RISKS IN
GOLF COURSE DEVELOPMENT PROJECTS
IN PAKISTAN.

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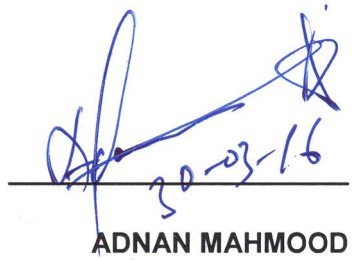

ADNAN MAHMOOD

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Abstract

Construction growth and expansion are particularly crucial for progressing countries; and the construction and development industry plays a crucial role in driving both of development and construction. The common situation detected currently in golf course development in Pakistan is that the yield of a construction company is usually distinguish by inferior quality work, time and cost overwhelm. These facets originate because a number of risks have not been properly taken into deliberation in the project planning and execution stage. Therefore, an emphasis on risk management is crucial to improve the running project's poor progress in sense of achieving quality standards and meeting the customer expectations. This research thesis mainly establish an exclusive and comprehensive risk management model which will upgrade the performance of golf course development projects in Pakistan. The upgraded performance will be in the form of attaining successful project completion within the allocated time, reduced cost overruns and improve project quality.

Keywords Golf Course Development, Pakistan, Risk Assessment, Risk Management.

Chapter # 1

1 Introduction

To deliver people with sports and game, relaxation, amusement, interest, restoration, refreshment and provision of job and relief. Golf course development projects are known as full of risk, complications and vigorous ventures. The simple four stages of a construction project are conceptual planning and design, construction execution, monitoring and control and closure and maintenance. However it is not an easy going and smooth sailing to complete and go from one juncture to another stage. Project management institute (PMI) narrates project as temporary task which should be undertaken to produce distinctive product, unique result or facility and service. People have been engaged on projects from the very beginning of life on the earth and the concept of project is not unknown and unfamiliar to them. The Millau Viaduct – a cable-stayed road bridge, Dubai's artificial island projects, Laerdal Tunnel – a 24.5km (15.2-mile) passage beneath the mountain ranges and waterways, Burj Khalifa in Dubai – the tallest man-made structure in the world, Tarbela Dam in Pakistan, Jinping-I Dam in China, the pyramids of Egypt, Great wall of China are some examples of manmade mega projects. Projects are manage in this way using unique and distinct methodologies, so nothing is new to us.

The cost associated with risk is among the biggest costly and valuable items that companies should be taken into account while planning and design stage, and is often ignored due to poor knowledge and information about risk. Risk can't be neglected, it can be administered, mitigated, allocated, shifted or undertaken. Management of risk helps the crucial contributors of the project like client, consultants, developers, contractors and vendors to fulfil their dedications lower negative effect on project progress, performance in term of quality, safety, environment, time and cost. The general situation observed currently in golf course development in Pakistan is that product of a development and construction organization is usually distinguished with a poor quality output, time and budget overwhelm. Due to poor knowledge about risk management many important risk facets have been ignored in the planning, design and execution phase causing these uncharacteristic. To handle these problems, risk administration has become a crucial part of decision making procedure in development and construction companies because it derives the failure or success of a construction project.

The focus of this research thesis is the development of a risk assessment model and risk register which should be most suited for the administration and development of a golf course development project success by adopting a systematic, comprehensive, continuous and integrated approach of process for key risk elements affecting the delivery of a golf course development project. The purposes of this research are: to indicate key risks that have valuable impact on the performance of a golf course development project in Pakistan, development of a risk assessment model including recognition, analysis and assessment, management and risk control on practical and continuous improvement basis so that successful delivery of project with in approved budget, a given definite time period with meeting the quality standard could be achieved. This research thesis will also review the present available literature including assessment and management of risk in developed countries and countries which are under developing stage. The work proposed in this research thesis will indicate and discuss research conducted so far in the area of risk management models, find out their drawbacks and limitations, and evaluate the potential for further research. A comprehensive review of risk management literature published in the project management and construction management domains will be undertaken.

1.1 Research Problem Statement

Golf course development projects are distinctive in nature in the context of design, method of construction, architectural and landscape features, personnel etc. Fluctuation in these parameters will cause risks (Threats) of different types effecting the project objectives namely cost, time, quality, safety and environment. Furthermore, risks (Threats) may occur from financial, economical, legal, social, environmental, logistics, political, management, physical, and technological and other different crucial areas.

Hence, most of the risk assessment and management models may not fully accommodate risks (Threats) facets that are particular to golf course development project undertaken in Pakistan and this could have a valuable influence on risk management framework of the project. Therefore, development of a risk assessment model is necessarily required. This research thesis has suggested a risk assessment model for golf course development project to facilitate the management and administration of golf course development projects in Pakistan. To develop risk assessment model related literature has been reviewed and personal meeting with developers from golf course industry and professionals are conducted to explore the potential risks which could occur to cause valuable impact on project objectives. Many existing models from construction industry for assessing and managing risks has been consulted to get the fundamental approach towards risk management. Implementation, testing, verification and validation of proposed model and risk register is suggested as next mile stone of this research. The findings from this research may prove as a platform for further development in risk management in the golf course development industry.

1.2 Significance of the Study

The focus of this research thesis is the development of a risk assessment model and risk register which should be most suited for the administration and development of a golf course development project and management plan to improve the management of golf course development projects in Pakistan. This study will also provide a base for the presentation and idea of risk management model for construction and development projects other than golf course development projects in Pakistan.

1.3 Purpose of the Study/ Research Objectives

1) To identify and appreciate the typical risks (Threats) affecting project's objectives in term of cost, time, quality, environment and safety.

2) To develop risk register for golf course development project.

3) To explore and discuss various risk mitigating strategies for risk management.

4) To explore and compare different risk assessment and management models as presented by former researchers.

5) To develop a risk assessment and management model/framework especially for golf course development projects in Pakistan.

Chapter # 2

2 Literature Review

The main purpose of the literature review is to check the validity of the idea i.e. whether it is sound and solid to be pursued. Pinder (Pinder, Price et al. 2003) suggested that the domain of the constructs should be fixed as first step of the procedure for the review of the literature of the subject under the research. At this stage of the research segregation of topics which should be and which should not be the part of the research is done. Hence my research of risk in golf course development project starts with a massive review of literature.

2.1 Construction Project Risk

Construction projects are unique in nature in term of time, cost, quality and scope. Hence due to uniqueness occurrence of threats is natural. Forecast of risk events serve as safeguard for the project if they are managed properly at right time. It is necessary to have sound review of previous and current research and literature available on topic under study. In developing countries from research it has been found that construction industry is facing a lot of risk factors which may be known and unknown, and different strategies have been devised to manage threat events.

Phenomenon of risk event to occur is complex in nature and it has various physical dimensions, cultural, social and also monetary dimensions (Loosemore, Raftery et al. 2006). Risk is the probability of occurrence of such threats that effect an investment in the prospects of profitability which may be unrequired, not predicted and not sure. Putting the responsibility to cater risk on the others is not professionalism rather it should be control, minimized and shared (Kartam and Kartam 2001). Risk is described as degree of exposure of future events to the adverse results as mentioned in PRINCE-II (Projects in controlled environment). Whenever a settlement is represented in the form of a wide range of certain outcomes and outcome is also associated with known probabilities then there are chances of risk events to happen (Smith and Merna). In construction projects risk is variable the occurrence of which results in uncertainty in the outcome such as total duration, ultimate cost and the project quality standards (Odeyinka, Oladapo et al. 2006).

Risk, certainty, and uncertainty are three methods describes the environment in which making of decision takes place ultimately. When a decision maker is sure about an event to occur then certainty is present provided that time taken for decision making is known and that time span should be according to the conditions of the certainty (Abujnah and Eaton 2010). However, such type of phenomenon does not occur in the construction sector organizations. In order to attain the effect of uncertainty and risk on performance of the project it is essential to make a clear distinction between risk and uncertainty (Perminova, Gustafsson et al. 2008).

Subject of risks events which affect project outcomes negatively are taken as uncertainty and subject of risks events which affect project outcomes positively are taken as opportunities (Perminova, Gustafsson et al. 2008). Dual nature of uncertainty is represented in term of having both positive and negative influence in the predecessor statement. External and internal resources which act as main sources of uncertainty to the project conditions. In spite of considering chances of happening of an event in advance uncertainty can be taken as a chance or in other words an event whose expectation to occur were ignored (Perminova, Gustafsson et al. 2008). Hence, whenever there is question mark on the establishments of the realities the presence of certainty is must, as a result there is also a question on known negative situations and known positive situation calculations. A holistic image of the risks involved in the project is given by Bryde (Bryde and Volm 2009) in the figure 1.

Figure 1. A holistic view of project risks (Bryde and Volm 2009)

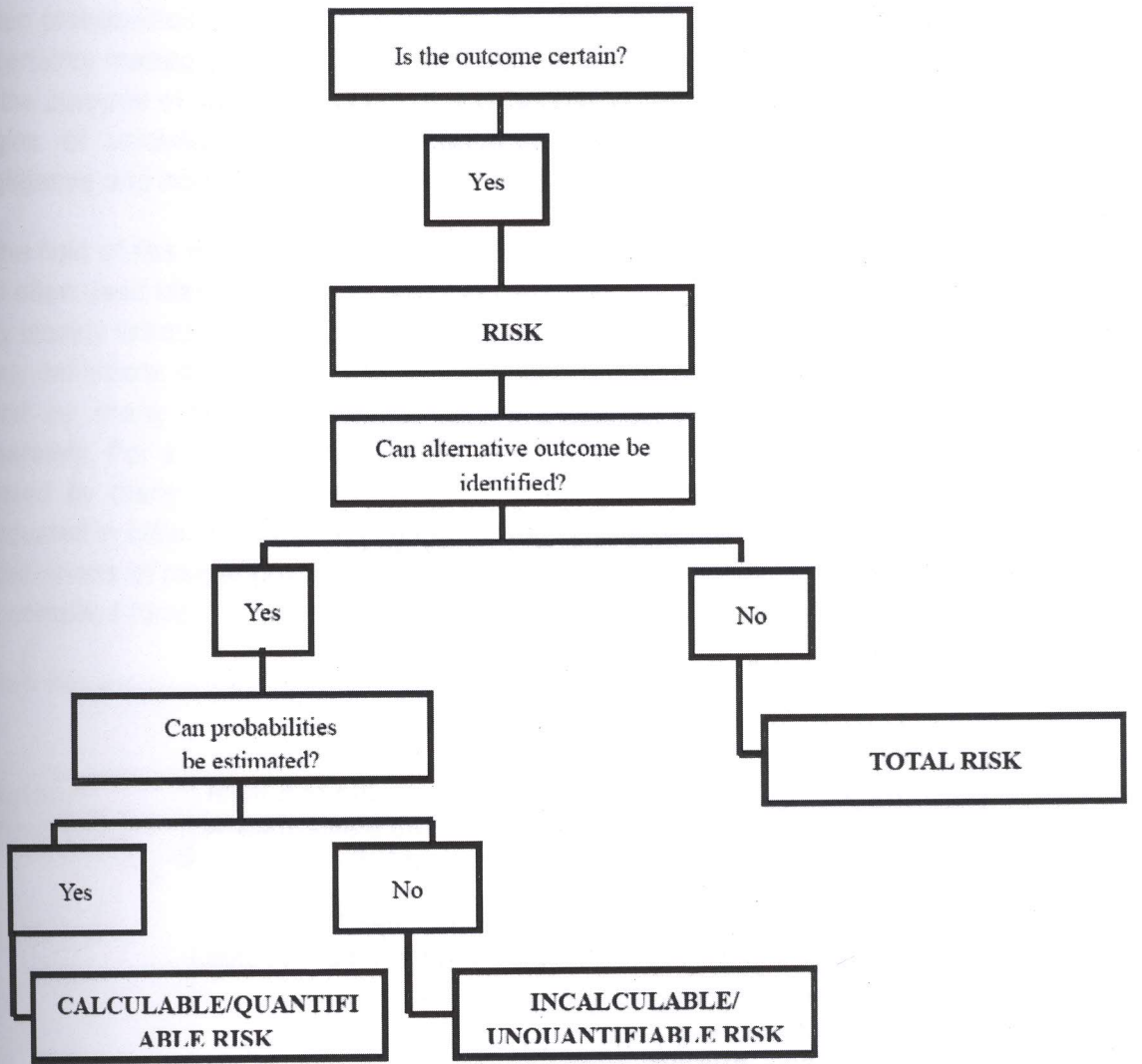


Figure 1. represent that precondition of the risk of the project is given by the extent of the uncertainty. It means if answer is "Yes" against the question " Is the result not certain" then there are chances of risk. When it is impossible to find another replacement of a result, then "Complete risk" takes the place of " Total uncertainty" according to spectrum of apprehension (uncertainty) (Hargitay and Yu 2003).When it is possible to find another replacement with known chances of a result, then " Partial uncertainty" takes the place of " Unmeasurable risk". Dual nature of uncertainty is represented in term of having both positive and negative influence in the predecessor statement. External and internal resources which act as main sources of uncertainty to the project conditions. In spite of considering chances of happening of an event in advance uncertainty can be taken as a chance or in other words an event whose expectation to occur were ignored (Perminova, Gustafsson et al. 2008). Hence, whenever there is question mark on the establishments of the realities the presence of certainty is must, as a result there is also a question on known negative situations and known positive situation calculations.

When probabilities are known only then risk can be measured or estimated. Hence, uncertainty management is the predecessor of project risk administration. Therefore, for the purpose of risk assessment, it is essential to have deep knowledge of different origins of uncertainty like, error source, imprecision, fluctuation, inexactness, negligence and non-clarity (Baloi and Price 2003, Chapman and Ward 2003).

In the field of risk management it is evident from the literature that the most common and often used ideologies are no certainty and risk. No doubt, these two concepts are very closely linked with each other. Many authors make them differentiate by making many definitions of them separately (Samson, 2009). Also a great difficulty has been faced by many professionals in the sense of understanding these two steps separately. For a specific project various definition of risk and uncertainty have been tailored by many researchers. In this regard a research based on literature was conducted in order systemized in a better way. This research was resulted in a number of definitions of risk and non-certainties, which are presented in the following table in the compiled form.

Table 1: Risk and uncertainty definition

Author:	Risk definition	Uncertainty definition
Winch (2002)	A stage where there is a lack of information, but by looking at past experience, it is easier to predict the future. Events where the outcome is known and expected.	Uncertainty is a part of the information required in order to take a decision. The required information consists of the amount of available information and uncertainty. The level of uncertainty will decrease the further a project is proceeding throughout the lifecycle.

