

## **Risk Management Perceptions and Trends among Construction Contractors in Pakistan**

Rizwan U. Farooqui

*(Assistant Professor, Department of Civil Engineering, NED University of Engineering and Technology, Karachi, Pakistan & Ph.D. Scholar, Department of Construction Management, Florida International University, Miami, Florida, USA)*

Sarosh H. Lodi

*(Professor and Chair, Department of Civil Engineering, NED University of engineering & Technology, Karachi, Sind, Pakistan)*

Farhan Saleem

*(Graduate Student, Department of Construction Management, Florida International University, Miami, Florida, USA)*

### **Abstract**

Construction is a highly risk-prone industry with not a very good track record of coping with risks. The participants of the industry, as a result, have been enduring the agonizing outcomes of failure in the form of unusual delays in project completion, with cost surpassing the budgeted cost and sometimes even failing to meet quality standards and operational requirements. This research presents the findings of a study conducted to investigate the current state of perception and trends of risk management practices in the construction industry of Pakistan. The study was undertaken via a questionnaire survey targeted to contractors. Data was collected in ten key areas namely contractors' perception about risk, risk management policy and management support in their organizations, risk management program and procedures used by them, risk identification process, risk assessment process, risk response strategies adopted by them, risk response control mechanisms implemented by them, risk management training structures in their organizational setups, their risk management performance, and obstacles in implementing formal risk management in their organizations. The results of the survey show that the contractors in Pakistan construction industry are not well aware of the concept of risk management. Formal risk management practices are infrequent among contractors and the projects suffer from low productivity resulting in project delays and cost overruns. In many situations, contractors perceive risks based on their own experience and judgment rather than using systematic procedures to identify, assess and tackle them. It can be concluded that contractors in Pakistan construction industry, owing to lack of systematic procedures, do not have adequate capability of retaining and mitigating risks and hence resort to mechanisms such as transferring risks. Recommendations include arrangement of formal and/or informal education and training in risk management. A change in the views and attitude of the clients through awareness programs can bring a prominent and distinctive change in the risk management status in Pakistan not only among contractors but also in the entire construction industry.

### **Key Words**

Risk Management, Project Management, Construction Industry, Contractors, Pakistan

### **1. Introduction**

Different parties in a construction project face a variety of uncertain factors. These factors can be compiled under the category of risk. Making decisions on the basis of assumptions, expectations, estimates and forecasts of future events involves taking risks. Risk and uncertainty characterize situations where the actual outcome for a particular event or activity is likely to deviate from the estimate or forecast value (Raftery, 1994). Risk affects productivity, performance, quality and budget of a construction project (Akintoye and Macleod, 1997).

The construction industry has long been recognized as particularly risk laden and subject to more risk and uncertainty than many other industries. The industry has had a poor reputation for coping with risk; many projects failing to meet deadlines, cost, quality and performance targets. Clients, contractors, the public and others have suffered as a result (Thompson and

Perry, 1992). Few risks associated with the construction process are fairly predictable or readily identifiable; most may be totally unseen (Smith and Gavin, 1998). The process of taking a project from initial investment appraisal to completion and into use is complex, generally bespoke, and entails time-consuming design and production processes. It requires a multitude of people with different skills and interests and the co-ordination of a wide range of disparate, yet interrelated, activities. Such complexity moreover, is compounded by many external, uncontrollable factors (Flanagan and Norman, 1993). Unmanaged or unmitigated risks are one of the cardinal causes of project failure in construction.

Risk in a construction project, however, cannot be exterminated entirely. Though risk can be managed and controlled by influencing the risk drivers to diminish the impact through risk management. In the context of project management, risk management is defined as: “A formal orderly process for systematically identifying, analyzing, and responding to risk events throughout the life of a project to obtain the optimum or acceptable degree of risk elimination or control” (Al-Bahar, 1990). It endeavors to maximize the positive consequences and minimize the repercussions associated with an event. It either eliminates, reduces or works around a risk to achieve project completion with minimum additional cost and delays without compromising on quality and performance.

It is surprising that the managerial techniques used to identify, analyze and respond to risk have been applied in the construction industry only in the last decade, and that too on a very limited scale (Flanagan and Norman, 1993). In the construction industry the euphoria, optimism and excitement of a new project often leads to the AGAP ‘All Goes According to Plan’ attitude. “We tend to give budgets, estimates, and completion dates based upon all according to plan. Construction has many unknowns and things rarely go according to plan. We need to be more aware of WHIF ‘What Happens If’ analysis” (Flanagan and Norman, 1993). People should be encouraged to have brainstorming sessions of destructive thinking, where wild ideas can be thrown up about the things, which might go wrong, even though there is no precedent. The ideas need to be collected into a risk management system where analysis can be undertaken.

Each party in a project perceives risk from their unique perspective. Owner’s greatest overall risk resides in the ultimate product and not with the development process of the facility. Generally, design consultants provide professional services to the client on investment, design, cost, contractual arrangements and all other facets of dealing in projects, and will always seek to balance the risks in best interest of the client. Through procurement of external design consultant the owner transfers the design risk while retaining the overall project risk. A contractor’s overall risk is a portfolio of risks, made up of individual project risks created by complexity of design and estimating total project cost (Gary R. Smith and Caryn M. Bohn., 1999).

For the past few years, many construction industry practitioners, especially general contractors in the US, UK and other European countries have been involved in some form of risk management. However, management of risk on a formal level is a practice scarce in Pakistan. There have been no significant attempts to inaugurate and institute the concept in the routine project management activities not only among contractors but also in the entire construction industry. Compared to the past, the current decade is witnessing massive infrastructure growth in Pakistan. There are numerous infrastructure development projects in progress as well as under planning. All of these projects have the potential to lead the local industry to gain glory, status and international recognition but only when appropriate efforts are extended to achieve the same. With the stage set for a golden era for development, the challenges are still higher and need for formal project risk management systems is even greater than ever before.

The objective of the research presented in this paper is limited to the risk management perception and trends among the general contractors, while the findings of risk management perception and trends among the other key players (public clients, design consultant and project management consultant) of Pakistan construction industry will be presented later. This research aspires to enable the local professionals to minimize their cost and time overruns due to unforeseen events and attain their goals more proficiently. It is an attempt to establish a benchmark for the existing risk management practices of the industry. The ultimate expected achievement of this research is to develop a risk management model and to highlight its relevance in the successful completion of the project and its utility to the stakeholders. It aims to enable the professionals to predict events detrimental to the project before hand and allow them time to decide on a response methodology. This would reduce the cost and time overruns resulting from unforeseen events along with reduction in resource wastage, hence leading to the completion of the project effectively and efficiently. Moreover, the research would provide a foundation for further research on the topic of risk management. It would be an attempt to commence a process of the development of Risk Management System in Pakistan.

## **2. Objectives and Scope**

The research work reported in this paper is part of an on-going research project under Pakistan-US Science and Technology Cooperative Program (STCP), with funds provided jointly by the United States Agency for International

Development (USAID), USA and Ministry of Science and Technology (MoST), Pakistan. The above-mentioned project has four main objectives:

1. Assess the current state of Pakistan construction industry through quantitative research with specific reference to the status of construction management education, research and practice.
2. Develop a strategic model for the improvement and strengthening of construction management education, research and practice in Pakistan.
3. Devise a framework to standardize the construction industry practices for achieving improved performance on cost, time, quality, productivity and safety.
4. Capacity building of academia, industry, owners and government in the area of construction management so as to improve the overall efficiency and productivity of the construction industry.

