A Research on the Factors of Construction Management for Indian Construction Companies

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ABSTRACT

In the era of progressive globalization, it is hard to avoid risk, which has become an indispensable part of everyday life. Risk is present everywhere, in every aspect of our life. One of such aspects is the construction industry, where risk is an inherent element. Effective risk management does not mean the removal of risk, which would seemingly be the cheapest option. From economic point of view this option is pointless because what is potentially profitable is by definition risky and activity that does not pose a risk is not economically interesting, and thus, does not bring tangible benefits. The main objective of this research is to investigate whether rules and regulations and the other organizational external factors (economic, political, and technology factors) having the effect on construction risk management. The organizational external factors and moderating variables (political, economic, and technology factors, and rules and regulations) and the construction risk management variables were adapted for the study. For the Risk factor analysis, the Partial Least Squares (PLS) Path Modelling and Wold has been used having software platform Smart PLS 2.0 M3. A detailed study has been carried out.

Keywords– *Risk, Construction Industry, External Factors, Risk Factor, Partial Least Squares (PLS), Path Modelling.*

INTRODUCTION

Alteration is inherent in construction work. For years, industry has had a very poor status for coping with the opposing effects of change, with many projects deteriorating to meet deadlines and cost and quality targets. This is not too surprising considering that there are no known perfect engineers, any more than there are perfect designs or that the forces of nature behave in a perfectly predictable way. Change cannot be eliminated, but by applying the principles of risk management, engineers are able to improve the effective management of this change.

Change is usually regarded in relations of its adverse properties on project cost estimates and programs. In extreme cases, the risk of these time and cost overruns can invalidate the economic case for a project, turning. A potentially profitable investment into a loss-making venture. A risk event implies that there is a range of outcomes for that event which could be both more and less favourable than the most likely outcome, and that each outcome within the range has a probability of occurrence. The accumulation or combinations of risks can be termed *project risk*. It is important to try to capture all the potential risks to the project even if they are not strictly events or a calculation of project risk. To achieve these aims it is suggested that a systematic approach is followed:

1) To identify the risk sources,

2) To quantify their effects (risk assessment and analysis),
3) To develop management responses to risk and finally
4) To provide for residual risk in the project estimates.

These four stages comprise the core of the process of risk management. Risk management can be one of the most creative tasks of project management.

1) The benefits of risk management can be summarized as follows:
2) Project issues are clarified, understood and considered from the start;
3) Decisions are supported by thorough analysis;
4) The definition and structure of the project are continually monitored;
5) Clearer understanding of specific risks associated with a project;
6) Build-up of historical data to assist future risk management procedures.

Typical Risks on a Construction Project

1) Occurrence of accidents to operatives on site causing physical injury. Failure to complete with in the stipulated design and construction time.
2) Failure to obtain the expected outline planning, detailed planning or building code/regulation approval s with in the time all owed in the design program.
3) Unforeseen adverse ground conditions delaying the project.
4) Unexpected rises for labour and materials.
5) Force majeure.
6) Failure to complete the project with in the client's budget allowance.
7) Loss of the contractor caused by the late production

It is important to distinguish the sources of risk form their effects. Ultimately, all risk encountered on a project is related to one or more of the following

1) Failure to keep within the cost budget/forecast/estimate/tender.
2) Failure to keep within the time stipulated for the approval s, design, construction and occupancy.
3) Failure to meet the required technical standards for quality, functions, fitness for purpose, safety and environment preservation.

The effect of adverse events will be financial loss. The task of professional advisors, contractors and suppliers is to identify the discrete sources of risk which cause to failure occur, and to develop a risk management strategy that provides for the most appropriate organizations to carry that risk.

LITERATURE REVIEW

"No construction project is risk free". To pursue the success of construction projects, risk should be managed effectively. Construction projects are also frequently faced with complex problems related to stakeholders, including conflict among project team members such as clients and contractors, as well as protest from external parties such as the affected community. Meta-analyses of stakeholder theory applications in a project context have shown that management of stake holders is vital to the successful implementation of various kinds' ofprojects, among which the construction industry is a dominant sector. Despite the salience of both risk management (RM) and stakeholder management (SM) in construction projects, there are still numerous project failures resulting from poor management in risk andstakeholder. It thus calls for much more effort from the theory and practice on these two critical issues.