Cleden (2009)	Risk is the statement of what may arise from that lack of knowledge. Risks are gaps in knowledge which we think constitute a threat to the project.	Uncertainty is the intangible measure of what we don"t know. Uncertainty is what is left behind when all the risks have been identified. Uncertainty is gaps in our knowledge we may noteven be aware of.
Smith et al. (2006)	Risks occur where there is some knowledge about the event.	There might be not enough information about the occurrence of an event, but we know that it might occur.
Webb (2003)	Risk is a situation in which he possesses some objectives information about what the outcome might be. Risk exposure can be valued either positively or negatively.	Uncertainty is a situation with an outcome about which a person has no knowledge
Darnall and Preston (2010)	Risk is a possibility of loss or injury.	
Cooper et al. (2005)	Risk is exposure to the consequences of uncertainty.	
PMBOK (Fifth Edition)	Project risk is an uncertain event or condition that, if it occurs, has a positive or negative effect on one or more project objectives such as scope, schedule, cost and quality.	

Risk can be represented as a condition where shortage of some facets can result in the form of threats to the major task in the view of the definitions presented above in the table. The most commonly reported factors considered as major reason of failure to the main task are shortage of knowledge and lack in information. The statement for risk which is best suitable for this situation is demonstrated by PMBOK ; it narrates how risk described as an ignorance of knowledge and information normally called as gap which, if handled with carelessness will be result in the form of a severe impact to the project.

In the above table the concept which is defined more theoretically is uncertainty. Again the most commonly reported factors considered as major reason of failure to the main task are shortage of knowledge and lack in information. Shortage of knowledge and lack of awareness and information is the biggest difference. Definitions of risk and non-certainty given by PMBOK and Cleden (2009) will be used for this research as these definitions well describe the difference between them and are consistent with the vocabulary used in this research.

Known unknown risks may be defined as those which are easy to point out and predictable before they occur, while unknown unknown risks may be defined as those which are neither easy to point out and nor predictable before they occur and result in

the form of additional time and increased cost (Darnall and Preston 2010). This description is according to the statement given by Celeden (2009) who used the similar wording while in the definition of uncertainty instead of unseen, unpredicted events, while in contrast there should be possibility of prediction in case of risk. The deep analysis of the terms used for the definitions of non-certainty and risk shows that risk/threat is a part of non-certainty which is big concept. This truly defines the confirmed relation between these different terminologies.

In the upcoming chapter the researchers focus will be on risk and its management and uncertainty will be ignored as it is intangible and is not the focus of research subject.

2.2 Risk Identification and Categorization

It has been clear from the review of the literature is that the initial step which is conformal and could be done by various means for the purpose of risk management and which is strongly dependent on the organization culture and the will of the project team. It has been clear that experience in the industry, data bank of the organization or organizationall proccess assets (OPA) and previous experience of similar nature project all are the predecessor of process of risk identification. For the purpose of risk exploration which are potential an allocation with respect to the category has been done. This is also totally dependent on the arrangement and decision made by the companies. In this scenario as each method is dependent upon the type of input used and the required out put, and the purpose is mere the identification of the possible risks in the major task, no method for this purpose seems superior than the other.

It is difficult to completely finish the threats and risks but can be easily controlled and action can be taken on them once they are identified. If the reasons of events relating to the risks are point out and proper resources are assigned to cater that specific problem to occur, the management of the risk will be better effective (PMI, 2004). Risk management includes both the solution of problems at earlier stage and preparation for hidden and unexpected problems in advance. Minimization of losses with in the main task is not the object of handling hidden threats, but also an alternative to convert potential problems into opportunities, hence leading to profitability in sense of economy, environment and achievement of milestone on time and also potential advantages (Winch, 2002).

Risks are identified to obtain a list of potential risks that are to be managed in a project (PMI, 2004). Different techniques can be practiced to find possible risks which might influence a certain project. The project team must be familiar of that method and it must prove beneficial for the project. The aim is to highlight the potential problems, so that the project team could aware of them. Authors describe many creative alternative methods. This process can be systematized by tabulating all the reviewed methods of risk identification as shown in Table 2. (Smith et al. 2006; Lester, 2007; PMI, 2004)

Table 2: Risk identification techniques

Information gathering methods	Workshops
	Brainstorming
	Interviews
	Questionnaires
	Benchmarking
	Consulting experts
	Past experience
	Delphi technique
	Risk breakdown structure
	Visit locations
Documentation	Databases, historical data from similar projects
	Templates
	Checklists
	Study project documentation (plan, files etc.)
	Study specialist literature
Research	Stakeholder analysis
	Research assumptions
	Research interfaces

Lists of possible problems are shaped on different bases and are scheduled and personalized for a specific project objective. Literature gives examples of risks which can be used in creating those impacts. Possible reviewed risks which can be found in the project are combined in Table 3. (Webb, 2003; Smith et al. 2006; Lester, 2007; Potts, 2008; Bing, et al, 2005; Edwards, 1995; Jeynes, 2002; Darnall and Preston, 2010;)

Table 3: Risk categories

Risk categories	
Groups:	**Risks:**
Monetary	Financial
	Economical
	Investment
Political	Legal
	Political
Environmental	Environmental
	Natural
Technical	Technical
Project	Contractual, client
	Project objectives
	Planning, schedule

	Construction
	Design
	Quality
	Operational
	Organizational
	Labor
	Stakeholder
	Human factors
Human	Cultural
Market	Market place conditions
	Safety
Safety	Security, crime
	Resources
Materials	logistics

The project convolution tells the level of risk (Darnall and Preston, 2010). There must be more risks in bigger and complexed project; for example in construction industry. More risks are faced in large projects. Of the numerous factors that can encourage risk occurrence; finance, time, design and quality and environment (the project's surrounding, location and overall regulations) are mostly mentioned in the previous literature. The level of technology used directly influence the occurrence of risk (Gould and Joyce, 2002).
Cleden (2009) claimed that complexity is a limiting factor for a project. Bigger and complexed projects need more resources for completion. Furthermore, after identifying the potential risks, the project team must be aware of the probability of happening of more threats and should not exclusively focus on management of identified risk. Majority of risks are discovered by using RM and a project manager should also be trained for managing reservations that are not included in a RM plan (Cleden, 2009).

2.3 Risk Assessment/Management Models

Some of the risk assessment/management models by former researchers are presented;

2.3.1 Model#1 (Al-Bahar and Crandall 1990)

CONSTRUCTION RISK MANAGEMENT SYSTEM—CRMS MODEL
This newly proposed model is named as "*Construction Risk Management System (CRMS)*". For responding risks in construction works by identifying risk quantitatively and through proper evaluation this model provides a better systematic framework. This CRMS states that "Minimization of losses with in the main task is not the object of handling hidden threats, but also an alternative to convert potential problems into opportunities, hence leading to profitability in sense of economy". The processes which describe CRMS are four in number and given below:

- Identify and point out main critical risks

- Analysis of crucial risks and their evaluation
- Management of response
- Administration of the system

When these four key processes are organized in a sequential and logical way these provide the vendors a more arranged manner of risk mitigation. The features which are included in this CRMS are that it is objective type, methodological, analytically sound, self-contained, and gives quantitative measurements which shows it is a systematic model and framework. It involves a method which is well defined.

It has an arranged and solid way of handling risks of complex projects. Further more input used is objective type rather than subjective type and gives verified and documented results. After analysis and detailed evaluation risks are managed systematically. In the end impact of the risk is obtained quantitatively. In the last, completion in itself is the part of the system. It exists in the form of an entity. For updating the information into the system and in order to see the interaction of these four processes a closed loop response is provided by a closed linkage between them.

Figure 2. Risk identification process framework

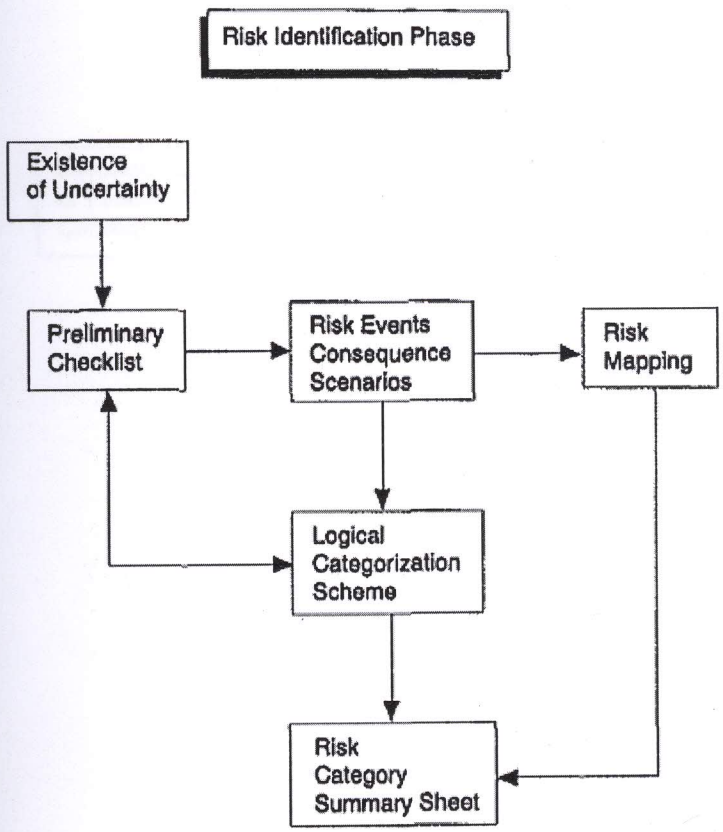
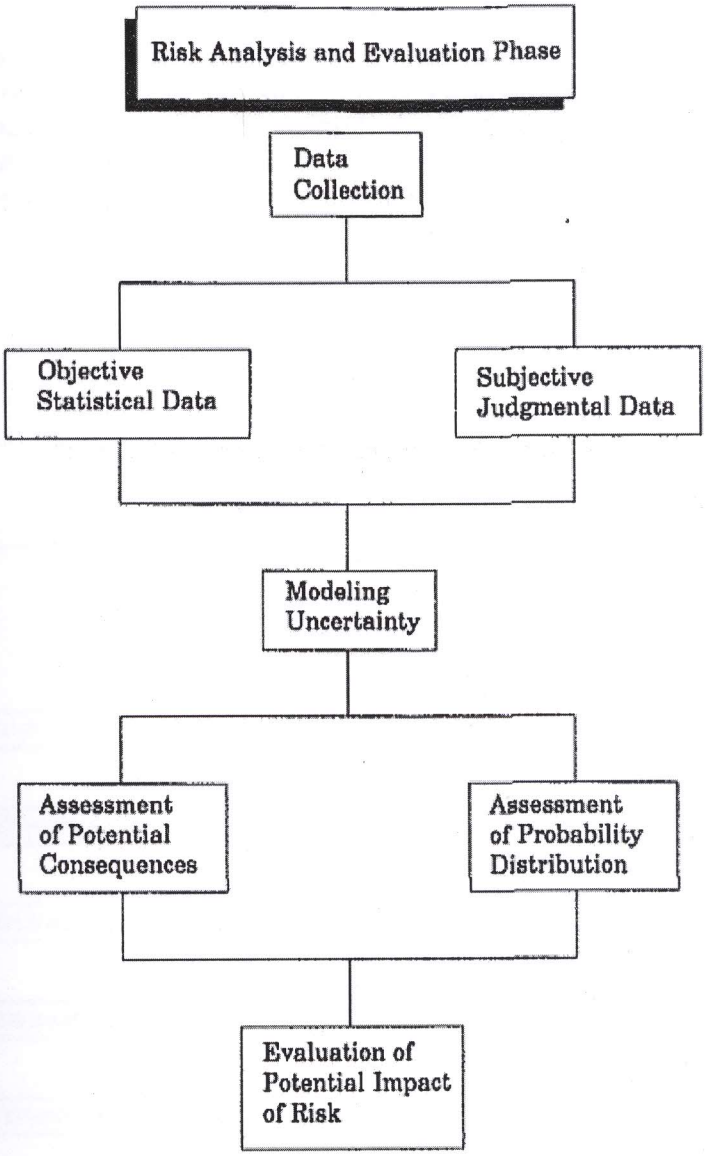


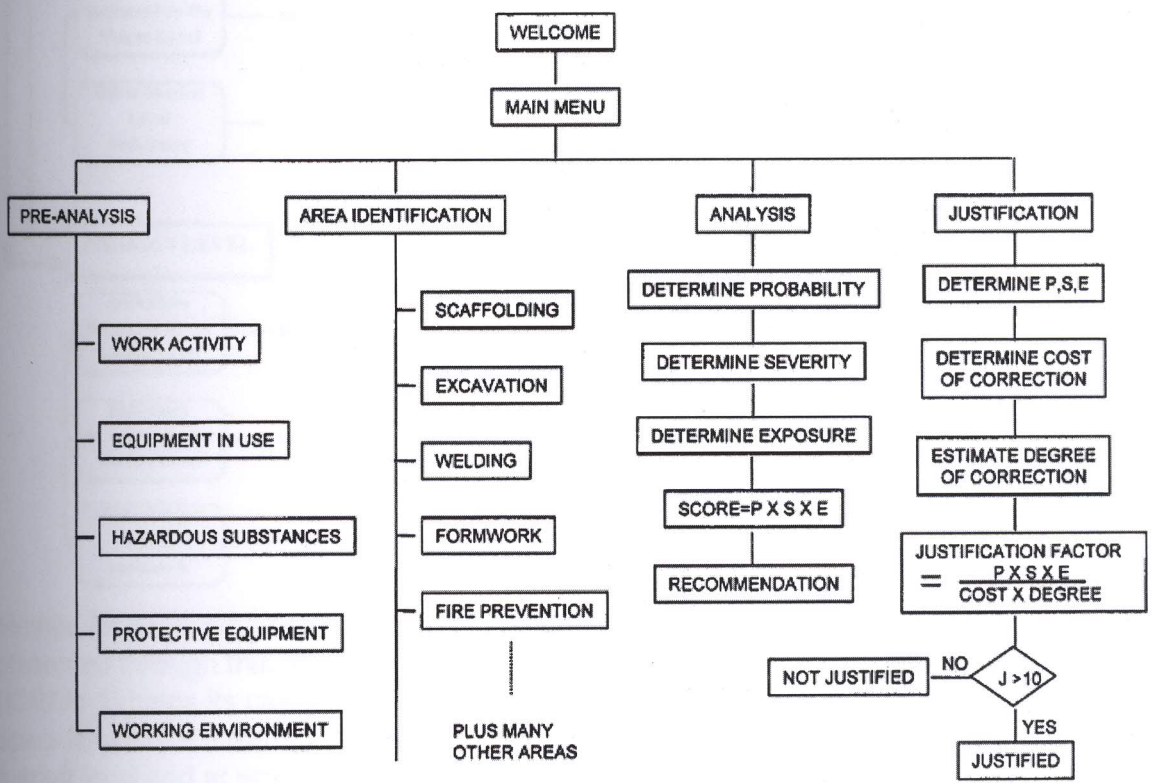
Figure 3. Risk analysis and evaluation process framework