Since no accurate information regarding the extent of construction management application in the Pakistan construction industry was available, the first objective of the research project was set as the investigation of the adoption and implementation of construction management practices in Pakistan construction industry.

One of the major objectives of the above mentioned research work is to develop a *Risk Management Model for the Pakistan Construction Industry*. While the scope of research presented in this paper is to diagnose the present practices of risk management by the contractors in Pakistan construction industry and to critically evaluate their perceptions and trends, the remaining research work related to the above objective will be reported in further papers.

Hence the specific aims and objectives of the research presented in this paper include investigating the risk management perception and trends among contractors in Pakistan construction industry and introducing/ fostering the concept of risk management practices in local construction industry.

It is expected that the findings of the study will aid in developing a risk management model for the Pakistan Construction Industry, which will be presented in a future research paper.

It is expected that this study will be of a pioneering nature. For the local construction industry, this research has the potential of benchmarking the risk management practices which will aid in developing appropriate risk response strategies and hence a risk management model for the Pakistan Construction Industry.

### **3. Methodology**

The research methodology consisted of the following steps:

1. Development of a questionnaire to elicit information about the contractors' perceptions and trends of risk management practices in Pakistan construction industry.
2. Conducting questionnaire survey through postal mail, electronic mail and fax.
3. Assessment of feedback from questionnaire survey to identify the perceptions and trends.

The steps are explained as follows.

A questionnaire was developed consisting of two parts – A and B. Part A consisted of requesting respondent's personal information (e.g. work experience, position in company) and company information (e.g. types of construction works performed, years in business, annual volume of work, number of employees). Part B comprised of 48 questions laid out in 10 key areas as follows:

1. Contractors' perception about risk,
2. Risk management policy and management support,
3. Risk management program and procedures,
4. Risk identification process,
5. Risk assessment process,
6. Risk response strategies,
7. Risk response control,
8. Risk management training structures,
9. Risk management performance,
10. Obstacles in implementing formal risk management.

Target population was large and medium size contractors housed in major cities of Pakistan. A list of approximately 200 contractors was prepared from the list provided by Pakistan Engineering Council. From the 200 contractors, a sample of 100 contractors was randomly selected using 95% confidence level and 5% confidence interval. The questionnaire was sent to those 100 contractors and responses were collected over a period of three months. Of the 100 questionnaires sent to the contractors, 45 valid responses were received. This response rate is typical of a construction industry questionnaire survey and can be used to draw conclusions (Akintoye and Macleod, 1997). Most firms which responded to the questionnaire survey and interview survey were medium-to-large size (based on their annual turnover and number of employees) general contractors working in public sector. The questionnaires were completed by their top management who were involved in the risk management programs. Almost all of them (more than 85%) had over 10 years of different types of construction experience. On the basis of their position, education, work experience and professional background, it can be inferred that the respondents had adequate knowledge of the risk management activities in their organizations.

#### 4. Analysis and Discussion

The analysis and discussion about the questionnaire survey is organized in ten key areas as identified in section three (3) above. In line with the format of the questionnaire, the results are reported in ten sections. The companies' responses are mostly indicated as a percentage of total responses.

##### 4.1 Contractors' Perception about Risk

In this section, six questions were asked to investigate the awareness and perception of contractors regarding risk. The results are as follows.

###### 1. How do you perceive risk? Check all that apply.

Option	Percent of Responses
Financial loss to organization	73%
Cost overrun on projects	71%
Time delay on projects	67%
Changed site conditions	62%
External technical/ managerial/ administrative problems (e.g. design errors, incomplete contract documents, communication issues, approval issues, etc.)	62%
Quality non-conformance on projects	53%
Unforeseen events	53%
Internal technical/ managerial problems (e.g. resource related, scheduling, cost estimating)	51%
Contractual disputes / liabilities/ Litigation problems	51%
Unwarranted project scope changes	47%
Loss of reputation	33%
Unsafe project conditions (accidents )	27%
Issues with compliance of regulatory requirements	22%
An opportunity for profit	20%
An opportunity for innovation/ organizational improvement	18%

Most contractors perceive risk as financial loss to organization, cost overruns, time delay, changed site conditions and external technical/ managerial/ administrative problems. Time delay and cost overrun are major contractual liability, changed site conditions and external problems may lead to internal technical/ managerial issues, contractual liabilities and/ or financial liabilities, while financial loss itself is a major organizational setback which may affect not only the project itself but other current and future projects. It is important to note that very few contractors (33%) perceive risk as a loss of reputation. This depicts the fact that not many contractors are reputation conscious in the industry. This is indeed true in the public sector works in Pakistan where contracts are usually awarded on lowest bid rather than past performance and reputation history of contractors. Also, a very few contractors (20% and 18% respectively) perceive risk as an opportunity for making profit or for innovation/ organizational improvement. This is understandable because, since risk management maturity level is not very high in Pakistan construction industry and formal risk management systems seldom exist (as concluded after this survey), risk, by most contractors, is not considered an opportunity – for making higher profits, for getting market edge by innovation or for organizational improvement. Looking at it from another perspective, it may be asserted that as proactive risk management approach is not employed to cater risks, contractors are not capable enough to accept high risk projects for the incentive of extracting higher margins of profits or organizational improvement.

2. *Based on your expert opinion, during which project phase do you think formal project risk management efforts should typically begin?*

Option	Percent of Responses
Conceptual planning	11%
Conceptual design	18%
Detailed design	49%
Procurement	13%
Construction	9%

There is a normal distribution trend seen on above results, with majority of contractors indicating that formal project risk management efforts should typically begin in detailed design phase (modal value). There is consistency in this result and the result to the previous question, in which a majority (62%) of the contractors identified that they perceive risk as external technical/ managerial/ administrative problems (such as design errors, incomplete set of specifications, design communication, etc.). Hence it can be inferred that the reason that many contractors believe that formal project risk management efforts should begin in detailed design phase is that a major proportion of risks generated in their projects evolve during detailed design, and may be better tackled by risk assessment during the design phase.

3. *Based on your expert opinion, on which projects do you think formal risk management system should be implemented? Check all that apply.*

Option	Percent of Responses
Complex Projects	80%
Large Projects	64%
Small Projects	13%
All Projects	20%

A vast majority of contractors indicated that they perceive formal project risk management as a process more suited to complex projects or at least projects with appreciable size and scope. This may be because risk management is still a naïve concept in Pakistan Construction Industry and application of risk management tools and techniques are perceived as costly both in terms of time as well as in terms of effort. Hence most contractors, do not realizing the advantage that formal risk management can bring to their projects, envisage that it is not worth the effort until there is enough complexity in a project that justifies adopting it.

