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Decentralized Risk Management in Construction Industries in Kerala

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ABSTRACT: Decentralization is a fashionable reform, adopted by many sectors with different characteristics even though there are doubts, though, about its objectives and impact. Currently there is a propensity that decentralized hierarchy is adopted by organizations. Vast realms of research endeavor have been committed to understand the advantages and setbacks of decentralized organizations, and their results indicate that inadequate decentralization will constrain the creativity of employees while over decentralization may push the company towards chaos. As technology has become cheaper, easier-to-use, more reliable, and more powerful, decentralized approaches seem to be an increasing possibility. However, little research exists in construction industry to improve understanding or facilitate prediction of the equilibrium of decentralization. In response to the need, this study focuses on the decision-making of the low level employees in construction firms to understand how different degrees of decentralization impact on companies performance. The main objective of this paper is to find out how decentralization helps to reduce the uncertainties and risks occurring during a project. Construction projects are plagued with various risks in all the stages of the life cycle of the project. Management systems including risk management are widely used in the construction projects to mitigate these risks, how it avoids the bureaucratic inefficiencies of central direction and whether it provides motivation for the employees and helps to improve the quality of decision making for both low and top level management .In favour of decentralizations impact of construction companies, literatures are collected and discussed.

KEYWORDS: Decentralization, Bureaucratic inefficiencies.

I. INTRODUCTION

Risk is the exposure to the chance of occurrence of uncertainty. Uncertainty represents the probability that an event will occur. Risks and other uncertainties can cause losses that lead to increased costs, time delays and lack of quality during the progression of the projects and at their end.

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Risk management is about thinking ahead and calculating the risks and uncertainties involved in a project. Possible risks that are involved in construction environment include external risk such as economic risk, political risk, legal risk, weather risk, public risk, etc. and internal risk such as financial risk, contractual risk, construction design risk, technical risk, personal risk etc. The effectiveness of risk management techniques depends on time, cost, quality and function and client satisfaction.

The project aims to

- To find out the influence of decentralization in construction companies.
- Identify various risks facing by construction projects in Kerala, rank these risks, and assess its impact on time, cost and quality.
- To find out how the low level manager's decision making power influence the companies performance , either in a good or bad way
- Develop a computerized Decentralized Risk management system to be used in construction companies.

II. LITRATURE REIEW

Alberts et al .,(2003).studied, rigid and obsolete centralized organizations, known as "Command-and-Control" organizations, have been changed and restructured to decentralized organizations dramatically. The changes are because of flexibility to deal with changing environment, improved organizational innovation, least cost the processing and sharing of information and knowledge.

Taylor et al .,(2005) The changes(from centralized to decentralized) are visible in the AEC (architecture engineering and construction) companies because they are mostly project-oriented organizations where new structures are in need to fit with new mentality of project management. In AEC companies the changes are due to several reasons: low cost for information processing and knowledge sharing, emphasis on employee and low-level managers creativity and autonomy, easy access to sharing resources, reducing risk and uncertainty, increasing inter organizational and global networking..

Hage. J et al ., (2007).Decentralization of decision making has been defined in multiple ways. For instance, decision making can be viewed as centralized when power is concentrated in the hands of a few individuals, regardless of their organizational level.

Akintola S Akintoye(1997)describes, on the basis of a questionnaire survey of general contractors and project management practices, the construction industry's perception of risk associated with its activities and the extent to which the industry uses risk analysis and management techniques. It concludes that risk management is essential to construction activities in minimizing losses and enhancing profitability. Construction risk is generally perceived as events that influence project objectives of cost, time and quality. Risk analysis and management in construction depend mainly on intuition, judgment and experience. Formal risk analysis and management techniques are rarely used due to a lack of knowledge and to doubts on the suitability of these techniques for construction industry activities.

He Zhi (2000)explains that the construction projects may have totally different risk characteristics in different regions.It is more difficult to assess these risks and the subtle impact of relationships among them.Identifying and assessing all the new risks and their relationships is a very complicated, time-consuming and expensive process. This process is almost impossible for the majority of projects, especially when there are inadequate amounts of information and time. When such a complex scenario is faced, identifying and controlling these vital risk factors in overseas projects becomes extremely important. In this paper, a method of managing various risks for overseas construction projects is developed. How to effectively identify the vital risks in overseas projects is discussed. A useful risk assessment technique is introduced which combines risk probability analysis with risk impact assessment.