2.3.2 Model#2 (Jannadi and Almishari 2003)

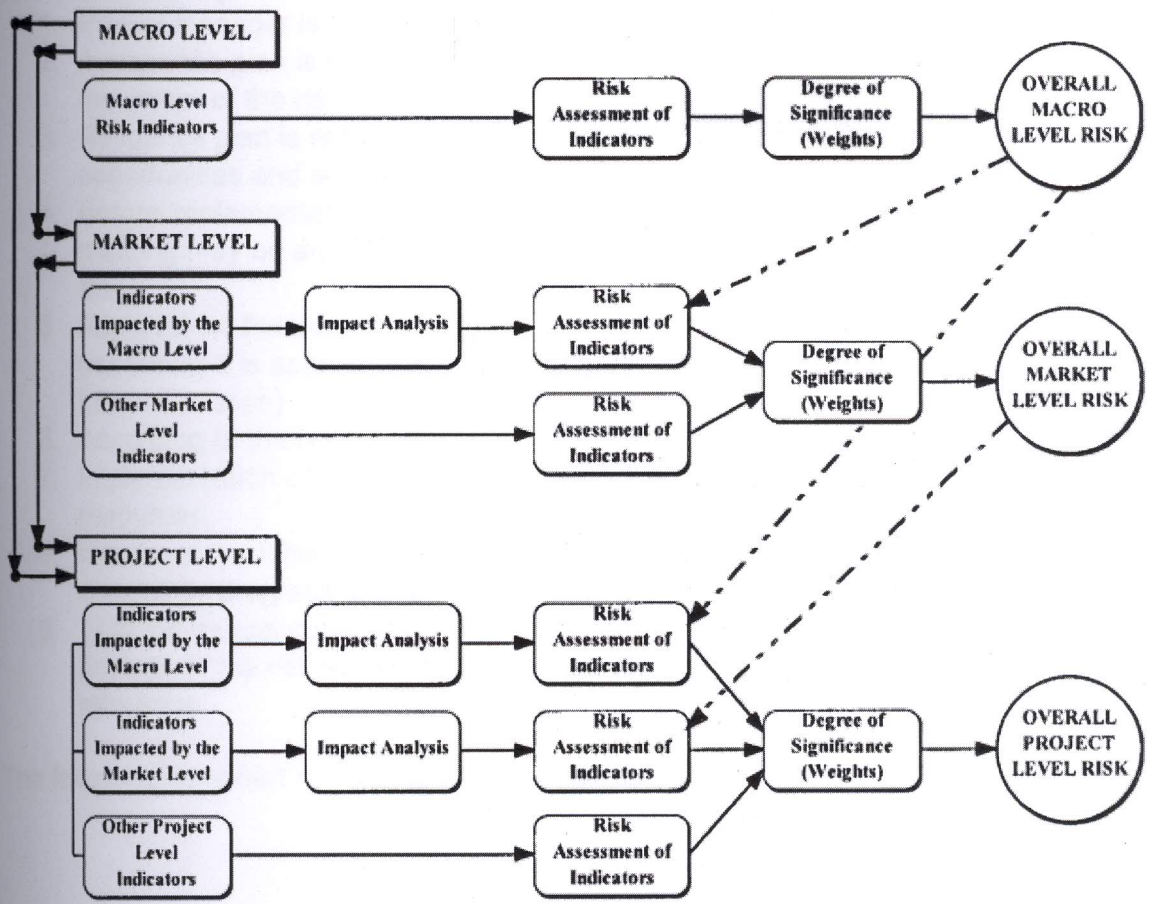
This (RAM) risk assessor model was a software based model. The main focus of this model is to provide a factor of justification of an assigned remedy and the associated risk with a specific activity. Ability of accepting a risk is also provided by this model in the form of a level. This model has been developed and computerized in such a way that there is no need to keep in mind the formulas and steps involved. The main features of this model are that it is completely driven manually, menu style is pop-up and interface is user friendly. A complete knowledge of each and every activity and practices used for working is required for risk assessment while using this model.

Figure 4. Risk assessor model approach



2.3.3 Model#3 (Hastak and Shaked 2000)

Figure 5. Framework of ICRAM-1



Method for assessing risk for international projects of construction industry is presented through this model. International Construction Risk Assessment Model (ICRAM-1) helps its users in such a way that risks included in exploring the operations in the international industry are subjected to analysis at project level, local market level and at environment of the country that is macro level respectively. Risks included in exploring the operations in the international industry are subjected to analysis at project level, local market level and at environment of the country that is macro level respectively. In this paper this model has been applied and explained through a practical example. International Construction Risk Assessment Model (ICRAM-1) has been designed for the examination of a particular project in another country and it basically provides a structured way for the evaluation of indicators of risks which are inherent in an international project of construction. This model is suggested as a useful tool by the researcher in quantitative analysis of risks which are inherent in an international project of construction as prerequisite requirement in the evaluation of the project. The Following four crucial findings are attained from the analysis of this ICRAM-1:

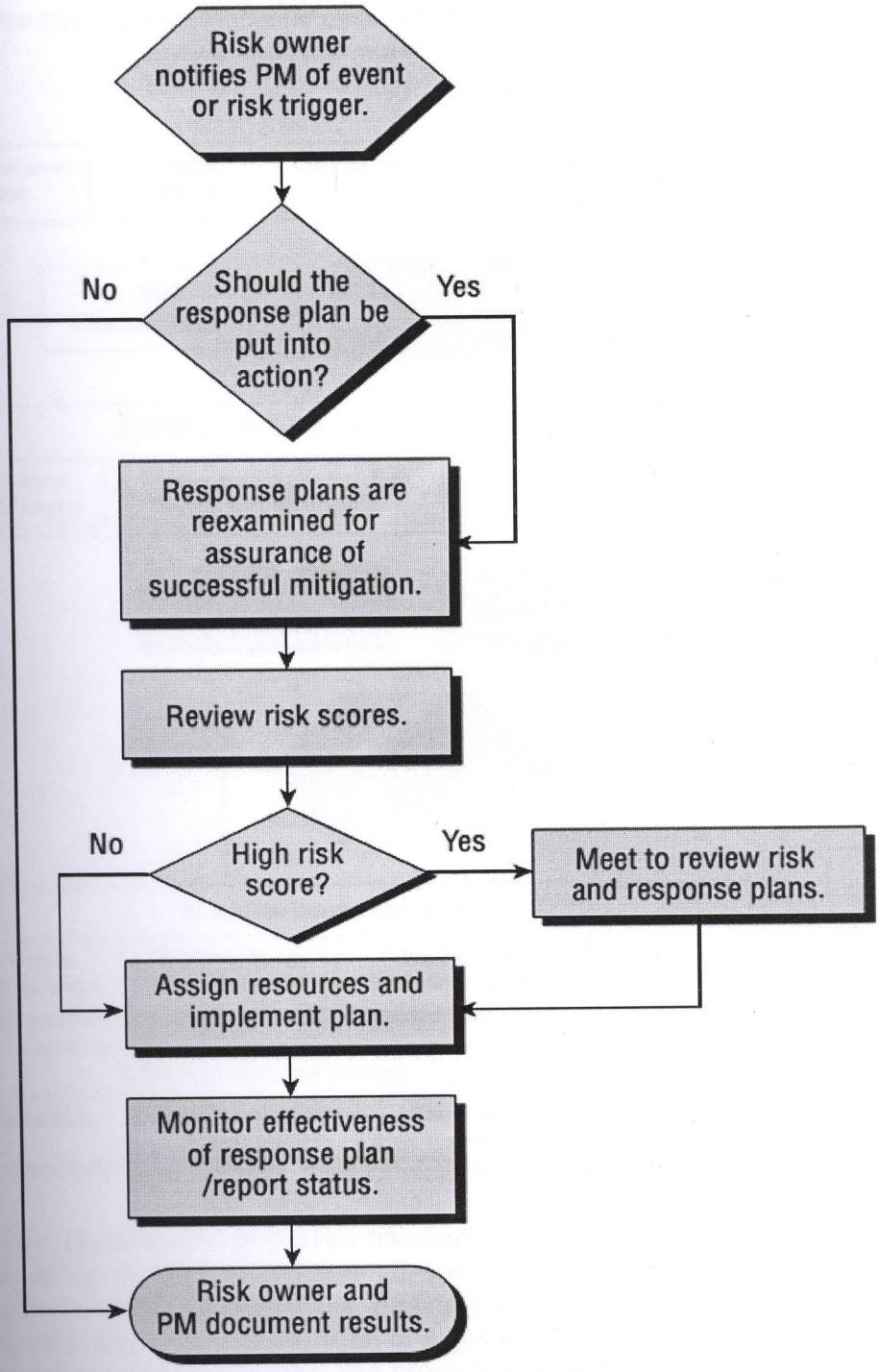
(1) Indicators of high risk
(2) How a particular project is affected by the environment of the country
(3) How a particular project is affected by the environment of the market/industry
(4) Overall risks of the project

2.3.4 Model#4 (Heldman 2005)

1. Project manager is told by the risk owner about the risk triggers or risk events.
2. A response plan is made with the mutual consultation of project manager and the owner of the risk.
3. Response plan is rechecked in order to assure the capitalization of the opportunities and solid strategy devised for mitigating the risks.
4. Before implementation of the response plan about any risk trigger or event , a meeting may be arranged with the stakeholders involved and the project team.
5. Approval for the budget is required due increased expenditures for catering risk where it is appropriate. (not necessary that all responses need money for implementation)
6. According to the response plan related resources are assigned.
7. Implementation of response plan takes place after assigning the appropriate resources.
8. It is the duty of the risk owner to monitor the response plan effectively and discuss its progress in each weekly held meeting.
9. With the mutual consultation of project manager and the owner of the risk findings of the risk events and response plan are documented for future reference.

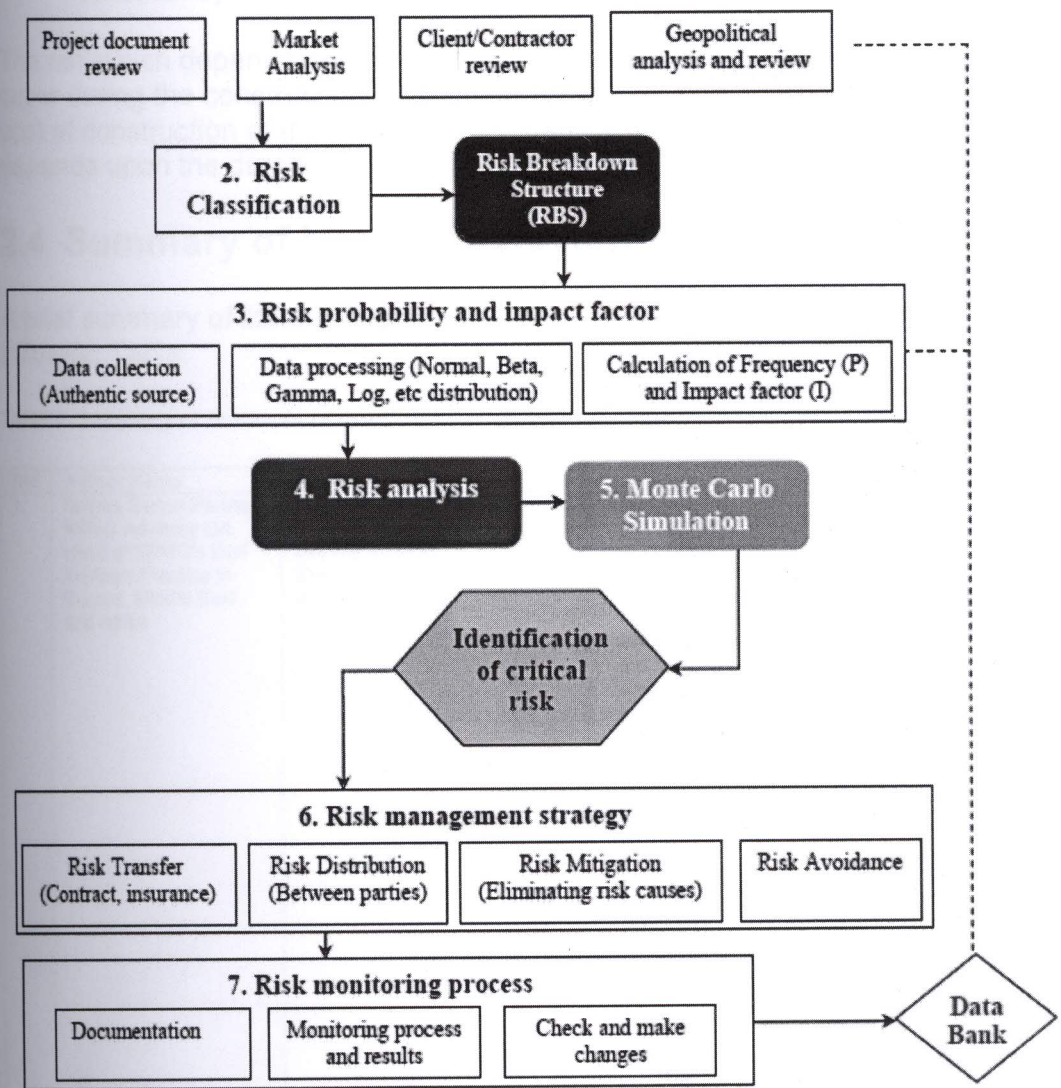
The following flowchart shows the process outlined in the previous list.

Figure 6. Model #4



2.3.5 Model#5 (S.Mubin and G.Mubin 2008)

Figure 7: Risk Management Model for pipelines construction project.



In this article, classification of the risk has been done appropriately on the basis of risk facets concerned with environmental, security, political, technological, organizational and natural conditions. Basically this model was developed for the management of risk in the construction of a gas pipeline project in Pakistan and effort was done to make it simpler. The procedure through which this model was developed is given below;

- Data was collected through questionnaires, industry survey, Interviews with experts and data from government departments.
- In this model Monte Carlo simulation was adopted for the identification of the crucial risks.

- ❖ Excavation during construction, material transportation and pipeline stringing were the most crucial tasks as found by the software of risky project.
- ❖ In this research the researcher suggested that the companies should make contract with the other party in order to transferred or reduce risks namely fluctuation in material prices, separate work packages, and design consultancy.

The risk which depends on span of the construction of a particular project and can occur during the construction phase is "Earthquake" and which impact is only on the cost of construction of the main task. Probability of occurrence of this risk strongly depends upon the duration of the execution phase.