4. *According to your expert opinion, to what extent are the following processes effective in a formal project risk management system (Scale 1 to 5, 1:Least effective 5:Most effective):*

Process	Average Effectiveness (scale of 5)
Risk identification	3.9
Risk assessment	3.3
Risk response development	3.8
Risk response control	4.0

Contractors perceive risk response control as the most effective process in risk management system followed closely by risk identification and risk response development. Ironically, risk assessment is considered the least effective risk management process.

5. *To what extent is managing risk on projects perceived to be critical to your organization's success? (Scale 1 to 5, 1:Least critical 5:Most critical)*

Majority of contractors (76%) responded that managing risk is perceived to be either very critical (scale of 4 in 5) or most critical (scale of 5 in 5) to their organization's success. The rest perceived it to be moderately critical (scale of 3 in 5). Looking at this response in conjunction with a previous response given by contractors indicating that formal project management system should be implemented on complex projects only or at least on large projects, it can be asserted that most contractors envision that, although risk management is perceived to be very important towards project and organizational success, it may be achieved by informal means and methods on less complex/ smaller projects. This is an important finding about contractors' perception towards need and use of formal risk management processes.

6. In your expert opinion, formal project risk management is a tool that can be beneficial to (check all that apply):

Option	Percent of Responses
Manage project complexity	84%
Improve project cost performance	80%
Improve project time performance	78%
Improve project quality	76%
Remove/ Reduce project uncertainty	76%
Ensure project safety	71%
Improve stakeholder relations	67%
Minimize contractual liabilities	64%
Maximize organizational opportunities for profits	60%
Improve organizational competitiveness and productivity	58%
Increase market reputation/ share	53%
Improve probability of project regulatory compliance	47%

A vast majority of contractors considers risk management as a multi-dimensional tool that can be used to improve mainly project performance (manage complexity, improve cost, time, quality and safety performance, and reducing project uncertainty). Improving organizational performance in terms of improving stakeholder relations, minimizing contractual liabilities, maximizing organizational opportunities for profits, increasing organizational competitiveness and productivity, and increasing the market reputation/ share of the organization are perceived as comparatively less obvious benefits of risk management to contractors. This emphasizes that contractors perceive risk management as more of a project control tool rather than an organizational improvement tool.

The analysis of this section indicates that majority of contractors perceive risk as a negative entity and do not acknowledge its significance as a major contributory to improving organizational performance and competitiveness. Many contractors believe that formal project risk management efforts should typically begin in early project phases (especially detailed design phase) because a major proportion of risks generated in their projects evolve during detailed design, and may be better tackled by constructability input and risk assessment during that phase. Most contractors, do not realizing the advantage that formal risk management can bring to their projects, envisage that it is not worth the effort until there is enough complexity in a project that justifies adopting it. Among the formal risk management processes, risk assessment is considered to be the least effective by most contractors. Although some consider risk management significantly vital to project success, others were less concerned about the concept. A vast majority of contractors perceive risk management as a multi-faceted tool to improve project performance, primarily, and organizational performance to a moderate extent.

#### 4.2 Risk Management Policy and Management Support

In this section, seven questions were asked to explore facts about the risk management policy, management support and responsibility in contracting organizations. The results are as follows.

7. How can you best define your company's risk tolerance level (or risk attitude)?

Option	Percent of Responses
High tolerance / Risk Taking attitude ( <i>risks are opportunities and have financial and non-financial utility values and hence should be taken</i> )	16%
Low tolerance/ Risk Averse attitude ( <i>most risks are potentially dangerous and have high probability of becoming financial and non-financial liabilities and hence should be avoided as much as possible</i> )	26%
Neutral tolerance/ Risk Neutral attitude ( <i>risks should be taken only when they are within organizational capability to handle; all risks above this threshold should be avoided</i> )	58%

Most of the contracting organizations identified that their risk tolerance level is either 'neutral' (58%) or 'low' (26%). This clearly indicates that contractors are not willing to accept high risk (they have either risk averse or risk neutral policies), which further substantiates a major finding of the previous section that most contractors do not perceive risk as an opportunity. This, most likely, is owing to the lack of existence of formal risk management systems in the industry, which do not allow contractors to be more innovative and competitive.

8. *Do you have a written risk management policy for projects? (Yes/ No)*  
*If yes, how do you promote the policy within the organization?*

The survey indicates that majority of the organizations (82%) do not have a formal documented risk management policies. Among the eight respondents (18%) who do have a documented risk management policy, the most frequently used method for the promotion of policy is the distribution of documentation evidencing the policy (five respondents) followed by meeting, conferences, briefing and training courses/workshops (three respondents).

9. *Does the policy identify key senior personnel for overall coordination and implementation of the policy? (Yes/ No)*

The response was affirmative by all the respondents to which this question was applicable (18%).

10. *Does each level of management have assigned formal risk management duties and responsibilities? (Yes/ No)*

The response was positive by three respondents and negative by the remaining five.

11. *In your policy, has the individual risk management responsibilities of all employees been clearly defined? (Yes/ No)*

The response was negative by all the respondents to which this question was applicable (18%).

12. *What is the hierarchy of accountability of risk management implementation on projects?*

Forty percent (40%) respondents indicated that project teams are held accountable for risk management implementation. This is followed by top management (33%) and site engineers and technical staff (27%). None of the respondents indicated non-technical staff as accountable. In the absence of formal risk management policies, accountability is an over-burden rather than carrying practical significance.

13. *To what extent does your organization involve itself into following? (Scale 1 to 5, 1:Very Little 5:Very High)*

Option	Average Involvement
Create the understanding, expectation and desire to innovate and take risks in order to achieve extraordinary performance?	1.2
Actively promote creativity, innovation and risk management to encourage a radical approach to improvement?	0.9
Create an environment/culture that supports and encourages considering risk taking?	1.1

The responses indicate that the average attitude of contracting organizations toward innovation and risk taking is very conservative. In general, construction is a risky business but this is more true for Pakistan because of the absence of formal project management systems in the industry (including formal risk management mechanisms). This has made the major role players of the industry – the contractors – passive in response and has negatively affected the industry output in terms of creativity and innovation as well as productivity.

Results of this section indicate that contractors mostly lack risk related policies and management support; only few contractors have written risk management policies and procedures. Most of the contractors are either risk averse or risk neutral i.e. they do not perceive risk as an opportunity and their attitude toward innovation and risk taking is very conservative. This is particularly true because of the absence of formal risk management systems in the industry. Majority of respondents indicated that project teams are held accountable for risk management implementation. In the absence of formal risk management policies, accountability, with no in-place responsibility structures, is of little practical significance.

### 4.3 Risk Management Program and Procedures

In this section, nine questions were asked to investigate the current state of adoption and implementation of risk management programs and procedures in contracting organizations and the industry. The results are as follows.

14. *On your projects, have you been formally involved in the conceptual phase of a project?*

Option	Percent of Responses
No	100%
Yes, in the following risk management activities:	0%
Provide input to project risk analysis	
Identify potential major construction risks	

The response was negative by all thirty (100%) respondents. That is, no contracting organization gets formally involved in any of the conceptual phase risk management activities on a project, each of which can extract substantial input from contractors in terms of risk management planning on projects. This is not surprising considering that majority of the respondents were contractors working in public sector, where currently no procedure exists for involving contractors in conceptual planning phase of a project.