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III. METHODOLOGY

This study is carried out in several parts.

First, collecting literatures related to decentralization in various sectors and organizations and are reviewed to understand why decentralization is important and what gains and setbacks decentralization will lead to.

Secondly, the problem of risk identification which has been done through unstructured literature review, archival study and informal discussion with colleagues and professionals in the construction sector and then the research design was formulated.

Third, 30 construction companies from Kerala region were selected on the basis of type of work and level of the company. Questionnaire survey is conducted.

Questionnaire contains 3 parts

(a) *Background information*– Name of the company and employees designation, experience of the employee etc.

(b) *Decision making for employees* - This part helps to explore the employees decision making ability, their knowledge about their post and freedom of employees to share their ideas etc.

(c) *Risk data collection* – This part was aimed to obtain information about risks facing in construction projects. The questionnaire were based on Likert's-scale of five ordinal measures of agreement for each statement (from 0 to 4) as explained in the following sections. The reasons for adopting this simple scale were:

• To provide simplicity for the respondent to answer, and to make evaluation of collected data easier.

The risks studied as the result of literature review and site visits were listed in this part and respondents were asked about the chances of occurrences of these risks based on the following scale of measurements or Likert scale values.

0 - Not at all = 0% probability to happen
1 -Unlikely= 0% - 25%
3 -Likely = 26% - 50%
4 -Almost certain = 51% - 99%
5 -Certain = 100% probability to happen

After identifying the probability of occurrence of the risks or uncertainties variables respondents were asked about the impacts of each risk or uncertainty based on the following scale of measurements:

0- No impact
1- Minor impact
2- Average impact
3- High impact
4- Extreme impact

Data collection section of the research is the most tiresome part, the most difficult one is the respondents' reluctance to react as per their promised schedule. The time schedule that was allocated to the research and respondents reluctance not to respond quickly made the research stressful for the period of data collection.

The research population was drawn from two categories of stakeholders in the construction sector: Site managers and Site supervisors.

	Probability				
Impact	Insignificant	Minor	Moderate	Major	Catastrophic
Certain	High	High	Extreme	Extreme	Extreme
Likely	Medium	High	High	Extreme	Extreme
Possible	Low	Medium	High	High	Extreme
Unlikely	Low	Low	Medium	High	High
Rare	Low	Low	Medium	High	High

Fig 1 Typical Risk Matrix

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IV. DATA ANALYSIS AND INTREPRETATION

A. *Methods of Data analysis*

Reliability Test

For ensuring reliability of the questionnaire responses,Cronbach's alpha reliability test is used. it is imperative to calculate and report Cronbach's alpha coefficient for internal consistency reliability for any scales or subscales,while using Likert-type scale.

George and Mallery introduce the following rules of thumb for values of Cronbach's alpha:" > .9 – Excellent, > .8 – GooIn the analysis, the 'mean score' method was adopted for the structured part of the questionnaire, to establish the relative importance of risks or uncertainties based on frequencies of occurrence and their impact. The five point Likert scale (0, 1, 2, 3, and 4) is used to determine the mean score for each risk and which was then used to determine the relative ranking among risks or uncertainties.

The data are processed through three pattern of mean scores given below;

- Mean Score Occurrence: This index expresses occurrence frequency of factor responsible for risks or uncertainties. It is computed as per following formula:

$$MSO = \frac{\sum_0^4 a_i \times n_i}{N}$$ Where:

a = constant expressing the weight assigned to each responses (ranges from 0 for Not at all to 4 for Certain).
n =frequency of each response.
N = total number of responses.

- Mean Score Impact: This index expresses severity of risks or uncertainities. It is determined as per following formula:

$$MSI = \frac{\sum_0^4 a_i \times n_i}{N}$$

a = constant expressing the weight assigned to each responses (ranges from 0 for Not at all to 4 for Certain).
n = frequency of each response.
N = total number of responses.

- Cumulative Mean Score Importance: This index expresses the overview of factor based on both their occurrence and impact. It is computed as per following formula:

CMS = MSO x MSI

The strength of associations of pairs of variables understudy is computed by correlation relationships. The three commonly used methods for determining the strength of association between two variables is the Pearson correlation method, the Spearman rank correlation method and the Chi square test of independence method.

