

# RISK MANAGEMENT IN CONSTRUCTION PROJECTS WITH RESPECT TO DIFFERENT PROCUREMENT OPTION

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**Abstract** - Almost every construction project faces some sort of risk during many stages. This affects project objective in terms of time, cost, quality and performance as a whole or in part. There is a direct relationship between procurement type and risk management in construction project. This paper deals with this relation in some procurement option and is based on questionnaire survey and interviews along with authors inference to it.

**Key Words:** Project Risk, Risk management, Risk allocation, Construction project, Procurement.

## 1. INTRODUCTION

Project Risk is an uncertain event or condition that, if occurs, has a positive or a negative effect on a project objective (PMI 2000). In construction projects, each of the targets i.e. Cost, Time and Quality are effected by risk and uncertainty. To minimize the cost of construction many a time the project gets into trouble. Almost all the risk can be identified at the early phases of project.

Project risk management is the systematic process of identifying, analyzing and responding to project risks (PMI 2000). Risk management process usually includes risk identification, risk assessment and risk response. Lack of any of this process can put construction projects in to failure. In projects, project actors attempt to avoid risks to the maximum and make somebody in the process to deal with it.

Any construction process can be divided into four main phases: planning, design, procurement/tender and production having major project actors as client, consultant and contractor. Procurement type along with clauses in contract agreement plays a major role in deciding who and how the risks will be managed in the project during various phases. Different procurement options have different ranges of responsibilities and liabilities distributed among project actors.

In India construction contracts are based on the standardized conditions of contract in conformity to various laws especially Indian Contract Act, 1872. These documents assign responsibilities and liabilities of each contracting party. Some procurement options mostly used in India are design-bid-build (DBB) contracts, design-build (DB) contracts and partnering form of collaboration.

This paper deals with how various project actors i.e. client, consultant and contractor deals with risk and their relation during various phases of project with respect to different construction project procurement i.e. design-bid-build (DBB) contracts, design-build (DB) contracts and partnering form of collaboration.

## 2. RESEARCH METHODOLOGY

### 2.1 Research Design

The research study is mainly divided as pre-study and main study. Pre-study aimed to create a theoretical base through literature review and to formulate the research questions. The main study aimed at finding out how the risk management process worked in the through questionnaire surveying different project participants in recently finished construction projects, supplemented with interviews and later on analyzing the data collected. By using questionnaire surveying, the risk management process from the different actor's perspectives with respect to different procurement option was assessed. Interviews with the project participants aimed of further understanding of the risk management process with respect to project procurement type. Collected data were analyzed using SPSS software.

### 2.2 Choice and Description of The Projects

In order to obtain an accurate picture, the following requirements to choose the projects were formulated:

- The projects are to be located in cities in the state of Kerala, India.
- Procurement option was limited to design-bid-build contracts, design-build contracts and collaborative partnering.
- The types of the projects are to be building and civil engineering.
- The total budget/cost of projects were limited in between Rupees One Crore and Rupees Fifty Crore.

## 3. DATA ANALYSIS

Total of 150 respondents were provided with the questionnaire. In which usable response was 91 and usable respondent rate 60.7%.

### 3.1 Respondent's Role in Project

The respondent's role in project was classified as follows: client, consultant and contractor. All respondents actually sampled and surveyed were mainly contractors, making 47 % of total valid respondents. Figure 4.1 shows the role of respondents in project.

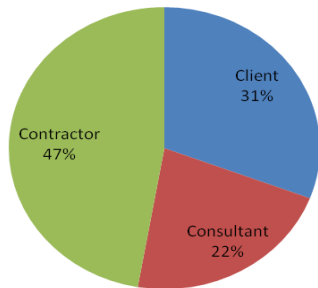


Fig 3.1 Respondent's role in project.

### 3.2 Procurement Type

Type of procurement in project was limited to following: Design Build, Design Bid Build and Partnering. Design Bid Build having 57.10% was the most represented type.

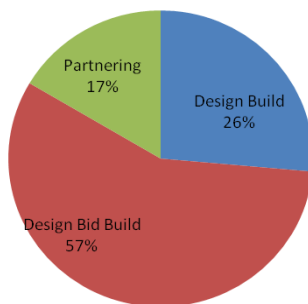


Fig 3.2 Procurement type.

### 3.3 Project Parameters Performance

In different procurement options, project parameters show different performance range. Better functionality performance is shown in design bid build procurement option. Although the performance of other two procurements are also good in respect to functionality. Cost performances in all the three procurement options are good, although partnering shows a better result. This can be due to better risk sharing nature of the procuring option. Better performance of time parameter is shown in design bid build procurement option. But it also has performed badly at some instants.