15. *On your projects, have you been involved in the design-procurement phase of a project?*

Option	Percent of Responses
No	80%
Yes, in the following <i>risk management activities</i> :	
Review design & specifications to facilitate easy and efficient construction	20%
Review design & specifications to facilitate site accessibility	11%

The response was positive by only 20% respondents. It is important to note here that those respondents who answered affirmatively to this question were mainly contractors working in private sector, where clients are more receptive as well as give significance to contractor input and have customized mechanisms for inviting client-contractor communications in early stages of project.

16. *As part of your project/ risk management program, does your organization develop a risk management plan for each project (by requirement or on discretion)?(Yes/ No)*

Only five organizations (11%) responded affirmatively to this question. The result indicates that the practice of preparing a risk management plan/ manual for a project in the project planning stage is neither practiced by contractors nor mandated by clients. It can be therefore, inferred that formal project risk management is not given due significance in project planning stage both by clients and the contractors.

17. *What percentage of project budget is formally allocated on developing and/ or implementing formal risk management on projects (formal risk management includes risk identification, risk assessment, risk response development, and risk response control)?*

Option	Percent of Responses
No allocation	67%
Less than 1%	27%
1-2%	6%
2-3%	0%
3-5%	0%

Most of the contracting organizations which identified that they do not have a formal risk management policy also indicated that they do not allocate any funds for implementing formal project risk management. However, one-third of the organizations do allocate some fund, usually in the range of less than 1% of project budget. Through informal discussions with these respondents, it was identified that most of this fund is placed as a contingency budget for risk control on projects.

18. *Are there pre-task meetings before executing an activity? (Yes/ No/ Occasionally)*

Most of the contractors (80%) identified that they do have a process of pre-task meetings not for every activity but occasionally (most probably depending on activity type and nature and extent of risk associated). The remaining (20%) do not have such a mechanism.

19. *When a risk event occurs on-site, what is your response procedure? Check all that apply.*

Option	Percent of Responses
Site management decides on response behavior based on experience/ judgment	69%
Problem is referred to office management for decision/ further assessment/ further communication	42%
Project (site) team decides after discussion/ meeting	29%
Appropriate action is taken as per the risk response plan	11%

An interesting finding from the results is that only five (11%) contracting organizations have risk response plans usually in effect on project sites to help them decide on appropriate risk response actions. Moreover, the results also highlight that most contracting organizations do not usually have a specific risk response strategy and hence invariably resort to various response methods such as decision by site management, referral to office management, decision after team discussion, as they deem appropriate based on specific circumstances. This also shows the absence of a proactive approach towards risk management among contracting organizations.

20. *Does your organization make use of any computer based software/ module for Risk Management or any of its process (e.g. Palisade Precision Tree, Palisade @Risk, Primavera Monte Carlo Simulation, Excel based simulation, PERT scheduling, etc.)?*

The response was rather expected. None of the contracting organizations are using any computer based risk management tools.

21. *Are subcontractors required to submit project-specific risk management plans?(Yes/ No)*

Again the response was rather expected. Only three organizations (7%) responded affirmatively to this question. This result is in consistence to the observation that these were the organizations out of the five organizations who indicated that they have a practice to develop risk management plan for each project. It can be inferred that owing to the absence of an integrated system of project risk management in the industry with clients not demanding risk management plans from contractors, any initiative to develop or procure (from subcontractors) project-specific risk management plans by contractors is only based on their own organizational commitment or significance given toward formal risk management.

22. *Does your organization employ external consultants for risk management implementation?*

According to the survey results most organizations implement risk management through project teams within their firms (67%); few organizations employ external project management consultants (33%). This shows that the trend of hiring specialized consultants to cater project risks is existent but the tendency to cater risks by internal teams is predominant. Had the organizations developed a mature risk management policy and management support, this would have been a positive trend. However, this is not viable in the perspective that despite the fact that contractors do not have mature and well established risk management systems, they prefer to manage risks internally as compared to employing external specialized services. This may be because of their believing that formal risk management services are not usually financially viable. This also indicates their lack of awareness of benefits of risk management.

Major findings of this section are as follows. None of the contracting organizations get formally involved in the conceptual phase risk management activities on a project. However, few contractors working in private sector, where clients are keener on inviting client-contractor communications in early stages of project, find themselves involved in few design phase activities related to project risk management. Owing to the absence of an integrated system of project risk management in the industry with most clients not demanding risk management plans from contractors, any initiative to develop or procure (from subcontractors) project-specific risk management plans by contractors is only based on their own organizational commitment or significance given toward formal risk management. Most contracting organizations do not allocate adequate funds for implementing formal project risk management. Most contractors do pre-task meetings but only for those activities which are more risk-prone. Contractors do not usually have a defined risk response strategy and hence invariably resort to various response methods as they deem appropriate based on specific circumstances. Generally, among contractors, there is a lack of awareness of the utility and benefits of formal risk management programs and hence little effort has been put on developing mature and well established risk management systems.

#### **4.4 Risk Identification Process**

In this section, four questions were asked to investigate the risk identification processes, tools and techniques employed by contractors in Pakistan Construction Industry. The questions were laid on the basis that it is desirable to understand and identify the risks as early as possible to decide upon a suitable strategy for handling it. That is, if project risks are identified at the appraisal stage, then the information can be used to choose between projects and establish constraints on the project (Bajaj D., Oluwoye J. & Lenard D., 1997). The findings are as follows.

23. Does your organization review, and where necessary amends its risk register/ database resulting from: (check all that apply)

Option	Percent of Responses
Changes in organizational structure?	0%
Changes in organization's role?	0%
Changes in organization's risk policy?	7%
Changes in work environment (such as government regulations)?	7%
New project experience?	27%
Don't have a risk register/database	67%

Results indicate that majority of the contracting organizations (67%) do not maintain a risk register/ database. This again emphasizes absence of proactive approach towards risk management. Few organizations (33%) who do maintain a risk database usually update it based on new experience (27%), but rarely update it for changes in organizational structure, organizational role, organizational risk policy, or work environment. Low response rate for new project experience indicates that once a project is completed risks that were encountered in the project are not registered for future reference by majority of contractors. Note that risk register forms an important basis to use registered experience on future projects to better manage their risks.

24. In respect of each identified risk, the risk register/ database records: (check all that apply)

Option	Percent of Responses
Consequences?	33%
Severity of impact?	27%
Possible sources?	18%
Likelihood of occurrence?	18%
Existing controls?	13%
Likely time of occurrence?	7%
Category/ Classification?	9%
No record is maintained	67%

The low (positive) response rate to the question again indicates that maintaining a comprehensive database or a risk register is not a popular trend among the industry. Looking at the trend of responses, it can be asserted that those contractors who do maintain a risk register/ database and record parameters for each identified risk, focus more on the consequences and impacts of each risk rather than possible sources, likelihood of occurrence, likely time of occurrence and existing controls for the risk. This result again illustrates lack of emphasizes given to risk management planning by contractors who usually adopt, in most cases, a reactive approach to risk i.e. emphasizing more on reducing the consequences and/ or severity of impact rather than eliminating the causes of risk and reducing its likelihood of occurrence.

25. Formally or informally, potential project risks are identified in which of the following phases of a project? Check all that apply.