PREVIOUS RESEARCHES

Managing the construction risks is renowned as vital management procedures to get project objectives by quality, safety, sustainability, time and cost. Construction is a risky field with uncertainties according to many internal and external elements that have an effect on construction process Risk management is an approach of recognizing, classifying, analyzing and assessing of all risks in any project and is an important step for project success. Therefore, it is important to analyze and study parameters of construction risks. Numerous methods had developed to support project managers and contractors for risk management in construction.Applications of these methods enabled project managers to avert potential problems. ‘‘AHP”Analytic Hierarchy Process was discovered by Saaty (1980), and it had been studied by Remon Fayek Aziz Eskander; 2018 with ‘‘MCDM” Multiple Criteria Decision Making; in this paper, AHP was used to normalize uncertainty estimates and rank risk likelihoodoccurrence which occurs specifically in construction projects in Egypt and Saudi Arabia during bidding and construction phases. The AHP enforcement steps had been simplifiedthrough ‘‘ECS” Expert Choice Software that is available for its fulfilment. Substantial empirical research has shown conflicting results regarding the influence oforganizational external factors on construction risk management, suggesting the necessity tointroduce a moderator into the study. The research carried out by A.Q. Adel eke et al; 2018 confirmed whether rules and regulations matter on their relationships between organizationalexternal factors and construction risk management. Based on discouragement andorganizational control theory, this research examined the effects of organizational externalfactors and rules and regulations on construction risk management among 238employeesoperating in construction companies in Abuja and Lagos, Nigeria. A personally administeredquestionnaire was used to acquire the data. The data were analyzed using partial least squares structural equation modeling. A significant positive relationship between organizationalexternal factors and construction risk management was asserted. This study also found asignificant positive relationship between rules and regulations and construction riskmanagement. As anticipated, rules and regulations were found to moderate the relationshipbetween organizational external factors and construction risk management, with a significantpositive result. Similarly, a significant interaction effect was also found between rules andregulations and organizational external factors. Implications of the research from a Nigerianpoint of view have also been discussed. Unexpected increase in cost and delays in construction projects are caused by owner,contractor, environments, etc. in which several types of risk factors may occur concurrently.The effect of cost overrun and schedule overrun do not only influence the constructionindustry but the overall economy as well. Even though construction project increasing in costand schedule has received extensive attention of researchers, but because of continuouschanges and development in the field, the study considered of added value to the constructionindustry in Egypt, in addition to risk strategy and plan analysis. In order to meet the deadlineof a project and due to the complex nature of construction projects, cost and schedulingshould be flexible enough to accommodate changes without negatively affecting the overallproject cost and duration. As such, the objectives of the presented research are to identify, study, and assess the effect of the factors that affect cost and time contingency by the Mohamed Sayed Bassiony Ahmed Abd El-Karim et al; 2017. Data are collected from sixteenconstruction companies in Egypt. The collected data, output charts and analyses spreadsheetswill be used for the development of computerized model built by the author’s withidentification abbreviation RIAM. The construction industry is the most dangerous sector of economy. S.S. Timofeeva et al; 2017analyses the occupational risk assessment methods recommended in the normativedocuments and

scientific publications. The selection of methods that can be used for theassessment of risks in construction industry is conducted. The largest building organizationsof the Irkutsk region, engaged in the construction of housing, as well as the workingconditions of construction workers are considered. The results of the assessment ofoccupational risks in 6 building organizations of the Irkutsk region are introduced using threemethods. According to the assessment results it is established that the electric and gas welder, brick layer, concrete worker, carpenter are constructional occupations with the greatestoccupational risks. The greatest relative occupational risks are observed in the constructionand Investment Company LLC ISK Vysota and JSC Sibaviastroi, which indicates the lowlevel of organization of labor protection here, as well as the technical condition of theequipment used for the execution of works.

MATERIALS AND METHODS

Conceptualization of Organizational External Factors

Several researchers have studied the influence of organizational external factors on the company and their relationship with construction risk management. Organizational factors were conceptualized as being intangible resources because they cannot be seen physically by any organization. According to *Kumaraswamy and Chan; 1998*, organizational external factors are a multidimensional construct that is composed of three dimensions: political, economic, and technology factors.

Jabnoun and Sedrani; 2005 viewed political factors as the influence of environmental variables such as safety, community perception, and legal acceptability; importantly, the impact of political and social factors on a project is mostly high. It was further explained by the authors that political factors included discriminatory legislative, covering tax regimes, riots, strikes, civil unrest, wars, terrorism, invasions, and religious turmoil. In the same vein, economic factors can be seen as the accessibility of materials, finance, equipment, labor, and the degree of demands. It also includes economic growth, interest rates, exchange rates, and the inflation rate. Aniekwu et al; 1997perceived technology factors as an environment that must be considered in developing countries' strategic plans.

Ojo et al 2010asserted that a suitable and proper construction technology can be measured by the presence of plant and equipment that are made locally, magnitude of local material resources and the level of utilization of the local construction resources, and skilled manpower resources. In a study on factors influencing flexibility in buildings in Sweden, Israelsson and Hansson; 2009 discovered that in the design phase, building projects are mostly affected by political 22 decisions, which subsequently affects decision making and flexibility in buildings. Political decision also positively influences construction risk management within the organization, by which some companies are politically connected to one another. The authors further discussed Scupola et al; 2003found that economic factors positively influence construction risk management.

The author suggested that competition in the economy and the role ofgovernment would positively influence construction risk management, because the materialsto be used in the construction project are not available in the market. Competition in theeconomy would persuade construction companies to devise a way to achieve a competitiveadvantage, which will make companies to be more creative in achieving their needs.Furthermore, Israelsson and Hansson; 2009 affirmed a negative relationship betweeneconomic factors and construction risk management. That those who are connected to the ruling party tend to

receive more capital, support, and huge projects with experts, compared withthose who are not.With regard to the aforementioned conflicting results, the following direct hypotheses were formulated.