### 3.4 Project Risk Management Carried Out

As per the study conducted design bid build procurement option provides equal importance to all the three risk management process i.e. risk identification, risk assessment and risk response. Risk identification and risk assessment better done in design bid procurement while it is least in partnering type. At the same time risk response is fairly done in partnering type of procurement this can be due to better collaboration between different project actors. Details are shown in figure 3.3.

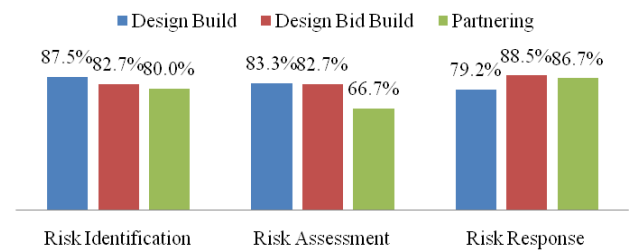


Figure 3.3 Risk management processes done on different procurement options.

### 3.5 Risk Occurred in Project

In this section whether risks occurred in project were studied. If occurred whether it was a identified risk or unforeseen risk is also discussed. It doesn't consider which type of risk occurred. As per the survey 88% of projects faced risks both identified and unforeseen combined. In most of the projects identified risks occurred more than unforeseen risk. Unforeseen risk occurred mostly in partnering type of procurement while identified risk occurred mostly in Design bid Build. Unforeseen risk was mainly due to untimely climatic events, safety and economical policy change. Details are shown in figure 3.4.

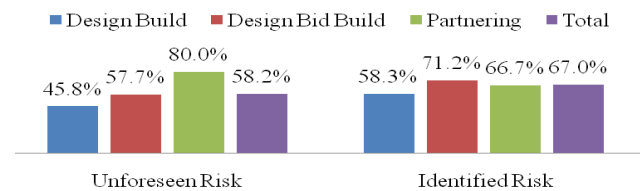


Figure 3.4 Risks occurred in different procurement option.

### 3.6 Who Carried Out Risk Management Process?

In this section who all was involved in various risk management processes i.e. risk identification (RI), risk assessment (RA), risk response (RR) during various phases of project namely planning, design, tender and execution. In all the four project phases joint risk management provided better results. In some cases risk management process are carried out by some external players like sub contractors, suppliers etc. Even though their participation level in the process is comparatively less.

During planning phase in all the three procurement option risk management is carried out jointly most effectively. Although contractor's participation is more in design build and design bid build compared to design bid build. This is mainly due to presence of consultant in design bid build procurement. Details are shown in figure 3.5.

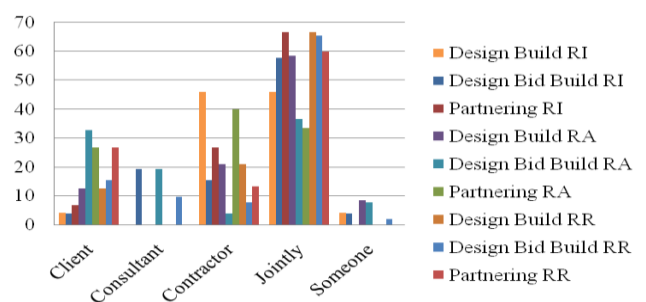


Figure 3.5 Risks management done in different procurement option during planning phase.

During design phase in all the three procurement option risk management is carried out jointly. In design bid and partnering procurements risk assessment is mostly carried out by contractor as there is no consultancy. Details are shown in figure 3.6.

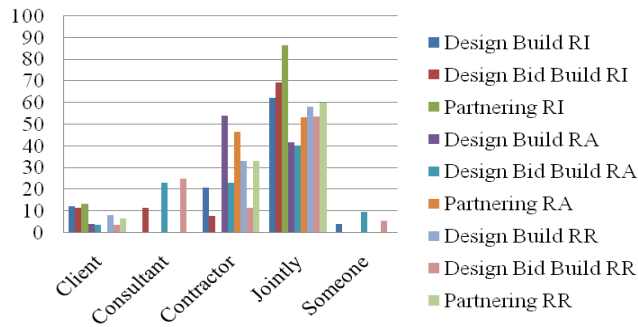


Figure 3.6 Risks management done in different procurement option during design phase.

