An Exploratory Study on Factors Governing Crisis Management Implementation in Construction Projects

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ABSTRACT

Construction projects generally involve complex interfaces, various technologies and integration of materials and equipments which in turn creates uncertainties and associated crises. It has been indeed need for the major participants involved in construction projects such as engineers, managers and owners to implement crisis management for effective resolving of such crisis situations and to prevent their future occurrence. This paper has critically identified the major factors that govern the crisis management implementation in construction projects. The research is carried out through questionnaire survey analysis made among the various engineers, managers and owners involved in construction. The major factors are identified and analysed through statistical tools. It includes supplier relationship, manpower availability, design changes, time contingency, management strategies, crisis management team unavailability, safety issues and environmental factors.

Keywords— Complex interfaces, Construction projects, Crises, Design changes, Uncertainties, supplier relationship.

I. INTRODUCTION

The construction projects forms an important role in exhibiting any nation’s infrastructure facilities. Such projects often involve complex situations and uncertainties due to their long term nature and integration of various sectors involved in the event of construction. These uncertain events often lead to crisis as they are inevitable in any process involving complex situations. During a crisis situation, an organization seems to be losing its potential for performing complex situation with regular practices. Crisis management is a process in which continuous steps are taken to overcome any crisis situation through early signals and eliminating the same with no or least damages. Construction projects are more prone to crisis situations due to the various complexities involved during the event of construction. Any organization that can estimate a crisis well through crisis management strategies can sustain any uncertainties with least possible negative outcomes. Therefore it is essential for the construction companies to deal with crisis through effective crisis management process. In this paper an attempt has been made for the implementation of crisis management in construction projects through identifying the various factors that may bring about crisis situations in construction projects. As stated above, this study involves the identification of factors that may lead to crisis in construction projects. The factors are identified through literature findings and real-time observation made through questionnaire survey conducted among various engineering and management personnel involved in construction industry.

II. LITERATURE REVIEW

The research has been carried out with the help of literature study made from various literatures related to crisis management implementation in construction projects. The literature findings revealed about the characteristics of crisis and decision making with the help of leadership styles (Abdullah et al., 2014), crisis management in Turkish construction industry during economical crisis (Emin et al., 2006), learning process involved in crisis management for complex organizations (Lagadec P. 1999), crisis preparedness for effective crisis management in construction companies (Loosemore M. 2000), the development and application of situational crisis communication theory in protecting organization reputation during a crisis (Coombs W. T. 2007), crisis management model and recommendation system for construction industry (N. T. Nguyen, 2013), the nature and
management of crisis in construction projects as projects-as-practice observations (Markus and Timothy, 2007), planning for crisis management in project management (Mallak and Kurstedt, 1997), Communication and organizational crisis management (Seeger et al., 2003), applicable vision, mission and the effects of strategic management on resolving crisis (Pinor Altiok, 2011), crisis management in planning and media relations for the design and construction industry (Reid J. 2007), crisis management from global crisis to national crisis in the case of the European Union Countries (Paula et al., 2013), the preliminary study on improving the efficiency of the Government crisis management (Wei wang, 2011), Anatomy of organizational crisis in contingencies crisis management (Hwang P. and Lichtenthal, 2000), the importance of crisis communication in effective crisis management of construction projects (Michal Vondruska, 2014) and approaches and process for innovative crisis management in construction projects (Selim et al., 2015).

III. RESEARCH METHODOLOGY

A. Objective
The main objective of this study is to identify the major factors that govern the implementation of crisis management in construction projects.

B. Scope
The scope of this study is confined to owners, engineering and managerial personnel involved in construction projects in south India.

C. Data collection
The data are collected among owners, engineering and managerial personnel involved in different construction projects through questionnaire survey. The questionnaire was prepared with two parts namely demographic profile of the respondents followed by thirty statements related to the factors governing crisis management implementation in construction projects. The respondents are provided with five point scale rating system to share their views regarding crisis management implementation in construction projects.

D. Descriptive statistics
The questionnaire survey was successfully carried out with 134 valid responses from various owners, engineering and managerial personnel involved in construction projects carried out in southern parts of India.

E. Factors considered for the study
The following factors identified through literature findings and real-time observations are considered for the proposed study on factors governing crisis management implementation in construction projects.

• Supplier relationship
• Material costs
• Government norms
• Financial aspects
• Manpower availability
• Crisis prediction
• Information system
• Design changes
• Change or appointment of managerial personnel
• Contingency plan
• Control over possible human errors
• Feedback on field operation
• Satisfactory employee performance
• Cultural differences
• Psychological counselling
• Scheduling variances
• Hostile client approach
• Learning from past
• Contractors performance
• Safety issues
• Environmental factors

IV. ANALYSIS AND DISCUSSIONS

A. General
The data analysis is carried out using SPSS (Statistical Package for Social Sciences), a statistical software tool for data analysis.