Option	Percent of Responses
Project tendering	20%
Construction preplanning	31%
Detailed construction planning	67%
Project executing	53%

The results are interesting. Only nine contractors (20%) have a process to formally or informally identify potential project risks at the time of project procurement. This implies that a majority of contractors are assuming potential risks associated with a project without prior assessment (or maybe unconsciously). This is an important finding. Another result is that a majority of contractors (67%) perform risk identification during detailed construction planning. This is a relatively positive finding. Yet more than half the contractors (53%) perform formal risk identification during project execution, where the focus should not be risk identification but rather be risk response control.

26. Which of the following formal and informal project risk identification techniques you use?

Technique	Percent of Use
Personal experience/ intuition/ judgment of project leader	91%
Experience/ Intuition/ Judgment of project team	73%
Expert views	71%
Historical data from past similar projects	60%
Brainstorming sessions	56%
Discussions among parties involved in the project	53%
Checklists	40%
Risk events/ consequences scenario analysis (what-if scenario analysis)	22%
Risk classification/ categorization	20%
Risk Breakdown Structures (RBS)	0%
Risk curves/ Risk mapping	0%
Risk summary check sheet	0%

Results indicate that the most frequently used techniques for risk identification are experience/ intuition/ judgment of project leader or project team, expert views, historical data from past similar projects, brainstorming, and discussions among parties involved in the project. Personal experience (or experience of project team) is most popular as it requires minimum time and minimum resources to implement. This again illustrates the contractors' approach toward risk management i.e. not emphasizing on substantial input of time, resources and effort into the risk planning phase. It is encouraging to note that almost half of the contractors (53%) involve other parties into their risk identification process. However, it is not encouraging to identify that simple means such as checklists, risk classification/ categorization and risk summary check sheets which are easy to use yet very effective are not practiced by majority of contractors (60% or more), not to mention the more sophisticated tools such as scenario analysis, RBS and risk curves, which are seldom used by any contractor.

This section of the survey indicates that the contractors do not have a proactive approach towards risk management. Majority of the contracting organizations do not maintain a risk register/ database. Those contractors who do maintain a risk register/ database and record parameters for identified risks, focus more on the consequences and impacts of each risk rather than possible sources, likelihood of occurrence, and existing controls for the risk. Most contractors are assuming potential risks associated with a project without prior assessment (or maybe unconsciously) during project procurement stage. A relatively positive finding is that most contractors perform risk identification during detailed construction planning; however, still more than half perform formal risk identification during project execution, where the focus should not be risk identification but rather be risk response control. The most frequently used technique for risk identification is experience/ intuition/ judgment of project leader or project team, which is not a formal means.

#### 4.5 Risk Assessment Process

In this section, two questions were asked to investigate the risk assessment processes, tools and techniques employed by contractors in Pakistan Construction Industry. The findings are as follows.

27. The organization finds it difficult (check all that apply)

Option	Percent of Responses
To prioritize project major risks	60%
To assess the likelihood of risks occurring	38%
To assess the potential impacts of risks	27%
No difficulty at all	0%

In this question, respondents were asked about the difficulties they face in assessing the identified risks. The results showed that although majority (60%) of the respondents find it difficult to prioritize the project risks, assessment of probability of occurrence as well as impact of risk is not viewed by the majority as difficult. Possible reason may be that the latter two, most probably, are informally assessed by the contractor staff on the basis of intuition, judgment and personal experiences; if more formal assessment methods would have been used, prioritization of major project risks would not have been a difficulty. This indicates lack of use of formal techniques for risk assessment.

28. Which of the following risk assessment techniques do you use?

Qualitative Techniques	Percent of Use	Quantitative Techniques	Percent of Use
Intuition/ judgment/ experience	80%	Payback Period	57%
Scenario Analysis	30%	Net Present Value (NPV)	53%
Flow charts and Influence Diagrams	27%	Benefit/ Cost Analysis	40%
Performance analysis	17%	Decision trees	20%
Reliability analysis	17%	Expected monetary Value analysis	13%
Capability analysis	13%	Semi-quantitative Scenario Analysis	13%
Cause and Effect Diagrams	7%	Risk probability and impact assessment	13%
Ranking options	0%	Breakeven analysis	7%
Comparing Options	0%	Internal Rate of Return (IRR or ROR) Analysis	7%
Descriptive Analysis	0%	Incremental Analysis	0%
Pareto Charts	0%	Life Cycle Cost Analysis	0%
Analytical hierarchy process (AHP)	0%	Expected Utility Value analysis	0%
Risk Assessment Form	0%	(Monte Carlo) Simulation	0%
Risk Assessment/ Severity Matrix	0%	Sensitivity analysis	0%
Risk rating tables	0%	Bayesian analysis	0%
		Mean end analysis	0%

The results show that, except for economic analysis techniques (such as payback period, NPV, benefit/ cost analysis) which are of utmost importance for any business entity from financial management and corporate decision making perspective, neither qualitative techniques nor quantitative techniques are widely used for risk assessment. This trend is particularly owing to lack of awareness and expertise about the techniques as well as lack of availability of data and tools to be able to apply the techniques. The consequence has been that a vast majority of contracting firms (80%) have resorted to intuition/ judgment/ experience for assessing risks rather than considering application of more formal techniques for risk assessment. Even simple yet effective techniques like cause and effect diagrams, Pareto charts, risk assessment matrix, expected monetary value analysis, risk probability and impact assessment are very uncommon.

Findings of this section indicate that risk assessment done by contractors is mostly informal based on intuition and judgment rather than using any formal techniques. Owing to this, they usually face difficulties in prioritizing major project risks as well as assessing the likelihood and severity of impact of these risks.

#### 4.6 Risk Response Strategies

In this section, nine questions were asked to investigate the risk response strategies adopted by contraction in Pakistan Construction Industry. The findings are as follows.

29. On a scale of 1 to 5 (1:Very Low 5:Very High), identify the frequency of usage of the following risk response strategies by your organization?

Risk Response Strategy	Average Usage (scale of 5)
Risk retention	4.6
Risk reduction/ mitigation	3.8
Risk transference	3.7
Risk elimination/ avoidance	2.5
Risk sharing	2.0

30. On your projects, risk retention, on average, has led to inflation (increase) of the estimated project budget by:

Option	Percent of Response
Less than 2%	0%
2-5%	0%
6-10%	11%
11-20%	27%
21-30%	33%
31-50%	16%
51-70%	11%
More than 70%	2%

Relating the results of above two questions, it can be asserted that majority of contracting organizations in Pakistan, on average, are following a risk retention strategy which, instead of giving positive results, has led to major budget inflations on projects (a mean inflation value as well as the modal value is range of 21-30% of original project budget). This correlation can be attributed to the finding of a previous section that contractors accept potential project risks without prior assessment of the possible risks as well as their capability to handle those risks. A major reason for this unknowledgeable decision, of course, is lack of awareness, expertise and use of formal risk identification and assessment strategies. However, another important aspect is the perspective of the current state of practice in Pakistan Construction Industry where contracts are mostly (if not always) awarded to lowest bidders and contractors are not typically involved in any risk assessment process during project development stages (as identified in findings of a previous section) and hence most of project risk, which has neither been identified nor been assessed formally, is transferred to project execution stage and hence to the contractors through contract terms and conditions. Trend of usage of risk mitigation strategies (average usage of 3.8) follow the trend of risk retention (average usage 4.6), which is consistent. Also, from above results, it can be identified that the frequency of usage of risk transference is lying in the higher range, which identifies the lack of contractors' capability to handle the risks themselves and hence resorting to risk transference mechanisms. The average frequency of usage of risk elimination/ avoidance as a risk response strategy is low, also supplementing the explanation given above that contractors usually are not in a position to eliminate/ avoid risk, particularly in public sector projects. The only choice they may have is not to take the project (by not bidding at all or bidding a very high price), which of course implies loss of opportunity and, in most cases, permanent loss of clientage. Risk sharing, understandably, is not a frequently adopted risk response strategy by the contractors because risk sharing mechanisms such as partnering and co-insurance are rarely adopted in the industry and hence risk sharing, which may be a very useful strategy in certain cases, is not commonly used as a risk response strategy.