Hypothesis 1: Political factor has a positive relationship with construction risk management.
Hypothesis 2: Economic factor has a positive relationship with construction risk management.
Hypothesis 3: Technology factor has a positive relationship with construction risk management.
Hypothesis 4: Rules and regulations positively moderate the relationship between political factor and construction risk management.
Hypothesis 5: Rules and regulations positively moderate the relationship between economic factor with skills and construction risk management.
Hypothesis 6: Rules and regulations positively moderate the relationship between technology factor and construction risk management.
Hypothesis 7: Rules and regulations positively moderate construction risk management.

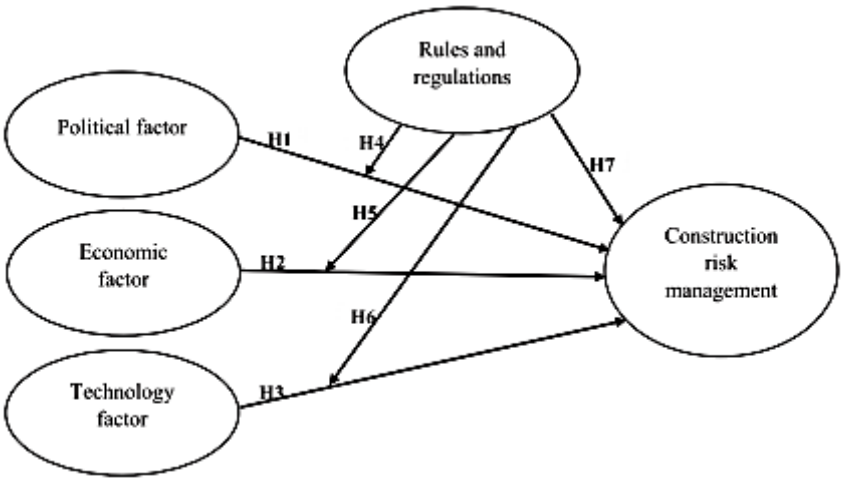

Fig. 1 Conceptual model considered for the Study ***(A.Q. Adeleke et al; 2018)***

Questionnaire Design
The questionnaire was composed of five sections to accomplish the aim of this research, as follows:
1) The organization profile (contractor and owner)
2) Risk factors that have been identified by literature, experts and by the researcher.
3) Risk preventive methods which could be used to avoid risk to take place.
4) Risks mitigate methods that could be used to mitigate risk impactor likelihood.

The organizational external factors and moderating variables (political, economic, and technology factors, and rules and regulations) were adapted from *Kumaraswamy and Chanet al*, and the construction risk management variables were adapted from *Aibinu and Jagboroet al.*

DATA COLLECTION AND SAMPLE

Research Population

A population consists of the totality of the observation with which we are concerned. In this research, the population is the first-class civil contractors of who have valid registration and the employees in the construction companies in the engineer and management level.

Fig. 1 Construction Sites

Fig. 2 Construction Sites in Central India Region

Fig. 3 Engineers and Managers working in Construction Company takes part in Survey

Sampling

This is a cross-sectional study. Data for this study were obtained (only once) from 60 contractors (i.e., contract manager, executive director, marketing manager, project manager, and engineers) operating in local and national construction companies in Central India Region (Jabalpur District). Contractors were selected as the suitable respondents for this study because they are the best people who have an idea on what risk is all about in construction companies. Besides, local, national, and multinational construction companies were selected following research guidelines.

Risk Analysis

For the Risk factor analysis, the *Partial Least Squares (PLS) Path Modeling and Wold* has been used having software platform Smart PLS 2.0 M3.

Partial Least Square

Partial Least Squares is a family of regression-based methods designed for the analysis of high dimensional data in a low-structure environment. Its origin lies in the sixties, seventies and eighties of the previous centuries, when *Herman O.A. Wold* vigorously pursued the creation and construction of models and methods for the social sciences, where “softmodels and soft data” were the rule rather than the exception, and where approaches strongly oriented at prediction would be of great value. The author was fortunate to witness the development first-hand for a few years.

CONCLUSION

1) Most of the engineers and workers in the industry fronting the poor safety.
2) After the safety deliberations the supply of imperfect material is the factor that raises the risk.

3) The Eco-friendly factors are the factors increase the risk but it does not raise the risk in higher values.
4) Differing site circumstances played the major role in the analysis.
5) There is significant negative relationship between economic factor and construction risk management.
6) There is significant and negative relationship between technology factor and construction risk management.
7) Findings from this study revealed a significant positive relationship among the variables, which shows that for every construction industry that follows rules and regulations, there is a probability for such industry to record less risk occurrence on projects.
8) Financial risks are common to most projects. The small firms don't pay as much attention to financial ratios as compared with the larger firms.

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