2.4 Summary of Literature Review

A brief summary of literature review and the findings is described through the following Table:

Table 4: summary of literature review

Sr#	Author Name	Article Title	Purpose Of Study	Conclusions/Findings
1	Andrea Sartori Partner, KPMG Advisory Ltd. Head of KPMG's Golf Advisory Practice in Europe, Middle East and Africa	**Golf Course Development Cost Survey 2014 in Europe, Middle East and Africa**	➢ Where were golf course developments concentrated in the last 6 years? ➢ Where will be the golf development hot spots for the next 5 years? ➢ What motivates investors to develop a golf course and how do they select key suppliers? ➢ How long does it take to develop a new golf course and what are the major difficulties developers usually face in different geographical locations? ➢ How much does it cost to develop a golf course in the EMA region? ➢ How much value can the name/brand of a renowned architect bring to a golf course development? ➢ What premium can a golf course add to	➢ Eighty-three percent of golf courses were located in Europe, 6% in the Middle East and North Africa and 11% in Sub-Saharan Africa. ➢ China was again the most selected location, followed closely by India, Russia and the Commonwealth of Independent States (CIS), South America & the Caribbean, and South-East Asia. Eastern Europe and the UAE were seen as being less dynamic. ➢ In 39% of the cases the main aim of the golf course development was to add value to the surrounding real estate development. In many cases the golf architect introduces the construction company to the developer. ➢ It usually takes 4-5 years to develop a golf course from concept to realization. Within this, the length of the permitting procedure can vary significantly depending on the country concerned, the nature of the site and the characteristics of the planned development. ➢ Average development cost for a golf hole (EUR) 531,000 in Middle East & North Africa. ➢ Sixty-three percent responded positively, with 35% estimating this premium to be above 10%, and a quarter placing it between 6% and 10%. ➢ Close to half of the respondents with an integrated real estate development estimated this premium to be more than 20% in comparison to the selling price of a similar real estate unit in the neighborhood but without the golf course connection. Over a third of the respondents estimated the premium to be between 11% and 20%, while 18% estimated an added value of less than 10%.

			adjacent real estate prices?	
2	**Washington State Department Of Transportation**	**Project Risk Management Guide** **(November 2014)**	Provide knowledge of risk, risk management & risk management practices.	This document provides information to Project Managers, project teams, and staff involved directly or indirectly with project risk management. It provides: ➢ Uniformity in project risk management activities. ➢ Techniques and tools for project risk management. ➢ Data requirements for risk analysis input and output. ➢ The project risk management role in overall project management. ➢ Guidance on how to proactively respond to risks.
3	**Nicholas Chileshe and Geraldine John Kikwasi**	**Perception Of Barriers To Implementing** **Risk Assessment And Management Practices** **By Construction Professionals In Tanzania** **(2013)**	➢ Exploring the barriers affecting the implementation of risk assessment and management practices in developing countries in an African context such as Tanzania. ➢ Filling the knowledge gap by conducting a survey among construction professionals' in Tanzania. ➢ Eliciting perception, identifying and ranking the barriers to the deployment of risk assessment and management practices.	➢ "Awareness of risk management processes", "Lack of experience", and "lack of information" were the most significant barriers that the Tanzanian stakeholders needed to overcome. ➢ The study provides insights on the barriers to implementation of RAMP across the Tanzanian construction sector, involving more stakeholders such as clients, consultants in additional to the contractors.
4	**O. O. Odimabo, C. F. Oduoza**	**Risk Assessment Framework For Building Construction Projects' In Developing Countries (2013)**	➢ To identify the major risk factors that have significant impact on building project performance in developing countries ➢ To develop a risk management framework pattern involving	Development of a risk assessment system to improve the management of building construction projects in developing countries.

			identification, assessment, analysis, mitigation and control of risk on a continuous and practical basis in order to achieve improved performance and a successful project delivery within a given time frame, while minimizing cost overruns and optimizing project quality.	
5	**Nerija Banaitiene and Audrius Banaitis**	**Risk Management in Construction Projects** **(2012)**	This paper reports the research that aims to examine the risk analysis and risk management practices in the Lithuanian construction companies.	➢ The research results show that the Lithuanian construction company significantly differ from the construction companies in foreign countries in the adoption of riskmanagement practices. To management the risk effectively and efficiently, the contractor must understand risk responsibilities, risk event conditions, risk preference, and risk management capabilities. ➢ The use of risk management in the Lithuanian construction companies is low to moderate, with little differences between the types, sizes and risk tolerance of the organizations, and experience and risk tolerance of the individual respondents.
6	**EWELINA GAJEWSKA** **MIKAELA ROPEL**	**Risk Management Practices in a Construction Project – a case study** **(Sweden 2011)**	➢ How are risks and risk management perceived in a construction project? ➢ How is risk management process used in practice? ➢ How do risks change during a project life cycle?	➢ Most respondents were not familiar neither with the concept of RM nor any methods within the RMP ➢ Lack of information as the second biggest obstacle preventing implementation of risk management. ➢ Individuals and their organizations most often use checklists and other manuals while groups use discussion as the most common technique to identify risks and problems. ➢ The qualitative approach is the most common type of technique to analyze risks. ➢ There are risks which are characteristic for each project stage.
7	**S. Mubin and G. Mubin**	**Risk Analysis for Construction and Operation of Gas Pipeline Projects in Pakistan** **(2008)**	In this paper, most appropriate risk classification is made based on technological, organizational, political, natural climatic, security and environmental risk factors. Effort has been made to device a simpler risk management methodology to analyze and manage risks of gas pipeline project.	➢ Three most critical tasks calculated by Risky Project are Excavation, Transportation of Material and Stringing of pipelines. The most critical risks come out to be change in economic parameters, Change in design and scope, earthquake and terrorism during construction and operation of gas pipelines. ➢ The secondary risks like change in material prices, construction not finished in time or budget and design not in time can

				be reduced or transferred to the other party or organization by contract. ➢ Earthquake risk during construction phase depends on the length of execution of project and only impact on the construction cost of the project. As the duration of the execution increases probability of occurrence of risk also increase
8	**AMANI SULIMAN BU-QAMMAZ**	**Risk Assessment Of International Construction Projects Using The Analytic Network Process** **(June 2007)**	This thesis offers a comprehensive risk assessment methodology that provides a decision support tool, directed for Turkish construction organizations, which can be utilized through the bidding decisions for international construction projects.	The risk assessment model developed with the assistance of the ANP(Analytic Network Process) technique was proposed to provide a general framework for the assessment of risk associated with international construction projects conducted by Turkish contractors.
9	**Dr Patrick. X.W. Zou,** **Dr Guomin Zhang, Professor Jia-Yuan Wang**	**Identifying Key Risks in Construction Projects: Life Cycle** **and Stakeholder Perspectives(2006)**	This paper aims to identify and analyse the risks associated with the development of construction projects from project stakeholder and life cycle perspectives.	This research found that these risks are mainly related to (in ranking) contractors, clients and designers, with few related to government bodies, subcontractors/suppliers and external issues. Risks spread through the whole project life cycle and many risks occur at more than one phase, with the construction stage as the most risky phase, followed by the feasibility stage.
10	**Office of Sports Business Research** **Dr. Rankin Cooter, Director** **Dustin Papendick, Graduate Assistant** **Nakia Washington, Graduate Assistant**	**An Economic Impact Study of the** **Golf Industry on the State of Georgia** **(January 2003)**	The purpose of this project was to determine the economic impact that the golf industry has on the economy in the state of Georgia.	The economic impact of golf in the state of Georgia's economy for the year 2001 was $2.69 Billion.
11	**Osama Ahmed Jannadi and Salman Almishari**	**Risk Assessment in Construction** **(2003)**	➢ This study is concerned with the assessment of risk for major construction activities. ➢ A risk assessor model ~RAM! was developed and computerized to determine the risk associated with a particular activity and the justification factor for a proposed remedy. ➢ Exploring the value of risk for the contractor	➢ This study has developed a model that determines risk scores for various construction activities. ➢ The model also provides an acceptability level for the risks and determines a quantitative justification for the proposed remedy.

12	**Bing LI1, Akintola Akintoye, Cliff**	**VFM(Value For Money) and Risk Allocation Models in Construction PPP(Private Public Partnerships) Projects.** **(2001)**	➢ To develop a risk management model specifically for PPP construction projects. ➢ Factors enhancing VFM in PPP projects. ➢ Perception of respondents on risk allocation in PPP projects.	1) Project participants should adopt any measures associated with "project efficiency", "sustainability", "multi-benefit consideration" and "effective procurement arrangement" in order to fully achieve VFM in construction PPP projects. 2) Macro level risks should be retained by the public sector; meso level risks should be transferred to the private sector; while, micro level risks should be shared between the two sectors.
13	**L. Y. Shen, George W. C. Wu, and Catherine S. K. Ng**	**Risk Assessment For Construction Joint Venture In China.** **(2001)**	➢ Based on a survey, this paper establishes a risk significance index to show the relative significance among the risks associated with the joint ventures in the Chinese construction procurement practice. ➢ The paper establishes a risk significance index, from which the most significant risks are highlighted.	➢ The proper understanding of this risk profile is essential in order for joint venture to take proper risk management strategies. ➢ They provide useful references to other joint ventures or those overseas firms who are planning to operate their businesses in China. ➢ The analysis and findings in this paper also present valuable data for the Chinese government and local partners to have an in-depth understanding of the risk environment to the operation of Sino foreign joint ventures.
14	**JAN WARNKEN*** **DANIEL THOMPSON** **DWIGHT H. ZAKUS**	**Golf Course Development in a Major Tourist** **Destination: Implications for Planning** **and Management (2001)**	➢ This paper focuses on the environmental ramifications of insufficient or lack of compliance with standard environmental and economic planning practices. ➢ Specifically, it looks at a tourist destination location that was under the influence of extensive land development and investment speculation.	➢ EIA must be done before the approval of the golf course development project. ➢ it will always be the local taxpayers who have to provide the capital for remediation work if golf development proves to be environmentally unsustainable. ➢ it is in the interest of any local community, and their elected officials, to demand effective local planning policies, better assessment, and more public scrutiny for generally controversial developments such as golf courses and golf resorts.
15	**V.Carr, J.H.M. Tah**	**A Fuzzy Approach To Construction Project Risk Assessment And Analysis; Construction Project Risk Management System (2001)**	➢ In this paper a hierarchical RBS is used to represent a formal model of risk assessment. ➢ The relationships between risk	➢ A prototype risk management system has been developed to support the risk management framework. ➢ The aim is to facilitate the practical and effective risk handling whilst allowing those involved in the process to develop a greater understanding of project risks resulting in improved project and corporate performance.

			factors, risks and their consequence are represented on cause and effect diagram.	
16	**Makarand Hastak and Aury Shaked**	**ICRAM-1:MODEL FOR INTERNATIONAL CONSTRUCTION RISK ASSESSMENT (2000)**	➢ This paper presents a risk assessment model for international construction projects. ➢ The International Construction Risk Assessment Model (ICRAM-1) assists the user inevaluating the potential risk involved in expanding operations in an international market by analyzing risk at the macro (or country environment), market, and project levels. ➢ The paperdiscusses some of the existing models for country risk assessment, presents potential risk indicators at the macro, market, and project levels, and explains the ICRAM-1 methodology through an applied example.	➢ The ICRAM-1 provides a structured approach for evaluating the risk indicators involved in an international construction operation. ➢ It is designed to examine a specific project in a foreign country and can be used as a tool to quantify the risk involved in an international construction investment as one of the preliminary steps in project evaluation. ➢ Four main results are obtained from the ICRAM-1 analysis: (1) high-risk indicators; (2) the impact of country environment on a specific project; (3) impact of market environment on a specific project; and (4) overall project risk.
17	**Jamal F. Al-Bahar and Keith C. Crandall**	**SYSTEMATIC RISK MANAGEMENT APPROACH FOR CONSTRUCTION PROJECTS (1990)**	➢ A risk model entitled construction risk management system (CRMS) is introduced to help contractors identify project risks and systematically to analyze and manage them.	➢ The logical extension offered in this paper is the systematic analytical approach starting with risk identification and its mapping, probabilistic risk analysis and evaluation of significant risks,and the development of alternative risk management strategies. ➢ Small firms may utilize the classification concepts to provide a better view of total risk and use these results to determine if the project is worth bidding. ➢ Larger firms may desire to blend the concepts into their existing insurance programs, maintaining a dynamic risk evaluation program for the life of the project as suggested.

2.5 Risk Management Process for Golf Course Development Projects.

Golf course development projects in Pakistan have constantly been facing great difficulty in controlling time and cost overruns. An example of poor project risk management can be found in the Pakistan construction industry. In the risk management discipline of management sciences, profits, reputation and asset of an organization are protected by dropping the possible harms or damages before their occurrence (Bing, Tiong et al. 1999). In the context of construction project management, Zou et al (Zou, Zhang et al. 2007) described risk management as an organized way of recognizing, evaluating and dealing with risk that is related to a project in order to achieve the objectives of a project while Williams (Williams 1995) explained the project risk management as a unified process in which project uncertainty is identified, its impact is estimated, interactions are analyzed and controlled in the accomplishment stage, and even provide feedback for the conservation of collective knowledge asset.

Risk management process is better understudied in recent expansions in the field of risk management (Ward and Chapman 1997,Akintoye and MacLeod 1997, Jafari, Rezaeenour et al. 2011). Figure 8 shows the cyclical risk management process, which is carried out independently for each phase of the construction project.

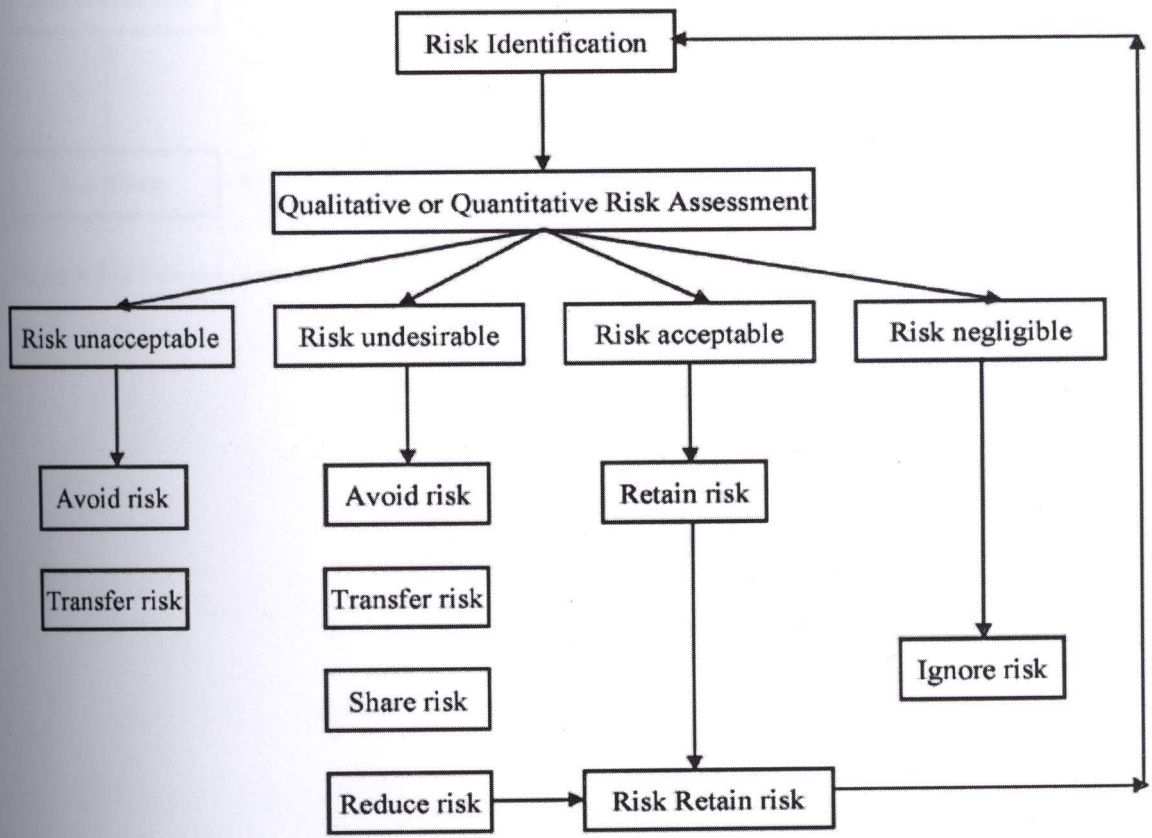


Figure 8:**Cyclical risk management process (Cerić, Marčić et al. 2011)**

In the construction projects, risk management is a wearisome task as the objectives tend to change during the life cycle of the project (Dikmen, Birgonul et al. 2007).A suitably designed and implemented risk management process can lower the probability of risks and augment the successful completion of golf course development projects, thereby making the projects more lucrative. When risk management is properly applied, the project can be completed more successfully because most of the risks are very vibrant all the way throughout the project lifespan.