31. Which method is used for financing retained risks and how effectively is the cost of retained risks covered. Check all that apply.

Option	Percent Response to Usage	Percent Response to Effectiveness
Internal funding	64%	47%
Absorbing losses as part of current operating cost	62%	42%
Contingency funds	58%	27%
Ad Hoc Loans	56%	33%
Diminution of assets	49%	24%

Interesting findings from the results are that internal funding and absorbing losses as part of operating expense are the most frequently used methods for risk financing and, comparatively, are the most effective as well. However, their effectiveness is still less than par. This is comprehensible considering the large amount of budget inflation that is usually incurred on projects owing to risk retention. In such cases, contingency funds, ad hoc loans and diminution of assets, although used by half or more than half of the respondents, lose their effectiveness as financing strategies to cover the (huge) cost of retained risks. The results suggest that although risk retention may be a comparatively effective method under certain circumstances, lack of choice and unknowledgeable acceptance of risks by contractors leads to budget inflations in such large amounts that the means for financing the budget overruns do not prove very effective.

32. Which risk reduction/ mitigation approaches do you use? Check all that apply.

Results supplement the previous findings. Most contractors indicated that the risk mitigation approach they use is reducing the impact of risk (82%) rather than reducing the likelihood of risk occurrence (33%)

33. In order to mitigate risks on a project in terms of delay, do you include in your project plans the following? Check all that apply.

Option	Percent of Response
Time buffers	62%
Catch up (contingency) work plans	16%

Most contractors use time buffers in their project plans; however, keeping in view the results obtained from previous responses, methods as well as estimation of these time buffers remain questionable. An interesting finding is that contingency work planning, which requires proactive thinking, is not a method usually adopted by most contractors. This again emphasizes the 'cure' approach rather than the 'prevention' approach adopted by contractors for risk mitigation.

34. Which methods are used for risk reduction/ mitigation by your organization and how effective these techniques have been in risk reduction on projects over time based on organizational learning? Check all that apply.

Option	Usage (Percent of Respondents)	Average Effectiveness (scale of 5)
Monitoring project performance & taking corrective actions as needed	87%	3.2
Improving working conditions	67%	3.0
Staff training to better identify, assess and control risks	62%	2.8
Brainstorming sessions to expose new risks	53%	2.6

It is interesting to note that the frequency of usage and the effectiveness of risk reduction techniques follow the same trend, with monitoring project performance & taking corrective actions as needed being the most frequently used as well as most effective, followed by improving working conditions, staff training to better identify, assess and control risks, and brainstorming sessions to expose new risks. However, the effectiveness of even the most effective strategy considered by contractors (i.e. monitoring project performance and taking corrective actions as needed) is just above average. This is logical keeping in view the huge amount of risk usually retained by contractors and their lack of expertise of using formal risk management strategies, which compel them toward adopting more control-based short-term strategies rather than investing time, effort and finance on organizational improvement (such as staff training) which will lead to improved risk profile of the organization in the long run.

35. When required, which of the following methods are used for risk elimination/ avoidance by your organization and how effective the techniques have been in terms of risk elimination? Check all that apply.

Option	Usage (Percent of Respondents)	Average Effectiveness (scale of 5)
Not bidding	67%	3.3
Bidding a very high price	58%	3.1
Not bidding on the high-risk portion of the contract	53%	1.9
Pre contract negotiations as to which party takes certain risks	49%	2.3
Placing conditions on the bid	36%	1.6

In this question the frequency of usage and effectiveness of various risk elimination techniques were inquired in order to investigate the most popular and effective techniques. From the results, the most frequently used techniques as well as the most effective, comparatively, are 'not bidding' and 'bidding a very high price'. This is valid if looked from the perspective of contractors working in public sector who are neither typically involved in project development process nor typically have much choice for pre-contract negotiations, placing conditions on bid, or not bidding on the high-risk portion of the contract if they desire to compete for the work (this is also evident from the low values of average effectiveness of all these techniques as given in the table). Hence they are usually left with two choices: not bidding or bidding a very high price.

36. Which methods are used for risk transference by your organization and how effective these methods have proved as risk response strategies? Check all that apply.

Option	Usage (Percent of Respondents)	Average Effectiveness (scale of 5)
Third Party Insurance	78%	3.2
Subcontracting	64%	2.6

Results show that 'third party insurance' is the preferred method of risk transference by most contractors; however, since insurance mechanisms are not well established in Pakistan Construction Industry, the effectiveness of the method is only slightly above average. Subcontracting is also used frequently as a risk transference technique; however, has not proved to be very effective either. Risk is transferred to specialist/sub contractors as they are assumed to have the capability and required skills to tackle them better within their field of specialty. However, since specialty contracting is not a well established industry in Pakistan, subcontracting does not necessarily reduce risk, which explains why subcontracting has not proved to be a very effective risk transference strategy. Overall high percentages on usage of risk transference

strategies again emphasizes that contractors, having lack of capability of handling risks themselves, attempt to adopt mechanisms to transfer risks, however not very effectively (average effectiveness range is 2.6-3.2) .

37. Which mechanisms your organization adopts for risk sharing? Check all that apply.

Option	Usage (Percent of Respondents)	Average Effectiveness (scale of 5)
None	51%	N/A
Partnering / Joint Venture/ Relational contracting	33%	3.2
Other (e.g. co-insurance, re-insurance, establishing a captive insurance company)	16%	Varies

Results indicate that risk sharing is not a frequent practice in Pakistan Construction Industry; almost half of the contractors do not practice any risk sharing strategy. Partnering or its form is practiced by one-third of the contractors with effectiveness value in the medium range. Considering the advantages that partnering (or its variation) may bring to the industry particularly in the form of improved performance, this percentage is relatively low. This lack of partnering approach may be attributed to the adversarial nature of the construction industry in Pakistan, particularly owing to the traditional design-bid-build lowest bidding environment, which has significantly affected the frequency of use of partnering or similar approaches as well as their effectiveness.

