AN EFFECTIVE WAY TO MINIMIZE THE WASTE & COST IN INDIAN CONSTRUCTION INDUSTRY

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ABSTRACT

Construction is a vital connection to the infrastructure and growth of industry in India. Building roads, bridges and other constructed facilities play an important role in shaping society’s future. Consequently, the construction Industry produces a vast quantity of waste which is environmentally unfriendly, and costly to project budgets. This study aimed to find out how much construction waste is costing construction project budgets, and attempted to make recommendations to the industry on how profits can be maximized and how the waste can be minimized. For the empirical investigation, a mixed methodology was used which combined questionnaire and interview data from stakeholders in the road construction sector, together with documentary and observational data, to examine the issue of construction waste and cost management. The research revealed that a number of construction companies in India, do not adhere to international best practices and standards. Practices such as site waste management plan, waste minimization strategies were found to be non-existent in these companies. A number of recommendations were made to improve the practices of the construction firms as per the need to train every construction employee on waste management and also recommended for government agencies to monitor and enforce rule of waste management in the construction industry.

Keywords: Waste Minimization, Cost Reduction, Waste Management.

INTRODUCTION

In general, a very high level of waste is assumed to exist in construction. Although it is difficult to systematically measure all wastes in construction, various studies from various countries have confirmed that waste represents a relatively large percentage of production costs. For example, the construction and demolition industry annually produces three times the amount of waste
generated by all households combined in India. In this research we provide details of waste scenarios of today set against the potential to improve in the future, and actions that could be taken to realize those improvements.

A wide range of measure have been used for monitoring waste, such as excess consumption of materials, quality failure costs and maintenance and repair costs, accident, and non productive means.

Measuring waste is an effective way to assess the performance of production systems because it usually allows areas of potential improvement to be pointed out and the main causes of inefficiency to be identified. Compared to traditional financial measures, waste measures are more effective to support process management, since they enable some operational costs to be properly modelled and generate information that is usually meaningful for the employees, creating conditions to implement decentralized control.

In fact, waste elimination is a major focus for process improvement in the Lean Production paradigm. Originated in Japan in the 1950s, this is an important development trend in manufacturing, based on both the Total Quality Management (TQM) and Just in Time (JIT) production philosophies. Furthermore, environmental conditions in the cities are appalling due to inadequate provision for services such as water supply, sanitation and waste disposal. These problems, and many others, constitute obstacles to the socio-economic development of the country and, therefore, hinder improvements in the lives of the population.

On the other hand, the poor environmental conditions in the cities to low institutional capacity for urban management, poor physical planning and the lack of enforcement of development laws, poor provision of infrastructure and services for environmental maintenance and low public awareness of environmental hygiene.

OBJECTIVES

The research has the following objectives:

1. To identify the critical sources and causes of construction waste.
2. To assess the environment and social concerns of operations management.
3. To review ways of reducing or minimizing cost related to waste in the construction industry.
4. To identify factors contribute to waste generation in the construction industry.

RESEARCH METHODOLOGY

This study presents the general approach and specific techniques adopted to address the objectives for the research. It begins with a discussion of the quantitative and qualitative research and the arguments for and against combining the two approaches in a single research. The strengths and weaknesses of the two opposing approaches are briefly pointed out and the rationale for combining them in a single study is further explained.
This survey designed in accordance with the following stages:

- **Stage one**: Identify the topic and set some objectives.
- **Stage two**: Pilot a questionnaire to find out what people know and what they see as the important issues.
- **Stage three**: List the areas of information needed and refine the objectives.
- **Stage four**: Review the responses to the pilot.
- **Stage five**: Finalise the objectives.
- **Stage six**: Write the questionnaire.
- **Stage seven**: Re-pilot the questionnaire.
- **Stage eight**: Finalise the questionnaire.
- **Stage nine**: Code the questionnaire.

The survey design to be used in this instance is both the quantitative and qualitative methods. The purpose of this study was to investigate the phenomenon of waste and cost reduction in the road construction industry, using some companies in India as a case study. The varied nature of the data required and different sources from which they had to be gathered made the mixed methods approach appropriate.

**SOMA Construction Ltd. and ISOLUX CORSAN Ltd.** were the two companies selected for this study. These companies will relate significantly to the study, especially the idea of reducing cost by employing waste minimization tools. I was motivated to focus on Varanasi because it provided an opportunity to investigate the problem of waste because they have ongoing road construction projects.