PMI PMBOK described that risk management comprises the processes of directing risk management scheduling, identification, analysis, response planning, and controlling risks on a project. The project risk management promotes the probability and influence of positive events, and decrease the probability and influence of negative events in the project.

In a project, the risks are understood and managed by Risk management process (RMP). Identification, assessment and analysis, and response are main phases of RMP (Smith et al. 2006) as shown in Figure 9 below. In order to proficiently implement the process in the project all steps in RMP should be involved when dealing with risks. Many variations of RMP are available in literature, but most commonly described outlines consist of those that are mentioned. Some models add one more step and the majority of sources identify it as risk monitoring or review.

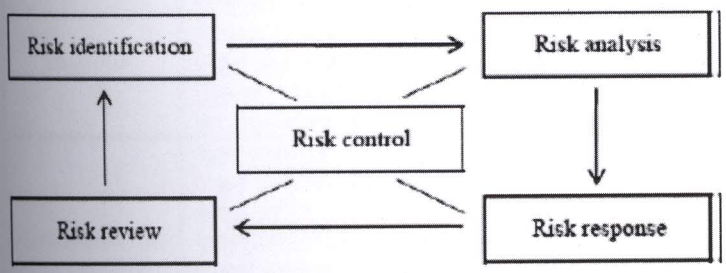


Figure 9: The Process of managing risks (Smith et al. 2006)

2.6 Risk Classification

Table 5: Risks Groups and risks factors of construction projects

Risk group	Risk factors
Physical risk	Occurrence of accident because of poor safety procedures
	Supplies of defective materials
	Varied labour and equipment productivity
Environmental risk	Environmental factors (flood, earthquake, etc.)
	Difficulty to access the site (very far, settlements)
	Adverse weather conditions
Design risk	Defective design (incorrect)
	Not coordinated design (structural, mechanical, electrical, etc.)
	Inaccurate quantities
	Lack of consistency between bill of quantities, drawings and specifications
	Rush design
	Awarding the design to unqualified designers
Logistics risk	Unavailable labour, materials and equipment
	Undefined scope of working
	High competition in bids
	Inaccurate project program
	Poor communication between the home and field officers (contractors side)
Financial risk	Inflation
	Delayed payment in contracts
	Financial failure of the contractor
	Unmanaged cash flow
	Exchange rate fluctuation
	Monopolizing of materials due to closure and other unexpected political conditions
Legal risk	Difficulty to get permit
	Ambiguity to work legislations
	Legal disputes during the construction phase among the parties of the contract
	Delayed dispute resolutions
	No specialized arbitrators to help settle fast
Construction risk	Rush bidding
	Gaps between the implementation and the specification due to misunderstanding and specification
	Undocumented change orders
	Lower work quality in presence of time constraints
	Design changes
	Actual quantities differ from the contract quantities
Political risk	Segmentation of construction process
	Working at hot (dangerous) areas
	New governmental acts or legislations
	Unstable security circumstances (invasion)
	Closure
Management risk	Ambiguous planning due to project complexity
	Poor HR, communication, procurement stakeholder management
	Changes in management ways
	Information unavailability (include uncertainty)
	Poor communication between involved parties

In previous studies, different sources of risk in construction have being identified. Literature suggests many approaches for classifying the risks. El-Sayegh (El-Sayegh 2008) presented a list of numerous factors that can affect construction proects. They include design, owners, contractors, sub-contractors and suppliers. Political, social and cultural, economic, natural and other such factors are also enlisted. Nieto-Morote and Ruz-Vila (Nieto-Morote and Ruz-Vila 2011) gave four ways of classifying risk. These are project management risk, execution risks, engineering risk and supplier's risk. Kuo and Lu (Kuo and Lu 2013) grouped risk into five subsections: Engineering design, construction management, construction safety-related, natural environmental hazards and socio-economic. Dikmen et al (Dikmen, Birgonul et al. 2007) classified risk into eight sets: Technical risk, resource risk, payment risk, managerial risk, productivity risk, client risk, design risk and subcontractors' risk. In short, risk can be classified in so many different ways in construction projects. But a method is chosen that is most appropriate for the certain project. In this paper, risk will be grouped using Enshassi and Mosa(Enshassi and Abu Mosa 2008) method, because risk groups classified by him are particular to Pakistan. Table 6 shows the various groups and the associated risk categories. Nerija Banaitiene and Audrius Banaitis explore the risks associated with risk categories along with their likelihood of incidence and influence on construction projects (Nerija and Audrius 2012).

Table 6: Risk categories

Risk ID	Catogaries	Likelihood 1(rare)-5(very frequent)	Impact 1(very low)-5(very high)
	Design risks		
D1	Design errors and omissions	4	5
D2	Design process takes longerthan anticepated	3	4
D3	Stakeholders request late changes	3	3
D4	Failure to carry out the works in accordance with the contract	3	3
	External risks		
Ex1	New stakeholders emerge and request changes	2	4
Ex2	Public objections	1	3
Ex3	Laws and local standards change	1	3
Ex4	Tax change	1	4
	Environmental risks		
En1	Environmental analysis incomplete	2	4
En2	New alternatives required to avoid ,mitigate or minimize environmental impact	2	4
	Organizational risks		
O1	Inexperienced workforce and staff turnover	3	3
O2	Delayed deliveries	3	3
O3	Lack of protection on a construction site	2	4
	Project management risks		
PM1	Failure to complay with contractual quality requirements	3	4
PM2	Scheduling errors,contractor delays	4	4
PM3	Project team conflicts	3	3
	Right of way risks		

R1	Expired temporary construction permits	1	4
R2	Contradictions in the construction documents	2	3
	Construction risks		
C1	Construction cost overruns	4	4
C2	Technology changes	2	4

Li (Li, et al, 2001) presented risk allocation analysis and recommended that macro level risks should be reserved by the public sector; miso level risks should be shifted to the private sector; while, both sectors should share micro level risks.

Following is the tabulation of risks in public private partnership "PPP" projects and their distribution that are identified by Li (Li, et al, 2001);

Table 7: **Risk Allocation in PPP projects**

Risks	Preferred Risk Allocation
Nationalisation/expropriation	Public Sector
Poor political decision-making process	Public Sector
Political opposition	Public Sector
Site availability	Public Sector
Government stability	Public Sector
Level of public support	Strongly Depending
Project approval and permit	Strongly Depending
Contract variation	Strongly Depending
Lack of experiences in PPP arrangement	Strongly Depending
Lack of commitment from public/private partner	Shared
Force majeure	Shared
Legislation change	Shared
Responsibilities and risk distribution	Shared
Authority distribution between partnerships	Shared
Tax regulation change	Primarily to Private Sector
Late design changes	Primarily to Private Sector
Residual risk	Primarily to Private Sector
Inflation	Primarily to Private Sector
Tradition of private provision of public service	Primarily to Private Sector
Staff crisis	Primarily to Private Sector
Third party tort liability	Primarily to Private Sector
Influential economic events	Primarily to Private Sector
Financial attraction of project	Primarily to Private Sector
Level of demanding project	Primarily to Private Sector
Different working methods	Primarily to Private Sector
Industrial regulatory change	Solely to Private Sector
High financing cost	Solely to Private Sector
Interest rate	Solely to Private Sector
Organization and coordination risk	Solely to Private Sector
Weather	Solely to Private Sector
Environment	Solely to Private Sector
Availability of finance	Solely to Private Sector

Ground condition	Solely to Private Sector
Operational revenue below par	Solely to Private Sector
Financial market	Solely to Private Sector
Quality of workmanship	Solely to Private Sector
Construction cost overrun	Solely to Private Sector
Frequency of maintenance	Solely to Private Sector
Availability of labour/material	Solely to Private Sector
Insolvency of subcontractors/suppliers	Solely to Private Sector
Low operating productivity	Solely to Private Sector
Design deficiency	Solely to Private Sector
Unproven engineering techniques	Solely to Private Sector
Operation cost overrun	Solely to Private Sector
Higher maintenance cost	Solely to Private Sector
Construction time delay	Solely to Private Sector

Risk Classification is of prime importance for effective risk management. Till now there are many kinds of classification that have been made (D'Alppolonia 1979). In general risks associated with development and construction projects may be classified as broadly:

- Risk during construction
- Risk during operation

The type and related causes of risk in each class are deferent. In Case of development and construction projects, risks are time susceptible and the probability of occurrence of different risk is time dependent. More is the duration of project higher are the probabilities of occurrence. These are generally related to the material availability, work excavation phase, finances (budget) , manpower, time frame, natural and accidental, Legal and environmental i.e the geodynamics of the region (Armbruster 1978). In monsoon season, probability of flood is high. These are a persistent threat of unrest and terrorism keeping in view the geopolitics of the regions. As there are frequent changes in economic parameters therefore, economic instability has also added the problem. There are all infect the potential risks for any construction project especially golf course development project in shich risks are multiplied many fold and there are cleanses of huge loss in case of occurrence of one or more risks in the form of environment damage and human loss.

However, risks are slightly different in operation, in which main consideration in given to avoid those factors which hurdle smooth and safe functioning and operation the golf course development project. In important followed by the security risk. In our case, risk during development, construction and operation can be divided into the following categories.

i. Political risk
ii. Natural catastrophic risk
iii. Environmental risk
iv. Safety and security risk
v. Organizational risk
vi. Technical risk
vii. Financial risk
viii. Socio-economical risk

Table 8: Risk Classifications

No.	Category Risk	Risk Factors			
1	Political risk	Unstable Govt. politics	Change in labour policy	Daley in approvals from regulatory bodies	Strikes, lockout lawlessness
2	Socio-economical risk	Change in economic parameters	Rise in inflation and material prices	Seasonal unavailability of labour	Change in economic policies and tax system
3	Organizational risk	Breach in contractual relationship	Loss of venture or partnership	Unrealistic SWOT analysis	Fine compensation
4	Investment risk	Unrealistic baseline and financial delay	Exchanges rate risk and rise in interest rate	Disinvestment from market	Strong credit policy
5	Technological risk	Inefficient communication	Inefficient and conventional technological	Insufficient resources and equipment	Quality risk and rework
6	Security risk	Accident during construction or operation	Note use of HSE policies and standard	Terrorism or war	Human error (Damage or loss of machine or human resource Weather)
7	Natural and climatic risk	Earthquake	floods	Landslide, hurricanes	Conditions e.g. humidity
8	Environment risk	Damage to natural resource	Damage to surrounding environment	Depletion of hydrocarbon resources	Damage to ecology and wildlife

2.6.1 Political Risk

The effect of country's policies has direct impact on project success or failure. Technical factors are usually ignored during the policy making process and policies are set in a way that operation of the project may not be trade offing or economical. In case of unstable government, this is more risk of change of labor polices, petroleum and economic policies which are directly related to the golf course development projects. Due to laborious and detailed procedure of approved from environment regulation agencies, public safety regulation department, federal and local development authorities, and labour law regulation authority delays can occur.

In international projects, policy and political risks are more concerned, such as in case of "Pak China Economic Corridor Project" These risks are sometimes assessed haphazardly or overlooked due to multinational nature of the project. Such risks usually include terrorism civil war, was access borders, expropriation, and trade credit defaults by foreign or domestic customers (Jhon and Edward 2003). Understanding and economic stability is necessary and critical for companies working internationally, although these are typically outside the scope of our study. A study by AON Trade Credit in 2001 discovered that, out of 1000, only about 26 % of companies and organization had in place consistent and systematic methodologies gives to assess political risks (Jhon and Edward 2003).

2.6.2 Natural Catastrophic Risk

These risks are generated by nature and on which there is no human control. These risks are act of God and can occur at any time anyway and anywhere. Land sliding, hurricanes earthquake are the common examples of such type of risk. However, now a days due to evolution and development of science and technology in the field of geological survey, seismograph, subsurface soil and ground investigation through various method, statics, simulation and modeling have given risk to the inventions and development of such tools and techniques which can not only measure magnitude and frequency of occurrence of such phenomenon in a particular region but also their impacts and volume of destruction. Particularly after incident of 8th Oct. 2005 earthquake, northern area of Pakistan are considered to be placed in high seismic zone (Armbruster 1978). In the incident of 8th Oct. 2005, more than 8600 people died, one million got injured and approximately 3, million became homeless, this facts is very much important in feasibility, planning, design and construction of any project in that area (Mahdi S and Muhammad S 2006). Tectonic plate motion in Himalaya is the major reason of earth quake in the northern areas of Pakistan. Euro Asian plate and India plate meet in Pakistan and uplift of Euro Asian plate by India plate is the main reason of this plate tectonic motion which causes earth make in Pakistan.

2.6.3 Environment Risk.

Now a day's awareness and concerns related to environment are increasing everywhere in the world. The worldwide movement of environmental protection has contributed to the uncertainty for construction become of inability to know what will be needed as per requirements and how long it will take to gain approval from the regulatory authority. Practically this delay the tine overrun for getting the approved has great influence on the total cost of the development project. Similar is the case for public safety rules and regulation. Due to change is in govt. regulations and policies, the situation becoming stricter and constantly change guidelines for consultants, engineers, client, owners and contractors as the project passes through designing, planning and construction stage. These fluctuating and moving goals, objectives and targets add a significant contribution to uncertainty which can make it really impossible to schedule and complete the project at the budgeted cost.