To identify the degree of agreement or disagreement among the respondent groups, Spearman's coefficient of rank correlation is done. The Spearman (rho) rank correlation coefficient for any two groups of ranking is given by the formula given below:

$$Rho = 1 - \frac{6 \times (\sum d^2 i)}{N \times (N^2 - 1)}$$

Where:
Rho = Spearman rank correlation coefficient
di = The difference in ranking between each pair of causes
N = Number of causes (variables)

The correlation coefficient (or "ρ") ranges from -1.0 to +1.0. The value of ρ closer to +1 or -1, the more closely the two variables are related. The value of ρ near to 1 implies there is strong positive linear relationship between the two

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variables while the value of ρ closer to -1 is a strong negative linear relationship between the two variables. Ideally, the correlation coefficient value of ± 1 is said to be a perfect correlation. Assume correlation coefficient value lies between ± 0.5 and ± 1, then it is considered to be a high degree of correlation and for the correlation coefficient value lies between ± 0.3 and ± 0.5, then it is considered to be moderate degree of correlation. If correlation coefficient value lies between ± 0.1 and ± 0.3 then it is considered to be a low degree of correlation and suppose correlation coefficient value equal to zero, then there is no correlation.

d, > .7 – Acceptable, > .6 – Questionable, > .5 – Poor, and < .5 – Unacceptable".

V. CONCLUSION

In this thesis, from the survey conducted in 30 different companies (low, medium, high level), its concluded that in low level companies the percentage of decentralization is very low. In such companies most of the decisions are taken by the top management itself and subordinates simply follow them.

In middle level companies decentralization is there. As per the experience of the employees they are taking decisions. But the decision right is still possessed by the high-level manager, but a decision cannot be made without consideration of employees. So half decentralization is occurring.

In top level companies full decentralization is there. The employees, rather than the top manager, possess decision-making rights. Each section has got separate managers and they will give necessary information to the employees. So its clear that in high level companies full decentralization is there.

But the exposure of knowledge to employees will decrease the diversity of their decisions. Without knowledge on project or company level, the autonomous employees will make decisions only based on their own preferences, and thus their individuality will dominate the decisions. With comparison between fully decentralized structure and half-decentralized structure, better performances are given by half decentralization in construction companies.

Risks identification had done on the basis of literature review, site visit and interview survey. and on the basis of risk identified and risk matrix, questionnaire had prepared.Questionnaire survey had done for contractors, site managers and clients. The analysis of questionnaire survey had been done by using SPSS software .Reliability of questionnaire and correlation had also been done by software analysis. As a result of survey, risks had been ranked using mean score method. Weather risk is highly ranked and due to proper planning and scheduling we can rectify the losses arises due to these risks. Lack of safety measures, Increment in labour charge, Poor material management, Nonperformance of sub-contractors and unskilled labours are other highly ranked risks. Unfavorable political situation and rules changes by government are the least ranked risks and the only way is to allow an extension to the contractor for extra time. Proper remedial measures are recommended so as to mitigate these risks from extreme to high, high to medium and medium to low. The stakeholders of small construction projects should strictly follow these remedial measures and thus reduce its impact on cost, time and quality.

This Thesis is concluding that by adopting Systematic Risk Management in small construction projects, reduce the extreme risks to high, high risks to medium and medium risks to low and thus we can achieve the basic goal of a construction industry such as completing the project at right time at right cost.

The results obtained from the study have been discussed in the previous chapter and the following conclusions have been obtained:

1. From the study of previous literature, site investigation and interview survey 30 risks or uncertainties were identified. These risks were made into a questionnaire and were ranked by respondents based on the cumulative value of probability of occurrence and severity of impact. The results showed that uncertainties in weather or bad weather, increment in labour charge, lack of safety measures, poor material management, Nonperformance of sub-Contractors, unskilled labours, Inefficient supervising, Frequent changes in scope of the project, Wrong estimation and Inadequate specification are the major identified risks or uncertainties.

2. The analysis shows that, according to site managers and supervisors bad weather, unexpected increment in labour charge, lack of safety measures, poor material management, delay on sanctioning of the plan and unskilled labours were the next most frequent causes and they constituted the top causes in terms of importance. The survey results indicate that most of the risks or uncertainties lead cost overrun (95.55%), time overrun (95.55%) and affect quality

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(64.44%) adversely. Attention to these risks or uncertainties and follow Systematic Risk Management listed below can go a long way in reducing the cost overruns and time overrun in construction and enhance better quality.

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