The project selected for this study are is 4 lane road construction project of NH-2 from Varanasi – Aurangabad. It is a contract of 193KM of road which is distributed in two companies as a consortium partners.

Questionnaires, interviews, observations and question guides were the main tools used in generating the data for this study. The uses of the questionnaires allow both subjective and objective views of respondents to be sourced.
RESULTS AND DISCUSSION

This chapter aims to display the research results of this study. The researcher interpreted and analyzed data and highlighted certain relation between the results. The total number of respondents who participated in this study consisted of thirty. The questionnaires comprised of nineteen questions respectively as the researcher aimed to do a thorough research investigation.

Two different questionnaires were administered, one for operation managers and the other for site foremen. The research result first considered the result of the operation managers’ questionnaires then that of the site foremen.

Both companies do not operate site waste management plan (SWMPs) on any of their construction sites. The failure to operate waste management plan means that recycling is not practiced and therefore waste is created without any attempt to curtail it. This obviously affects the cost of projects and may even impact negatively into the profit margin of the firms.

Result finding from Data

1. Waste detection and waste rate

SOMA estimated their waste rate at 10% while PMC valued their waste as 9%. Both firms believe that their acceptable waste rate is 5%.

2. Waste minimization plan

The researcher finds this practice unacceptable, especially when no clear methods of detecting waste exist and calculating the acceptable cost of waste per project is capricious. Moreover, there is no strategy in place in both firms on how to minimize waste.

3. The reasons of waste take in these firms

The respondents were asked to identify the three most prevalent forms of waste in their operations. The three recorded waste forms are;

➢ Excess material

Figure 3: Excess material

Figure 4: Cause of excess

Field Data 2014

Field Data 2014
48% of SOMA labourers and 52% of ISOLUX believed that waste is generated through excess material. According to the labourer this form of waste is caused by poor planning (20%), lack of coordination between production and the design teams (42%) and poor design specification (38%).

These results show that this form of waste is avoidable if there is effective coordination between the various departments in the management team. This form of waste is created due to management’s lack of harmony.

➢ Delay

The respondents noted delay as another form of waste they are confronted with. This assertion was noted by 62% of SOMA labourers and 38% of ISOLUX labourers. While a lot of delay occurs at SOMA, less of delay seems to occur at ISOLUX.

Figure 6 displays the causes of this reason of waste. Each cause was allotted various percentages by the respondents. Particularly;

i. late arrival of materials 20%

ii. The erratic release of fund 25%

iii. Unnecessary work 18%

iv. Poor project site layout 22%

v. Ambiguous information 10%

Ways of minimizing or reducing waste

They listed the following ways of reducing waste;
### Table 4.6: Ways of Minimizing Waste

<table>
<thead>
<tr>
<th>Suggestions</th>
<th>SOMA CONSTRUCTION %</th>
<th>ISOLUX %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buying qualitative materials</td>
<td>36</td>
<td>64</td>
</tr>
<tr>
<td>Performing to specifications</td>
<td>52</td>
<td>48</td>
</tr>
<tr>
<td>Sell the generated waste</td>
<td>45</td>
<td>55</td>
</tr>
<tr>
<td>Proper storage</td>
<td>60</td>
<td>40</td>
</tr>
<tr>
<td>Employ experienced workers</td>
<td>63</td>
<td>37</td>
</tr>
<tr>
<td>Effective supervision</td>
<td>46</td>
<td>54</td>
</tr>
</tbody>
</table>

### CONCLUSION & RECOMMENDATIONS

Government’s lack of supervision and monitoring of these companies is a reason for their non-compliance to international best practices and standards.

82% of the workforces agreed that waste management is worthwhile irrespective of cost. However, the behavior of the construction workforce in the actual workplace indicates a lack of a positive attitude and behavior towards waste minimization. This lack of practice of waste management principles was found to be caused by other priorities during pre and post-construction stages, such as profit, time, cost, etc.

Waste can only be reduced once all employees and contractors are fully aware of the extent of the problem in the company. Each construction employee must be trained on waste management. This training may include for example waste management induction training to reinforce the importance of waste minimization practices.

Each contractor must be clearly notified of their duties and responsibilities in respect to waste management. This must be incorporated into their contractual obligations. Sites need to present a waste totals to date on a monthly basis. On-site supervision of the waste management plan must be examined frequently. Regular waste management audits must be conducted to ensure that corrective actions bring about waste reduction. A tracking system should indicate the success or failures of corrective actions.

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### REFERENCES