2.6.4 Safety and Security Risk.

In a broader spectrum, security and safety, risks include factors due to which damage to or loss of resources (e.g. material, manpower, equipment and machinery, and money) or facilities (e.g. underground sweet water table, disturbance to living and surrounding population) can occur during construction or operation phase of golf course development project. There are very rear chances of loss work time, damage to equipment or machinery and manpower due accident which can occur because of negligence and ignorance of some worker. These risks include all actions (Terrorism, strike, war, malfunctioning, accidents etc.) due to which loss of resources and to the deliverables of the development project can occur. These risk are more prone to occur during the operation phase and comparatively less likely to occur in the construction execution phase. To minimize on-site and offsite accidents during construction and operation, health safety policy is strengthen to prevent these risks to occur. Golf course development projects are generally mega projects and accepted that these are target in terrorist's attacks and wars. Internal political situation may be the reason of much at risks. For safe construction execution and operation of much projects state to the art technology and methodology are being used, which generally include, Geographical Information System (D&S) and mapping technique, Remote sensing, Photogram entry, Global Positioning System (D&S), Light detection and ranging (LIDAR), data acquisition (SCADA) etc.

2.6.5 Organizational Risks

As in mega projects different and various organizations are involve, therefore, risks related to organization and organizational relationships may occur to be unexpectedly but are quit real. Due to involvement of various organization in design and construction execution phase it is natural to develop strained relationship among them. When mistakes happens or problems occur meetings and discussion often center on blaming and responsibilities rather than project goals and objectives at that time when solving the problems should be the main focus. Negotiation, Communication and cooperation between the parties involved are discouraged for the fear of the effects of impending litigation. By the appropriate contract terms, this barrier to communication results from the ill-conceived notion that problems and uncertainties resulting from technological problems can be eliminated the net result will be in the form of an increase in the costs of constructed facilities.

2.6.6 Technical Risk.

The risks which occur due to technological problems are associated with design consultant and contractor professions which have some amount of control over this category, however, technological risks have become greater in many instance because of rapid advances in new technologies which present new problems to designers and constructions. Certain design assumption have become obsolete in the present time-which have serried the design and contractor professionals well in the past. Underground soil condition, depth of water table and subsurface condition which always create some degree of uncertainty, can cause an even greater degree of uncertainty during construction. After starting of construction execution the design may need to be modified due to progressive elaboration of execution phase. An example of project which has encountered such uncertainty is the "Golf View Residencia Project Bahria Town Lahore" and many real state dealers, owners, designer, and contractors have suffered from this project. Technological advancement is necessarily required to overcome such risks.

2.6.7 Financial / Investment Risk.

Usually golf course development projects are mega projects. A lot of investment is required for the construction execution, completion and safe operation of golf course construction and development project. Due to multiparty involvement, investment has been always a prime risk in construction projects. Such types of projects many atop during the construction execution phase due to lack of founds available and eventually fail if funding requirements are not fulfilled. Bur especially for such types of projects, there is always risk of return on investment and payback. Therefore, the most important should be given to the management of risks associated with investment for safe and successful completion and operation of the project.

2.6.8 Socio economical risk.

Climate of uncertainty is further rein forced by the socio-economic conditions due to high inflection and interest rates. Unanticipated problems related to the financing of construction have also been generated due to the deregulation of financial institutions. Such types of conditions can be anticipated and the associated risks can be forested and liked with the economic indicators of the country. For instant in Pakistan, regardless of the political instability in the country, the economic indicators are tending to grow. Prior to 2005 earthquake, the GDP of the country was 8.4 %, but now it is 12.4 %. Floods and earthquakes during the last two years costed government approximately $ 5.4 B and expected to spend more $ 6.3 B till 2010. Overall there is potential for foreign investment in construction sector and growth in the work (Economic Survey of Pakistan 2006).

2.6.9 Risk Break Down Structure (RBS)

Risk Breakdown Structure (RBS) is made on the basis of risk identification and categorized as shown in Figure 2. Risk identification is the most important thing followed by the probability and impact calculations in whole risk analysis process.

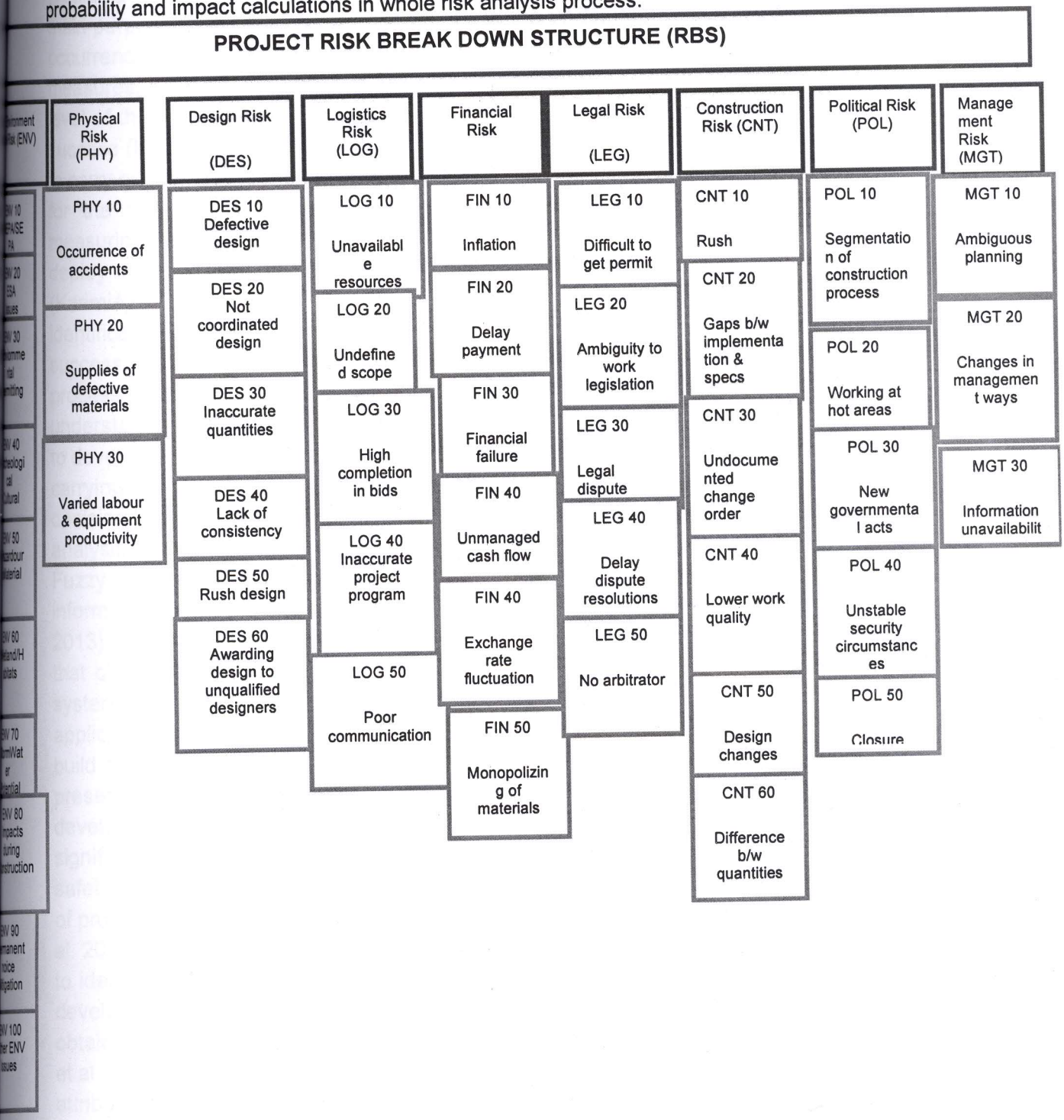


Figure 10: Risk Breakdown Structure of golf course development project

2.7 Risk Assessment in Golf Course Develop Projects

Risk assessment is a critical procedure for decision-making and projecting success (Williams 1995). Azari et al.[39](KarimiAzari, Mousavi et al. 2011) reported that its main purpose is to estimate risk by identifying the undesired events, the likelihood of occurrence of the unwanted event, and the consequence of such event. This involves measures, either conducted quantitatively or qualitatively, to estimate the significance level of the individual risk factors to the project, so as to estimate the risk to project success (KarimiAzari, Mousavi et al. 2011). Practically, different techniques are used to carry out risk assessment (Chapman 2001). The result obtained will serve as inputs for the purpose of optimum decision. Accordingly, with a better quantification measuring result, managers can recognize which risks are more important and then deploy more resources on it to eliminate or mitigate the expected consequences (KarimiAzari, Mousavi et al. 2011). According to William (Williams 1995), the identification and assessment of project risk are the critical procedures for projecting success, and they usually become the essential factors in the decision making process. Risk assessment or as many researchers call it risk analysis can offer an understanding to the detailed sources of project risk and assist construction industries to develop targeted helpful action. The approaches that have being frequently used in carrying out construction project risk assessment include; Probability analysis such as decision tree analysis, sensitivity analysis, Monte Carlo simulation techniques; Interval analysis estimates plausible ranges of results based on ranges for the input variables; Fuzzy set analysis is used to solve uncertainty problems, especially when probability information is limited and when boundaries of variables are not obvious (Kuo and Lu 2013). Oztas and Okmen (Jannadi and Almishari 2003) presented a literature survey that on the issues of risk, risk management/analysis and the design-build contract system, proposing a schedule and cost risk analysis model, and to show the applicability of these models in scheduling and cost estimation of a fixed-price design–build construction project through a case study. Zou et al (Zou, Zhang et al. 2007), presented an understanding of the key risks in construction projects in China and developed strategies in manage them. The risks were prioritized according to their significance of influences on typical project objectives in terms of cost, time, quality, safety and environmental sustainability, and then scrutinized from a joint perspective of project stakeholders and life cycle. KarimAzari et al, 2011 (KarimiAzari, Mousavi et al. 2011) used the fuzzy risk assessment technique for order preference by similarity to ideal solution (TOPSIS) method to provide a rational and systematic process for developing the best model under each selection criteria. Decision criteria were obtained from the nominal group technique. Zavadskas et al,2010 (Zavadskas, Turskis et al. 2010), present risk assessment of construction projects which is based on multi-attribute decision methods. The risk evaluation attributes are selected taking into consideration the interests and goals of the stakeholders as well as factors that have influence on the construction process efficiency and real estate value. Jaskowski and Biruk (Jaskowski and Biruk 2011), present a risk analysis and assessment framework

in which the AHP was adopted. The proposed risk model is based on evaluating and weighting the particular project's characteristics and expected conditions.

Having reviewed different contributions to risk assessment in the construction sector, it is observed that the risk models highlighted may not accommodate risk associated with golf course development projects in Pakistan where cultural and political factors mainly could influence risk management of a golf course development project. Therefore, a structured and systematic model to improve risks management in golf course development projects is intended to be the first step towards enhancing the risk management process for project managers and contractors working in the golf course development industries in Pakistan.

The literature still lacks a comprehensive and validated study linking risk, risk assessment, risk management and project outcome for golf course development projects. Also no major studies on these constructs are reported from Pakistan. The motivation for the present research is derived from these limitations.

2.8 Research Hypothesis

After vast and extensive literature review the following hypothesis have been formulated by the researcher.

2.8.1 Hypothesis 1

There is lack of interest in the planning of development projects due to demand of physical progress instead of written or reported daily progress which leads to the occurrence of risk events in the execution phase.

2.8.2 Hypothesis 2

Ambiguity in the design and progressive elaboration has also been observed in most of the projects by the researcher in the early stage of project execution causing valuable effect on the objectives of the project.

2.8.3 Hypothesis 3

Environmental and physical conditions has not been taken into consideration in the planning phase of the project. Hence failure to explore the potential risks due to these two factors.

2.8.4 Hypothesis 4

Legal, logistics, political and financial issues has not been well understood due to which poor identification of risks relating to these areas. Thereby improper management of such hidden threats.

2.8.5 Hypothesis 5

Lack of knowledge about risk and the risk management methodologies has been observed by the developers and the contractors which favors the risk events to happen.

2.8.6 Hypothesis 6

There is shortage of sufficient number of qualified professionals and project team members which is also a major reason of not properly understanding risks and their mitigation strategies and causing problems during construction stage.

2.8.7 Hypothesis 7

It seems stakeholders are not properly engaged and managed, communication among stakeholders is weak and not recorded in a proper manner. Similarly risks associated with the area of human resource and procurement are not addressed well.

Chapter # 3

3 Research Methodology

Comprehensive and vast literature review, an intangible questionnaire which has been posted to a significant number of qualified professionals and technical staff and statistical analysis of the survey data was the parts of the methodology used for this research.

3.1 Conceptual Research Design

Following conceptual research design will be adopted in this study. Comprehensive and vast literature review, an intangible questionnaire which has been posted to a significant number of qualified professionals and technical staff and statistical analysis of the survey data has been adopted to develop a risk register and assessment model.