During tender phase mostly risk management is carried out by contractor. Although in design bid build procurement it is carried out jointly. Details are shown in figure 3.7.

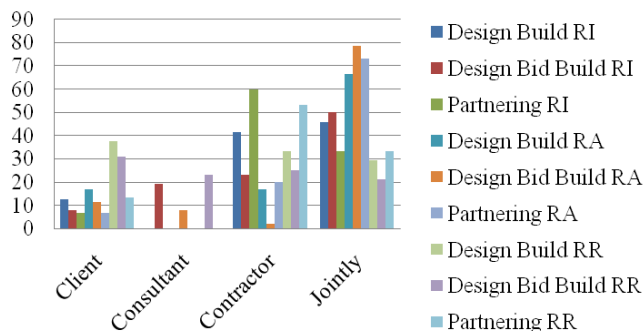


Figure 3.7 Risks management done in different procurement option during tender phase.

During execution phase in all the three procurement option risk management is carried out by contractor who has direct access to the project execution team. In design bid build procurement option all the project actors has equal weightage in carrying out risk management process. Details are shown in figure 3.8.

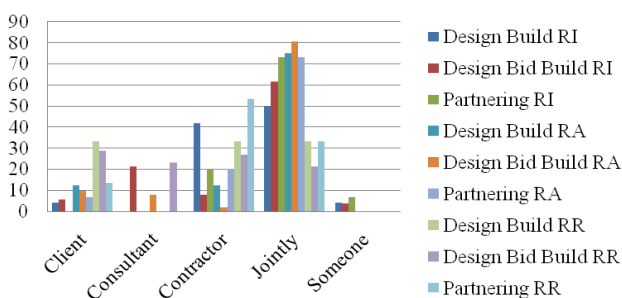


Figure 3.8 Risks management done in different procurement option during execution phase.

3.7 Who Managed The Risk?

In this section, who had managed major risks i.e. financial risk (FR), design risk (DR), contractual risk (CR), execution (ER) and force majeure (FMR) are discussed. In all the five risk mentioned above are mostly managed either jointly or by contractor in all procurement option. Details are shown in figure 3.9.

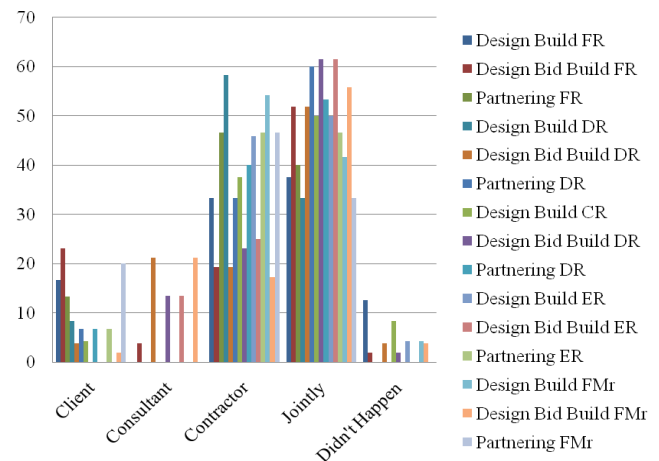


Figure 3.9 Who take the risks in different procurement option.

3.8 Risk Allocation

In this section, how risks are allocated between different actors was analyzed. This is mainly decided by conditions provided in the contract document which is classified as general contract conditions (GCC) and special contract conditions (SCC). In all the three procurement option general contract condition decides how risks are allocated between project actors. Details are shown in figure 3.10.

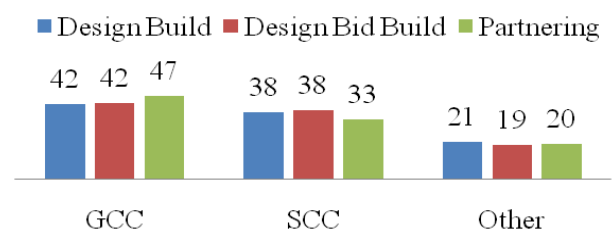


Figure 3.10 Who take the risks in different procurement option.

3.9 Collaboration Between Project Actors

In this section, how the collaboration between various actors in different procurement option was analyzed. This has a good influence on risk management. In all the three procurement option there is a better collaboration between project actors. Collaboration between project actors with respect to different project phases and risk management processes namely risk identification (RI), risk assessment (RA), risk response (RR) was also analyzed. During planning phase, all the three procurement option shows a well collaboration between project actors. Details are shown in figure 3.11.