B. Reliability statistics
Prior to the data analysis, reliability of the data is analysed using Cronbach’s alpha method. It is a common method for testing reliability of the data. The results showed a high level of internal consistency with Cronbach’s alpha value of 0.839 as suggested by Nunnaly (1978).

C. Principal component analysis
Principal components analysis is a procedure of reducing the variables from a larger set of data. The aim of principal components analysis is to explain the maximum amount of variance with the fewest number of principal components. Prior to the analysis, sampling adequacy is checked using Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. The sampling adequacy showed an acceptable value of 0.728. Therefore the data is suitable for reduction through Barlett’s test of sphericity. Also focus was made on initial eigen values to get measure the variance in the data extracted using SPSS software. The varimax method of extraction technique was chosen for rotation in principle components analysis. Initially 30 factors were used, after reducing these items by eliminating those which have insufficient loadings, we have 8 major factors. The identified major factors are given as follows.

• Supplier relationship
• Manpower availability
• Design changes
• Time contingency
• Management strategies
Crisis management team unavailability
Safety issues
Environmental factors

### TABLE I
**PRINCIPAL COMPONENTS ANALYSIS**

<table>
<thead>
<tr>
<th>Factors</th>
<th>No. of factors</th>
<th>Eigen values</th>
<th>Percentage variance</th>
<th>Cumulative Percentage variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier relationship</td>
<td>5</td>
<td>5.338</td>
<td>17.793</td>
<td>17.193</td>
</tr>
<tr>
<td>Manpower availability</td>
<td>5</td>
<td>4.149</td>
<td>13.831</td>
<td>31.625</td>
</tr>
<tr>
<td>Design changes</td>
<td>4</td>
<td>2.306</td>
<td>7.687</td>
<td>39.312</td>
</tr>
<tr>
<td>Time contingency</td>
<td>3</td>
<td>1.716</td>
<td>5.718</td>
<td>45.031</td>
</tr>
<tr>
<td>Management strategies</td>
<td>4</td>
<td>1.521</td>
<td>5.069</td>
<td>50.100</td>
</tr>
<tr>
<td>Crisis management team unavailability</td>
<td>4</td>
<td>1.324</td>
<td>4.414</td>
<td>54.514</td>
</tr>
<tr>
<td>Safety issues</td>
<td>2</td>
<td>1.221</td>
<td>4.069</td>
<td>58.582</td>
</tr>
<tr>
<td>Environmental factors</td>
<td>3</td>
<td>1.105</td>
<td>3.684</td>
<td>62.666</td>
</tr>
</tbody>
</table>

KMO Measures of sampling Adequacy: 0.728
Bartlett’s test of sphericity: Chi-Square Value: 1362.754

### D. Mean score analysis

The frequency distribution method of descriptive statistics is performed for mean score analysis of the identified major factors. The mean score analysis results are discussed below as follows.

### TABLE II
**MEAN SCORE ANALYSIS**

<table>
<thead>
<tr>
<th>Factors</th>
<th>Mean score</th>
<th>Standard deviation</th>
<th>Co efficient of variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier relationship</td>
<td>2.63</td>
<td>0.696</td>
<td>0.265</td>
</tr>
<tr>
<td>Manpower availability</td>
<td>2.29</td>
<td>0.678</td>
<td>0.296</td>
</tr>
<tr>
<td>Design changes</td>
<td>3.66</td>
<td>0.895</td>
<td>0.245</td>
</tr>
<tr>
<td>Time contingency</td>
<td>2.79</td>
<td>0.725</td>
<td>0.256</td>
</tr>
<tr>
<td>Management strategies</td>
<td>3.05</td>
<td>0.471</td>
<td>0.154</td>
</tr>
<tr>
<td>Crisis management team unavailability</td>
<td>3.53</td>
<td>0.976</td>
<td>0.276</td>
</tr>
<tr>
<td>Safety issues</td>
<td>2.06</td>
<td>0.753</td>
<td>0.365</td>
</tr>
<tr>
<td>Environmental factors</td>
<td>2.62</td>
<td>0.675</td>
<td>0.258</td>
</tr>
</tbody>
</table>

The result shows that among eight major factors, design changes and crisis management team unavailability have highest mean score of 3.66 and 3.53 respectively. It is then followed by management strategies (3.05), time contingency (2.79), supplier relationship (2.63), environmental factors (2.62), manpower availability (2.29) and safety issues (2.06).

### V. CONCLUSION

This study has identified eight major factors governing crisis management implementation in construction projects as supplier relationship, manpower availability, design changes, time contingency, management strategies, crisis management team unavailability, safety issues and environmental factors. Further, mean score analysis was performed using frequency distribution method of descriptive statistics. And the mean score analysis results showed that design changes and crisis management team unavailability have highest mean scores when compared to other major factors. Therefore, design changes and crisis management team unavailability have highly viewed dimension among owners, engineering and managerial personnel in crisis management implementation in construction projects.

### REFERENCES