The trend depicted from the results of this section shows that although contractors cater risk using various risk response methods, the overall effectiveness of these methods is limited. Most contractors are retaining the risk (by lack of choice or awareness or both) but do not have the right approach, tools and techniques to mitigate the risks, which ultimately lead to risk materialization, budget inflations in such large amounts that the means for financing the budget overruns do not prove effective, and a series of negative consequences to follow and ultimately project failure. Owing to this incapability of mitigating risks within their organizations, most contractors attempt to adopt mechanisms to transfer risks such as insurance and subcontracting, however not very effectively. Risk elimination and risk sharing are not frequent practices in Pakistan Construction Industry. This lack of usage of these approaches may be attributed to the adversarial nature of the construction industry in Pakistan, particularly owing to the traditional design-bid-build lowest bidding environment, which has significantly affected the choice of risk elimination as well as the possibility of using partnering or similar approaches with much overall effectiveness.

#### 4.7 Risk Response Control Process

In this section, three questions were asked to investigate the risk response control process used by contracting organizations in Pakistan Construction Industry. The findings are as follows.

38. Does your organization has a risk response control system to: (check all that apply)

Option	Percent of Response
Identify proposed response strategies	13%
List expected effects of proposed response strategies on schedule and budget	7%
Review, evaluate, and approve or disapprove of responses formally	13%
Negotiate and resolve conflicts of response, condition, and cost	7%
Communicate risk response strategies to parties affected	7%
Assign responsibility for implementing risk response strategies	13%
Adjust master schedule and budget	7%
Track all risk response strategies that are to be implemented	7%
Assess the effectiveness of the response strategies	4%

Results clearly indicate that risk response control system is literally non-existent in majority of contracting organizations in Pakistan Construction Industry. This again leads to the same conclusion that contractors in Pakistan do not practice risk management as a proactive approach.

39. During monitoring of projects, do you apply risk monitoring to formally assess the following? Check all that apply.

Option	Percent of Response
No formal risk monitoring process	78%
A risk event has occurred	22%
Project assumptions are still valid	20%
Proper risk management procedures being followed	20%
Risk response actions have been implemented as planned	13%
Risk response actions are as effective as expected, or new actions need be developed	13%
Risk level has changed from its prior state, with analysis of trends	13%
Risks, not previously identified, have occurred	7%

The results are not too encouraging. Risk monitoring is not adopted as a monitoring concern by a majority of contracting firms (78%). Only few firms look into aspects such as whether a risk event has occurred, project assumptions have changed, risk management procedures being followed. Tracking of risk response actions as well as the change of risk level of a project with time are not aspects frequently monitored by majority of firms.

40. Are risk monitoring and control results documented and reused on future projects? (Yes/ No)

Most contractors responded negatively to this question (73%). This is quite comprehensible considering that most contractors do not follow formal risk response control strategies, and hence do not have a process of documentation related to risk monitoring and control.

The results of this section indicate that risk response control system is factually non-existent in majority of contracting organizations in Pakistan. Also, risk monitoring is not adopted as a monitoring concern by a majority of contracting firms. Few contractors, however, monitor and document aspects such as occurrence of a risk event, validity of project assumptions with time and tracking of risk response actions.

#### 4.8 Risk Management Training Structures

In this section, respondents were asked four questions to explore about risk management related training programs designed for the employees.

41. To what extent does your organization stress upon technical risk management skills in its employees? (Scale 1 to 5, 1:Very Low, 5:Very High)

Option	Percent of Response
1: Very Low	7%
2: Low	22%
3: Medium	33%
4: High	20%
5: Very High	18%

The mean response was 3.2 (a medium value) and the mode was 3.0. The trend of responses as well as the mean and the modal values indicate that the contracting organizations, on average, do not emphasize much on technical risk management skills in their employees. This shows their lack of awareness towards the benefits that technical risk management skills may bring to their projects.

42. Is formal training in Risk Management given to employees?(If not, skip the rest of this section)

The results indicated that only five companies (11%) have developed formal training programs in risk management while another five (11%) companies provide ‘some’ training to their employees. The remaining companies (78%) indicated that they do not have any risk management training programs.

43. Percentage of managerial/supervisory staff who have undergone risk management training:

The companies that have a formal or informal training program indicated that on average 24% of their managerial/supervisory staff has undergone risk management related training. This training has primarily been given to project managers.

44. *Percentage of non-managerial/technical staff who have undergone risk management training:*

The companies that have a formal or informal training program indicated that on average 25% of their non-managerial/technical staff has undergone risk management related management. This training has mainly been provided to the project team.

45. *Training currently emphasizes: (check all that apply)*

Option	Percent of Response (Relative)
Risk control (reducing risk impacts)	73%
Risk identification process and techniques	23%
Risk assessment process and techniques	17%
Risk response strategies development	13%
Risk response control/ Risk monitoring	13%

This question was applicable to 22% companies who indicated that they have a formal or informal risk management training program. The respondents had a unanimous opinion that the training programs mostly emphasize on risk control as a primary goal. This emphasizes again that the risk management program and hence training are not proactive in nature in most contracting firms.

Results of this section indicate that risk management training is not common in the industry and there is not much significance given to formal risk management training in contracting organizations. Although the actual level of training existing is not much significant, the contactors do believe that training can bring about positive changes in the industry. They expressed the need of training in informal discussions.

**4.9 Risk Management Performance**

In this section, respondents were asked three questions to investigate their past risk management performance.

46. *What are the major risks faced by your projects? Check all that apply.*

The major risks faced by the contracting organizations on their projects, as indicated by the respondents, are shown below in descending order of responses (based on total number of responses received against each option).

1. Financial/ Economic risks (e.g. cost underestimations, cost overruns, price escalation)
2. Construction risks (e.g. labor, material, equipment issues , site accessibility/ layout issues, subsoil conditions)
3. Contractual risks (e.g. scope changes, disputes, litigation)
4. Site management risks (e.g. site layout, materials management, labor productivity)
5. Owner management risks (e.g. inspections, approvals, communication issues)
6. Business environment risks (e.g. delivery system implications on stakeholder relationships, tolerance problems)
7. Design related risks (e.g. incomplete specifications, inconsistent drawings, errors, omissions)
8. Time related risks (e.g. scheduling problems, delays)
9. Quality related risks (e.g. specifications non-conformance)
10. Safety related risks (e.g. accidents)
11. Regulatory environment risks (e.g. changing regulations, issues with permits)

47. *In your projects, risk has been a governing factor on:*

Option	Percent of Response
More than 95% projects	33%
80-94% projects	40%
60-79% projects	13%
40-59% projects	7%
25-39% projects	7%
Less than 25% projects	0%

Results clearly indicate that risk is a governing factor on more than 80% projects for 73% contracting firms. This depicts the absence of risk management strategies in the industry as well as the need for more formal risk management systems.

48. In the last 5 years the level of risk faced by your organization has:

Option	Percent of Response
Increased	31%
Decreased	24%
Not changed	27%
Not sure	7%
No response	11%

Only 24% organizations claimed that risk faced by them has decreased over the last 5 years. This shows that the methods to cater and reduce risks have either not been formally (and appropriately) employed by the contracting firms or have not proved to be quite effective.

Findings of this section indicate that risk management performance of contractors has not been at par in recent years; in most cases it has either decreased or has remained at an unacceptable level.

#### 4.10 Obstacles in Implementing Formal Risk Management Program

The obstacles in the implementation of formal risk management program, as indicated by the respondents, are shown below in descending order of responses (based on total number of responses received against each option).