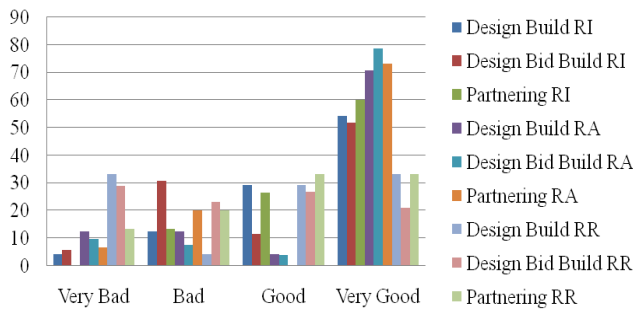


Figure 3.11 Collaboration between project actors during planning phase in different procurement option.

During design phase also all the three procurement option shows a well collaboration between project actors. Details are shown in figure 3.12.

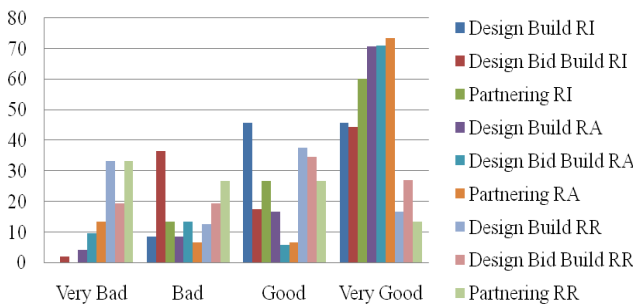


Figure 3.12 Collaboration between project actors during design phase in different procurement option.

During tender phase, all the three procurement option shows a well collaboration between project actors. Details are shown in figure 3.13.

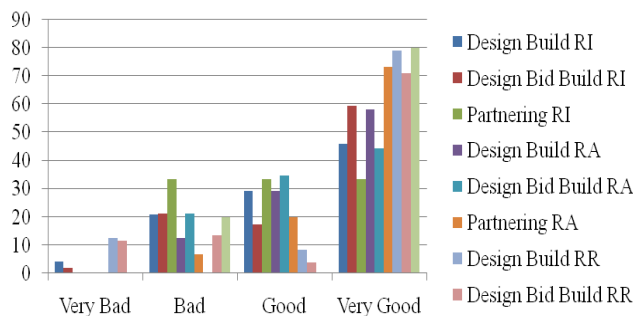


Figure 3.13 Collaboration between project actors during tender phase in different procurement option.

During execution phase, all the three procurement option shows a well collaboration between project actors. But during risk assessment process in all the three procurement option there shows relatively bad collaboration. Details are shown in figure 3.14.

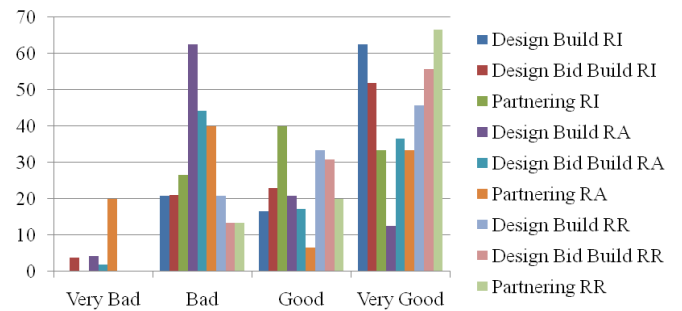


Figure 3.14 Collaboration between project actors during execution phase in different procurement option.

### 3.10 Risk Communicated

In this section, how the risks were communicated among the project actors are analyzed. Risks are well communicated by client, consultant and contractors of design bid build procurement. Contractors of all type of procurement communicate risk with other project actors. Details are shown in figure 3.15.

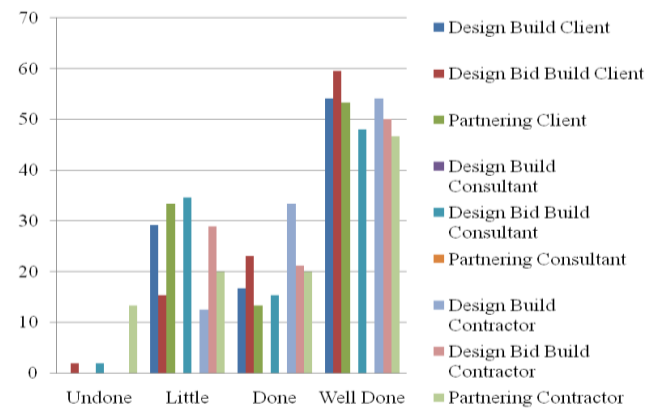


Figure 3.15 Risk communicated between project actors in different procurement option.

