience, instead of the number of supervisors involved in a project.

This paper has suggested that the quality of site supervision, represented by the supervisor's level of experience gained from training, can help to minimize the cost of rework of the construction projects.

Further research is required to confirm the relationship between optimization of project duration and skilled supervision by appointing skilled supervisor on project site.

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