1. Lack of awareness & familiarity with risk management techniques
2. Lack of expertise/resources in risk management (shortage of risk analysts )
3. Risk analysis of construction projects is seldom formally requested by clients, as they expect project management practice to set up projects risk-free.
4. Lack of technical staff required
5. Lack of accepted industry model for analysis
6. Time constraints
7. It is difficult to see the benefits
8. Most construction projects are seldom complex/ large enough to warrant the use of these techniques into them.
9. Risk management techniques require availability of sound data to ensure confidence
10. Degree of sophistication involved in the technique is unwarranted for project performance
11. Human/organizational resistance
12. The vast majority of risks is contractual or construction-related, and is fairly subjective, hence they are better dealt with based on experience from previous contracts.
13. Project risk management is about people not scientific models.
14. Lack of proper training of employees
15. Risk analysis in commercial terms is not always viable on projects
16. Doubts about the techniques being suitable for Pakistan construction industry
17. Lack of communication between stakeholders
18. Lack of top management commitment
19. Too much competition
20. Government Policies

An informal finding from the survey was that where the clients were risk conscious and keen about risk management, the entire team including contractors, consultants and subcontractors were actively practicing risk management. Hence, lack of risk management on the client's behalf is a major reason for inadequate risk management implementation in the industry.

## 5. Conclusions

The major conclusions are summarized as follows.

1. Majority of contractors perceives risk as a negative entity and do not acknowledge its significance as a major contributory to improving organizational performance and competitiveness.
2. Generally, among contractors, there is a lack of awareness of the utility and benefits of formal risk management programs and hence little effort has been put on developing mature and well established risk management systems.
3. Contractors agree that a major proportion of project risks evolves during project development stage (especially during detailed design phase) and hence can be reduced by contractor input in early project phases.

4. Most contractors are unaware of the strategic benefits realized by formal risk management systems and envisage that it is not worth the effort until there is enough complexity in a project that justifies adopting such a system.
5. Risk assessment, ironically, is perceived to be the least effective process within the risk management system by most contractors.
6. A vast majority of contractors perceive risk management as a multi-faceted tool to improve project performance, primarily, and organizational performance to a moderate extent.
7. Contractors mostly lack risk related policies and management support.
8. Owing to the absence of formal risk management systems in the industry, most contractors are either risk averse or risk neutral.
9. Accountability of risk management is not consistent with the responsibility structures (which, in most cases, are not defined).
10. In preconstruction risk assessment of projects, contractors are usually not involved in conceptual planning phase; few knowledgeable clients in the private sector tend to invite contractors for risk assessment input in design phase of a project.
11. Owing to the absence of an integrated system of project risk management in the industry with most clients not demanding risk management plans from contractors, any initiative to develop or procure (from subcontractors) project-specific risk management plans by contractors is only based on their own organizational commitment.
12. Most contracting organizations do not allocate adequate funds for implementing formal project risk management.
13. Contractors do not usually have a defined risk response strategy and hence invariably resort to various response methods as they deem appropriate based on specific circumstances.
14. Contractors do not follow a proactive approach towards risk management; majority of contractors neither maintain a risk register nor follow formal techniques for risk identification, risk assessment, risk response development or risk response control. They focus more on consequences and impacts of risks rather than sources, likelihood of occurrence, and existing controls for the risk.
15. The most frequently used technique for risk identification, assessment and response is experience/ intuition/ judgment of project leader or project team, which is rather informal. Owing to this, contractors usually face difficulties in prioritizing major project risks as well as assessing their likelihood and severity of impact.
16. Most contractors retain project risks without prior assessment during procurement stage. Also, they do not have the right approach, tools and techniques to mitigate risks, which ultimately lead to occurrence of risk events with severe budget impacts not usually controllable by traditional financing mechanisms, and a series of negative consequences to follow and ultimately project failure.
17. Owing to their incapability of mitigating risks within their organizations, most contractors attempt to adopt mechanisms to transfer risks through mechanisms such as insurance and subcontracting, however not very effectively.
18. The adversarial nature of the construction industry in Pakistan owing to the traditional design-bid-build lowest bidding environment do not support risk elimination and risk sharing by contractors, which, therefore, are not frequent or effective practices.
19. Risk response control system is factually non-existent in majority of contracting organizations in Pakistan. Also, risk monitoring is not adopted as a monitoring concern by a majority of contracting firms.
20. Formal risk management training is not common in the industry. Although the actual level of training existing is not much significant, the contractors do believe that training can bring about positive changes in the industry.
21. Findings of this section indicate that risk management performance of contractors has not been at par in recent years; in most cases it has either decreased or has remained at an unacceptable level.
22. The most significant barriers to the implementation of formal risk management systems in Pakistan construction industry include: lack of familiarity with tools and techniques, lack of expertise/resources in risk management, lack of technical staff required, lack of accepted industry model for analysis, the fact that risk analysis of construction projects is seldom formally requested by clients, time constraints, and lack of awareness of benefits and significance of formal risk management. Client's disinterest and lack of requirement for risk assessment is one of the major barriers to the implementation of risk management systems in Pakistan. Failure to recognize the short and long term benefits of risk management implementation has not only resulted in limited risk management implementation among the contractors but also the entire industry.

Key conclusions are that the concept of risk management is relatively new to the Pakistan construction industry. The responses to the questionnaire reveal that many contractors are not carrying out formal risk management. It appears that Pakistan contractors are still not aware of the benefits that risk management provides to the construction industry. In many situations, contractors perceive risks based on their own experience and judgment rather than using systematic procedures to identify, assess and tackle them. It can be concluded that contractors the Pakistan construction industry, owing to lack of systematic procedures, does not have adequate capability of retaining and mitigating risks and hence resort to mechanisms such as transferring risks. It was found that the practices actually followed by the Pakistan construction industry often led

to construction problems that are basically reflected in the form of low productivity resulting in project delays and cost overruns.

## 6. Recommendations

It would be appropriate to arrange some form of formal and/or informal education and training. Formal education could be graduate studies in risk management systems. Informal education and training could take the form of career development programs (like risk management awareness program) organized by academic institutions or professional organizations.

Successful implementation of risk management in Pakistan construction industry can be achieved through persistence, positive hands-on leadership, upfront preparation and continuous maintenance of a sensible plan. The following basic steps are identified to implementing risk management in the Pakistan construction industry:

1. Obtain client commitment to risk assessment. This is crucial to success.
2. Generate awareness, educate project staff and change attitude.
3. Develop and document approach to risk management to projects.
4. Prepare project risk management plans for all levels of work.
5. Install organization and managing bodies.
6. Institute proper tools and techniques which may enable the participants perform formal risk analysis .
7. Promote staff participation and contribution by pre-task meetings and initiate brainstorming sessions.
8. Review risk response plans and measure performance.

The authors strongly believe that a major need of the industry is to develop the attitude of clients towards an active risk management implementation, since clients are usually the driving factor towards an active and mature risk management system. Therefore, a change in the views and attitude of the clients through awareness programs can bring a prominent and distinctive change in the risk management status in Pakistan not only among contractors but also in the entire construction industry.

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