### 3.11 Important Factors Considered

In this section, how some important factors are considered in the project is evaluated. Important factors considered in the study are open communication between project actors (OC), Effective Coordination (EC), Trust and commitment of project actors (T), Individual responsibilities (IR), Joint responsibilities (JR), Frequency of meetings (M) and readiness to compromise (COM). All the factors considered are important in successful completion of project as well carrying out risk management. Details are shown in figure 3.16.

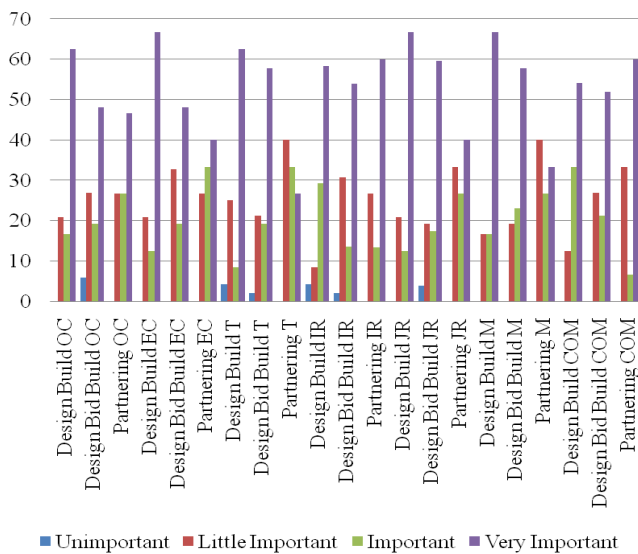


Figure 3.16 Important factors in different procurement option.

#### 4. CONCLUSIONS

In India risk management in the construction sector is still a new technique with growing interest, which should be changed at the earliest. With an increasingly complex and rapidly changing business environment, project actors are being challenged to manage risk while maintaining control and improving performance. Therefore, there is an unavoidable need in the construction industry to teach the concepts of risk management. So that all project actors recognize that the analysis of risk not just a cost but as an investment, in terms of money saved, effective resource utilization and avoiding unwanted delay.

##### 4.1 Project Actor's in Risk Management within the Project Life Cycle

Most of the respondents see risk as a negative event that can affect the project and cause problems. Only few persons mentioned opportunity as a benefit side of risk. Even with a general awareness of the risk management process, risk management implementation systematically in the project is still unknown. From the interviews it is clear that risk identification is the most frequently applied element with checklists and brainstorming as major techniques. Experience and intuition is the major risk management technique.

Within three groups of actors, contractors were the most active in performing risk management. Almost all contractors documented potential project risks and preventive measures. Contractors had the largest influence on risk management as they are into execution. This finding can be generally explained by risk management being carried out in the production phase. Contractors are able to manage many risks, but they need the dialogue with the client and consultant and not when risks appear in the production phase. This makes delay in managing such risks.

##### 4.2 Impact of the Procurement Options on Risk Management

A client's willingness to take risk influences the form of contract. The clients who want to minimize their own risks choose DB contracts due to the single point of responsibility for both design and construction. While partnering option is selected when the client is willing to take risk in side with contractor.

##### 4.3 Factors That Contribute To More Effective Risk Management

Most of the respondents were agreed that GCC are well-developed documents that facilitate clear risk allocation between the project's actors. However, the clients often deviate from GCC to transfer more risks to the contractor leading to conflicts and disputes.

Open discussions of possible risks in the early phases as well as collaborative management of risks throughout the project life cycle is noted to be important drivers of effective risk management. Many respondents are in agreement that currently the lowest bidder is assigned contract than a thorough analysis of the potential risks leading to high cost in later phases or project failure.

Joint risk management is given more importance by most respondents as the best option for managing unforeseen risks. In practice, the actors often have their own management systems and do not use a common database for risk management documents. All respondents agreed open dialogue and collaboration as the key for effective risk management.

##### 4.4 Further Research

In this study procurement options were limited to design bid build, design build and partnering. In the further research such forms as construction management contracts, public/private partnerships (PPP), build operate transfer (BOT), design build finance operate (DBFO) etc. should be explored from the perspective of dealing with risks. This study also considered only major project actors i.e. client, consultant and contractor. In further studies those involving suppliers, sub contractors, etc to be considered.

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