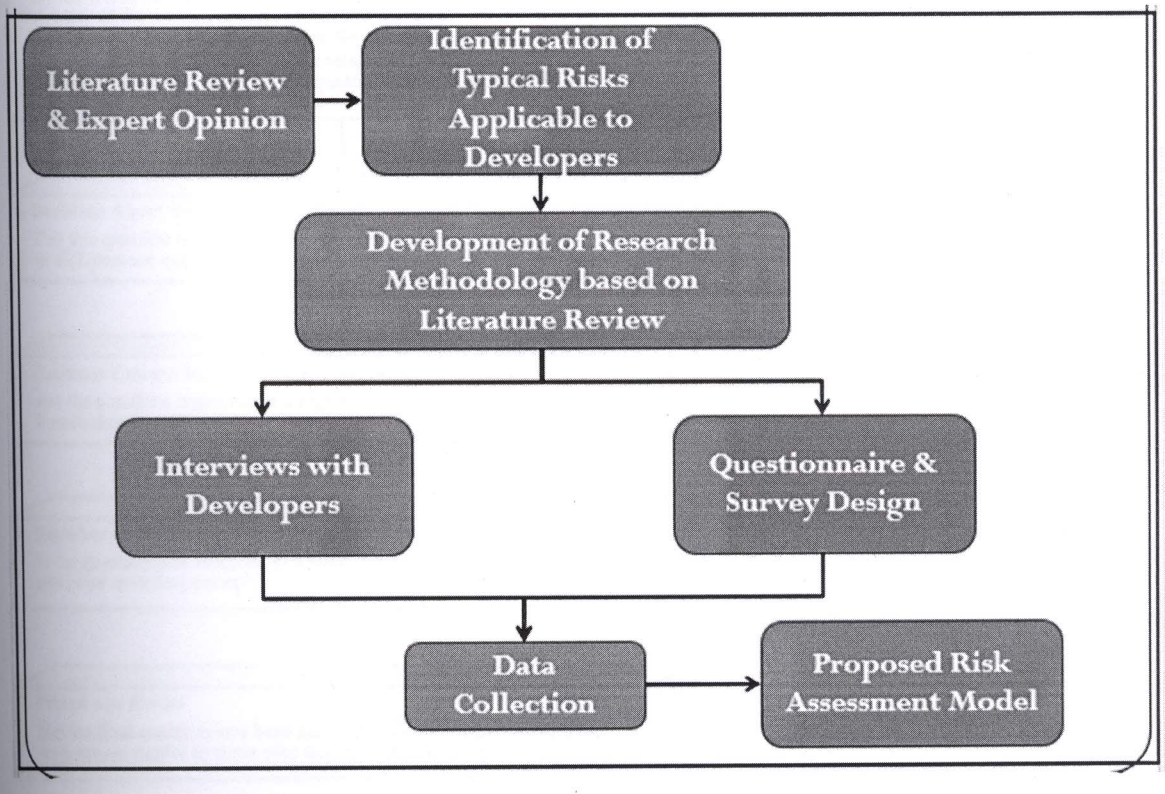


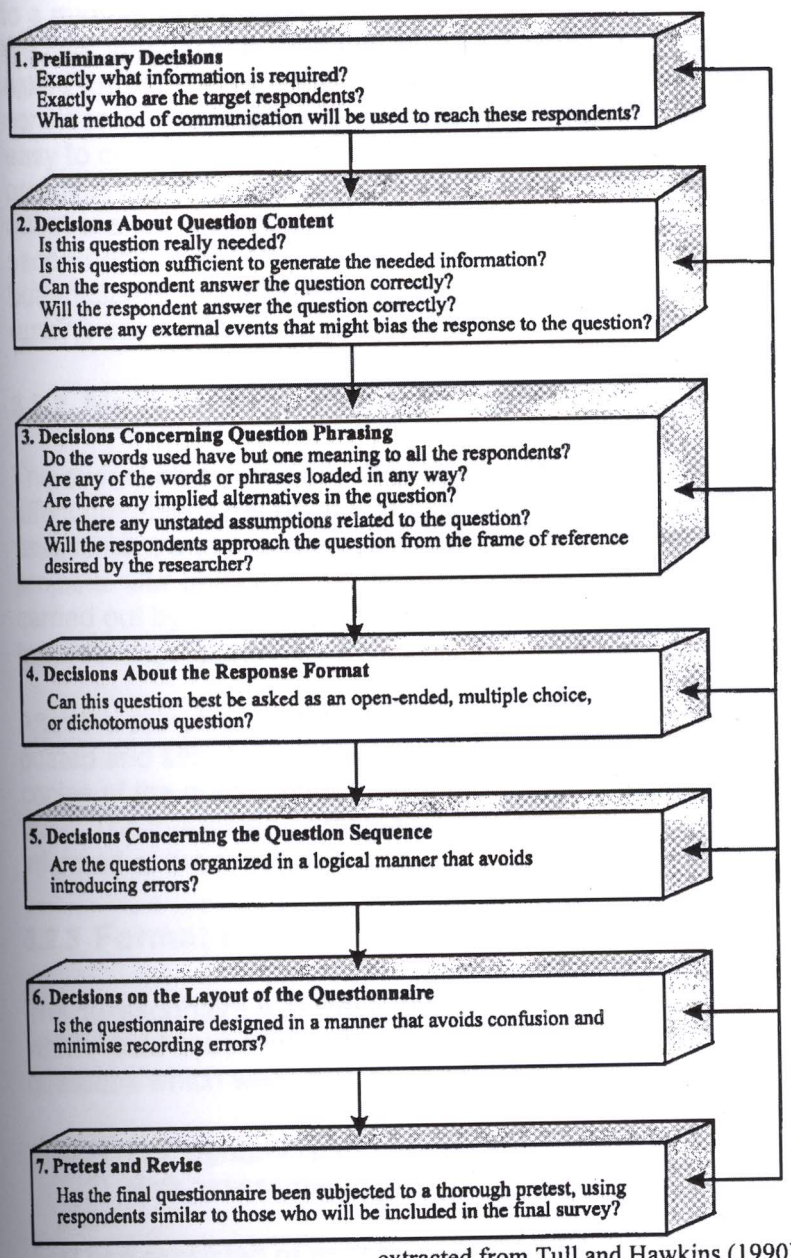
Figure 11: Conceptual research design

3.2 Instrument Design

The instrument selected for the data collection of this research study was a questionnaire, detail of which is as under:

3.2.1 Questionnaire Design

For the general design of questionnaire frequently interviews as well as utilising the colleagues experiences was preferred by Tull and Hawkins (1990). This followed the seven important decisions illustrated in the following Figure 12.



extracted from Tull and Hawkins (1990) page# 193

Figure 12: Questionnaire Construction Decisions

Basically the questionnaire has been designed to ascertain information on current trends used in today's risk management environment because of little standardization of risk management process. The target respondent were engineers, architects, construction managers, project managers, quantity surveyors and managing directors, who had been implicitly involved in major projects were risk management practices were used. Many versions of questionnaire were piloted out to a number of professionals from the field of construction and development before the final version was dispatched. The manner and style in which questions were asked and how they should be answered by the respondents was the major point of consideration as is always the case in the questionnaire design. To be quick and easy to complete was one of the major objectives of the questionnaire. This was preliminary and basic requirement and crucial to this study as there were many questions to be answered because the field of risk management is so broad. The second objective of the questionnaire was to keep the respondents answer quickly but efficiently and effectively. The questionnaire utilized five percentage ranges ranking scale. Open ended questions were avoided to optimize the response time.

3.2.2 Methodology of the Questionnaire

The overall objective of this thesis was to investigate the type of risks which can affect the objectives of golf course development project and to develop a risk assessment and management model particularly for golf course development projects. Our objective is also to explore existing risk management model/practices carried out by the construction industry. The questionnaire was inclined specifically towards major projects.

After the completion of the final version of the questionnaire, the questionnaire was posted and sent to the relevant professionals and their response was awaited. 100 copies of the questionnaire were produced. The final return date was 20 January 2016. The interested participants who requested the results would then have been informed of the result summary.

3.2.3 Format of the Questionnaire

The questionnaire was designed to collect information about specific identified risks which could cause impact on project objectives. The questionnaire consisted of 73 questions which were divided in to two parts:

1) Demographic part
2) Risk assessment part

First part consisted of general questions related to age, gender, position in the organization, profession, professional experience, qualification, about company, certification etc. It was designed so that the questions which required more time and information were placed latter in the questionnaire, which could have threatened the completion of the remainder of the questionnaire. It was designed so that all the respondent that did reply, completed it as best they could. Framework of the questionnaire is elaborated in the following Figure 13:

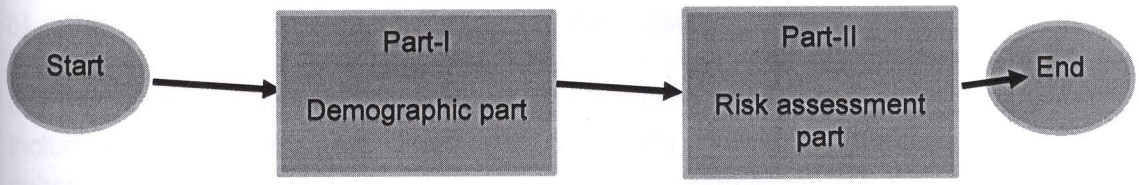


Figure 13: Framework of the questionnaire

3.3 Population Description

Our research study includes all the existing operational registered golf courses in Pakistan which are 45 in number. (Pakistan Golf Federation "PGA"). Further segregation is provided in the attached list in the annecture.

Sr#	Location	Affiliated Golf Courses		
		Civilian	Military	Total
1	FEDERAL	01	02	03
2	PUNJAB	05	19	24
3	BALOCHISTAN		01	01
4	KPK	01	08	09
5	SINDH	03	05	08
Summary		10	35	45
		22%	78%	100%

Figure 14: Registered Golf Courses Associated with PGA

3.4 Sampling and Sample Size

Convenience sampling has been done for the purpose of this study. Sample size was based on accessibility and convenience. 100 questionnaires were send to the professionals from construction and development industry and the appreciable feedback was received.

3.4.1 Data Collection

The following two methods namely questionnaire and interviews has been used for collecting the data for this research. We will discuss these two comprehensively one by one.

a) Questionnaire: On the basis of knowledge acquired from most relevant and vast literature review, discussion and frank interviews research questionnaire has been designed. It covers most of the crucial risks which are considered to be occurred in the construction and development projects in Pakistan.

b) Interviews: For obtaining inputs to risk assessment and management in golf development projects interviews has been conducted. The respondents which were the part of this research were either serving in public sector or in private sector including project managers, engineers, architects, managing directors, contractors, subcontractors, clients and sponsors and were interviewed for the data collection purpose.

3.5 Limitations

Although this study has made a valuable contribution to risk management practices but limitations of the study should be acknowledged. The limitations of this study are:

- Mainly focus on the project objectives namely cost, time, quality, environment and safety
- This study does not consider the impact of risks on the scope of project. Scope is excluded from project objectives while analysing and managing risks. It has been considered that scope will never change and it is fixed once it has been defined
- From perspective of contractor, the risk identified in this study are of generic type and particular to the contractors of golf course development and construction.
- The sample is consisted of golf course development industry particularly in Punjab due to time limitations. The terrain of Punjab is mostly flat. Consequently, the results and findings may not be applicable to mountainous terrain or other type of terrain. However, the findings describe a snapshott of the risks affecting project objectives despite these limitations.
- Risk assessment model and risk register has been proposed specifically for golf course development and as such care should be exercised while adopting and implementing this model to other type of development and construction. Also cautions should be adopted while generalization and interpretation of the findings.

3.6 Simulation and Modelling

The simulation experiments did not conduct due to time constraints.

3.7 Place of the Study

The study was conducted in Lahore, Pakistan under kind supervision of HOD, Bahria University Lahore Campus (BULC).

Chapter # 4

4 Results

The findings which are obtained after the analysis of the data collected is called the result. The description of the data collected is followed by conducted interviews and questionnaire survey.

4.1 Interpretation of Data

There were two parts of the questionnaire. First part was consisted of demographic data about the respondents i.e. general information. Second part consisted of 20 identified risks associated with the golf course development projects and the respondents were asked to consider and indicate the probability of occurrence of these risks as negligible, minor, moderate, highly or very high and the impact level on each project objective that were resulted in as negligible, minor, moderate, highly or very high. These risks were mainly taken from Ahmed *et al.* (1999), Chapman (2001) and Wang and Liu (2004) and to the best of the researchers' knowledge, were put into nine groups/categories, with 6 risks related to management problems, 2 risks related to design category, 2 risks related to legal category, 2 risks related to construction category, 2 risks related to logistics category, 2 risks related to physical category, 1risks related to political category, 2 risks related to environment category and 1risk related to financial category as illustrated below through Table and Pie-chart:

Table 9: Number of risks w.r.t category

Category	Risks
Management	6
Design	2
Legal	2
Construction	2
Logistic	2
Physical	2
Political	1
Environment	2
Financial	1
Total	**20**

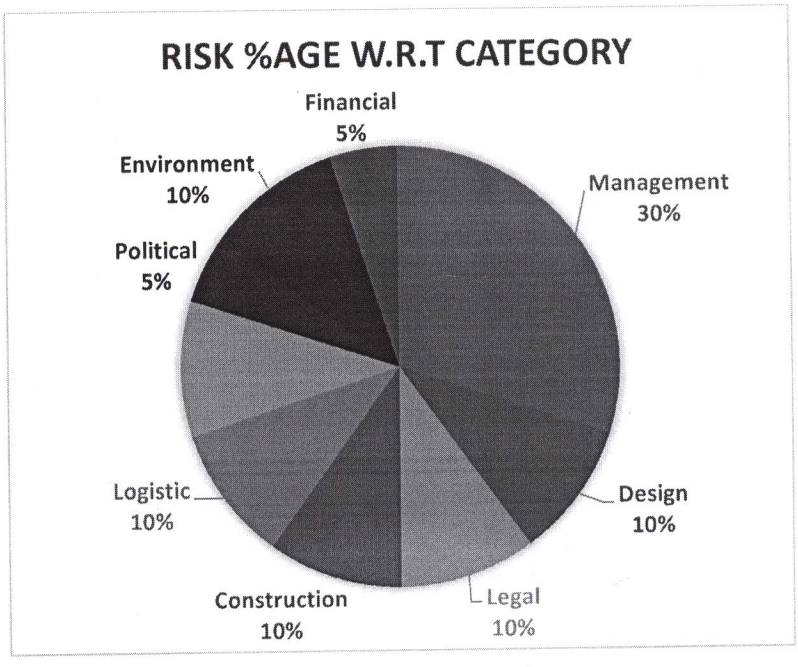


Figure 15: Risk % age w.r.t category

These risks along with their abbreviations are presented below in the tabular form:

Table 10: Identified Risks

Sr #	Identified Risks	Category	Abbreviations
1	Tight project schedule	Management	TPS
2	Design variations	Design	DV
3	Excessive approval procedures in administrative government departments	Legal	EAP
4	High performance or quality expectations	Construction	HPQE
5	Inadequate program scheduling	Logistic	IPS
6	Unsuitable construction program planning	Management	UCPP
7	Variations of construction programs	Management	VCP
8	Low management competency of subcontractors	Physical	LMCS
9	Variations by the client	Design	VC
10	Incomplete approval and other documents	Logistic	IAD
11	Incomplete or inaccurate cost estimate	Construction	ICE
12	Lack of coordination between project participants	Management	LCP
13	Unavailability of sufficient professionals and managers	Management	UPM
14	Unavailability of sufficient amount of skilled labour	Management	USL
15	Bureaucracy of government	Political	BG
16	General safety accident occurrence	Physical	GSAO
17	Inadequate or insufficient site information (soil test and survey report)	Environment	ISI
18	Occurrence of dispute	Legal	OD
19	Price inflation of construction materials	Financial	PICM
20	Serious noise pollution caused by construction	Environment	SNP

4.2 Interpretation of Response

The questionnaire survey was conducted from December 2015 to January 2016, in two months only. A pilot research was conducted initially with one professor (academic) and on technical (project manager) person in order to test the questionnaire, prior to the floating of the questionnaire. Capability of easy answering, intangibility, unambiguity etc. aspects of questionnaire were mainly focused at this stage. The main purpose of this exercise was to improve the quality of the questions which were required to be answered. Due to shortage of time a little refinement was made to the questionnaire and 100 questionnaire were sent to the qualified professionals and technical staff all over the Pakistan. All respondents were contacted before floating of questionnaire to them in order to make it sure that they are familiar with nature of the questions and their willingness to join this research. After a short time span of six week, 70 responses were received. Out of which 22 responses were partially filled or invalid answered. The response rate of this research is 48% greater than 32% representing a valid response and which is acceptable according to one sigma quality standard (Tenant and Geoff 2001). The feedbacks are represented through the following pie chart:

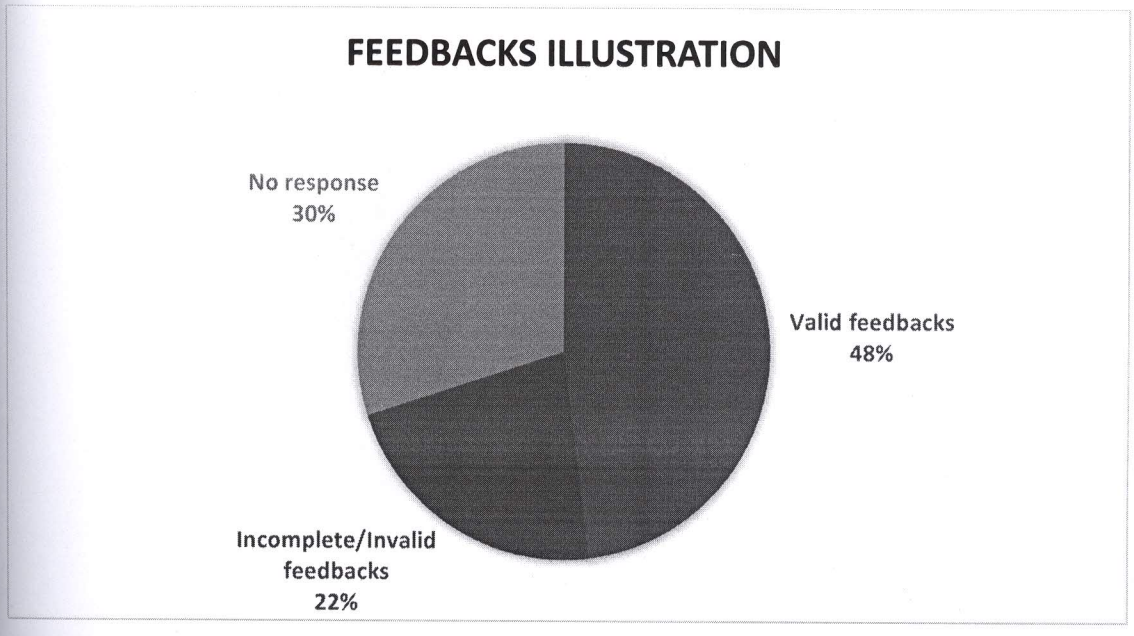


Figure 16: Feedback Illustration

4.3 Sample composition

The respondents which were the part of this research were either serving in public sector or in private sector including project managers, engineers, architects, managing directors, contractors, subcontractors, clients and sponsors. With respect to the professional back ground breakdown of the participants is given below.

Table 11: Demographical information of survey respondents

Professional background	Quantity	Percentage	Cumulative percentage
Engineers	20	42	42
Project Manager	10	21	63
Quantity Surveyor	10	21	84
Architect	5	10	94
*Others	3	6	100

Notes:*Other category comprised 1 Managing directors 1 Construction manager and 1 contract manager.

As indicated in Table 11, majority respondents were engineers (42 per cent) followed by the project managers (21per cent). Then quantity surveyors (21 per cent) followed by architects (5 per cent).The minority of the respondents (6 per cent) were drawn from the 'others' category comprising 1 managing director, 1 construction managers and 1 contracts manager. Demographic information w.r.t profession is illustrated through the following Pie-Chart:

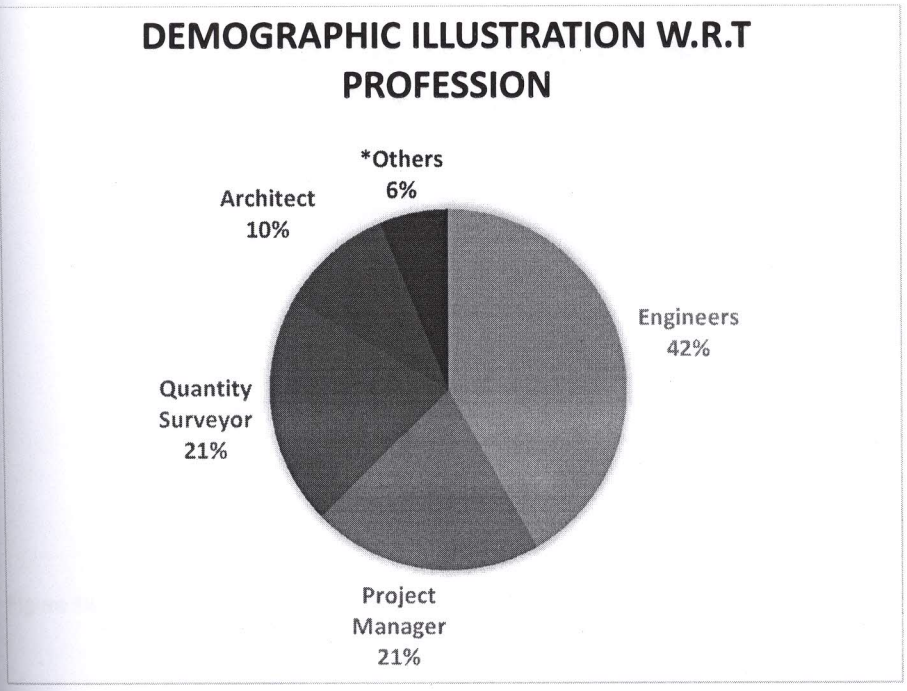


Figure 17: Demographic illustration w.r.t profession

On average experience in the construction sector of the respondents was 10 years. Demographic details of the respondent's experience is shown in the following table. Work experience in the industry of 56% of the respondents was greater than 7 years. Basic qualification of all respondents was bachelor level. Bachelor level education, long professional experience, and distinctive positions in the company shows that all the respondents adequate and sound knowledge of development and construction projects and the risks associated with them.

Table 12: Demographic data w.r.t. experience

Experience	Quantity
7-10 years 56%	27
11-14 years 25%	12
15-18 years 13%	6
> 18 years 6%	3
Total	**48**

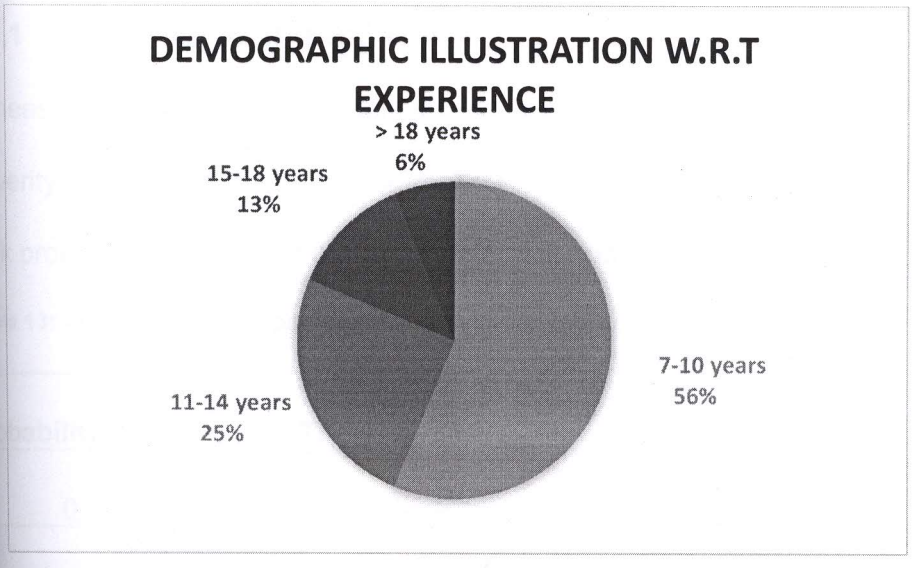


Figure 18: Demographic illustration w.r.t profession

4.4 Data Analysis Method

Feedback of the respondents were obtained in the form of assigned %age to the each likelihood of occurrennce and its level of impact respectively in the terms of cost, time, quality, environment and safety. The risk score/risk number/risk severity as described by PMBOK 5th edition (2013) has been used in this research. Risk score assessed by each individual respondent in the form of assigned %age to the each likelihood of occurrennce and its level of impact has been calculated by using the following Equation (1)

$RN = P \times I$ ..... (1)

Where:

RN = Risk number or risk significance score assecced by respondent for the impact of risk "I" on project objective with probability "P".

P = Probability/likelihood of occurrennce of a specific risk

I = Impact level of risk on project objectives (Cost, time, quality, environment, safety etc.)

This risk score also called the risk significance index score and will be used for ranking of all identified risks on a spsecific project objective.

The five-point scales for "P" (negligible, minor, moderate, high and very high) and "I" (negligible level of impact, minor level of impact, moderate level of effect/impact, high level of effect/impact and very high level of effect/impact) need to be converted into digital/numerical scales. According to PMBOK 5th edition (2013) the matrix presented in the following Table shows the calculation of the risk score/risk number.

4.4.1 Probability & Impact Matrix:

A measure of the severity of risk is:

Severity/risk score = (Probability x Impact)

Risk probability and impact matrix used for risk analysis is given below:

Table 13: **Probability and impact matrix**

Probability	Threats					Opportunity				
0.9	0.045	0.09	0.18	0.36	0.54	0.54	0.36	0.18	0.09	0.045
0.7	0.035	0.07	0.14	0.28	0.42	0.42	0.28	0.14	0.07	0.035
0.5	0.025	0.05	0.1	0.2	0.3	0.3	0.2	0.1	0.05	0.025
0.3	0.015	0.03	0.06	0.12	0.18	0.18	0.12	0.06	0.03	0.015
0.1	0.005	0.01	0.02	0.04	0.06	0.06	0.04	0.02	0.01	0.005
Impact	0.05	0.1	0.2	0.4	0.6	0.6	0.4	0.2	0.1	0.05

Impact (numerical scale) on an objective (e.g., cost, time, quality, environment or safety). Each risk is rated on its probability of occurring and impact on an objective if it does occur. The thresholds for low, moderate or high risks are shown in the matrix and determine whether the risk is scored as high, moderate or low for that objective.

4.4.2 Risk severity Definition:

Risk severity definition on the basis of which analysis is conducted is explained through the following table:

Table 14: Severity definition

Risk Score	Severity	Color Scheme
≥0.005<0.05	**Negligible**	
≥0.05<0.1	**Minor**	
≥0.1<0.20	**Moderate**	
0.2→0.28	**High**	
0.3→0.54	**Very high**	

The risk score/point has been used for the ranking of risks in the upcoming portion. It is important to mention here that the formula used for calculating risk number my ignore the importance of such risks having low probability of occurrence and with a higher level of impact on the objectives of the project, but such risks should not be ignored and taken into the consideration in risk management planning. Furthermore, such risks are not the focus point of this research. Risks that fall within the DARK RED, RED and YELLOW zones will have risk response plan which may include both a risk response strategy and a risk contingency plan.

4.5 Survey Results

It has been observed by the collected questionnaire from the respondents that all risks mentioned in the questionnaire can occur to some extent causing variable impact to nay golf course development project. The crucial object of this questionnaire was to obtain a list of most important(key) risks which can prominently influence the objectives of a golf course development project not mere the identification of list of threats/risks. For this purpose, only the most important ranked risks as indicated by the former researcher (McIntosh and McCable, 2003; Tam et al., 2004) were chosen as key risks.

All these identified key risks are prioritized and ranked in line with the measurement of their severity on the predefined project objectives like cost, time, quality, environment and safety ignoring their respective category. For this purpose, ranking of risks has been done by the researcher by application of the following two principles:

(1) Ranking with respect to the accumulated risk severity on overall predefined project objectives and

(2) Ranking with respect to the severity of each isolated risk on each project objective neglecting the category.

In the first principle there are chances that risk with higher severity on any one project objectives are likely to be neglected on other project areas as overall impact will be consider on the basis of a particular category of risks. While in the second principle, in contrast to the first principle severity of each risk on each project objective has been determined and then the all predefined risks have been prioritized based on their risk score neglecting and considering the category. The results of probability and impact variation and the ranking is presented in the following control charts and tables.

4.5.1 Data Validation

The collected data is validated through simple and basic statics by making control charts.

Standard deviation of the sample is calculated by the following formula assuming that probability is normally distributed:

The "Sample Standard Deviation" σ (The Greek letter sigma):

$$s_{N-1} = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N}(x_i - \bar{x})^2}$$

The table below gives long term DPMO (Defects per million opportunity) values corresponding to various short term sigma "σ" levels.

Table 15: Sigma level and DPMO

Sigma level	Sigma (with 1.5σ shift)	DPMO	Percent defective	Percentage yield	Short-term C_{pk}	Long-term C_{pk}
1	−0.5	691,462	69%	31%	0.33	−0.17
2	0.5	308,538	31%	69%	0.67	0.17
3	1.5	66,807	6.7%	93.3%	1.00	0.5
4	2.5	6,210	0.62%	99.38%	1.33	0.83
5	3.5	233	0.023%	99.977%	1.67	1.17
6	**4.5**	**3.4**	**0.00034%**	**99.99966%**	**2.00**	**1.5**
7	5.5	0.019	0.0000019%	99.9999981%	2.33	1.83

Extracted from (Gygi *et al* 2005)

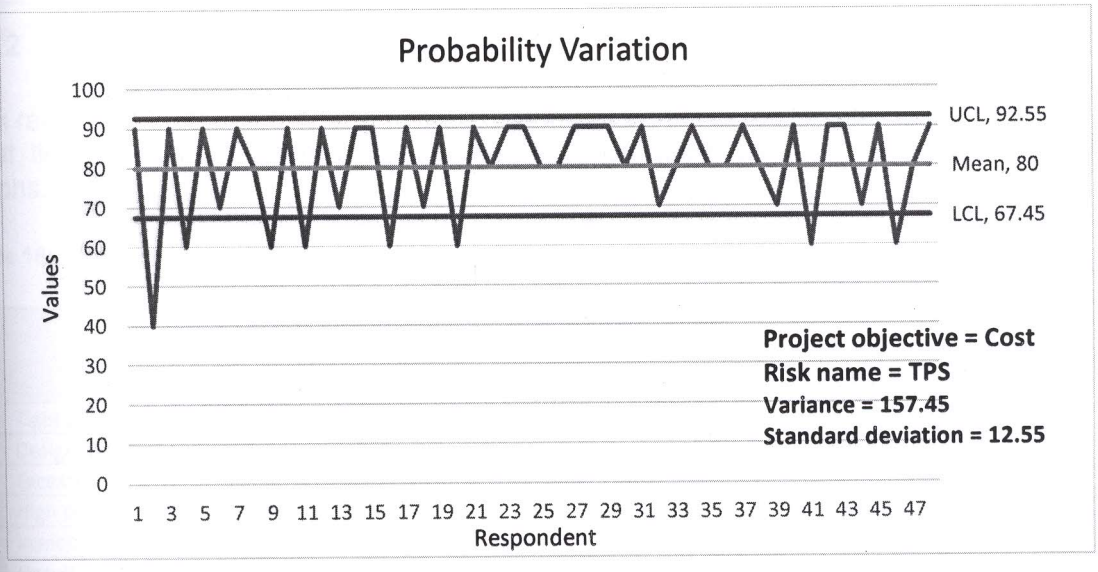


Figure 19: Probability Variation

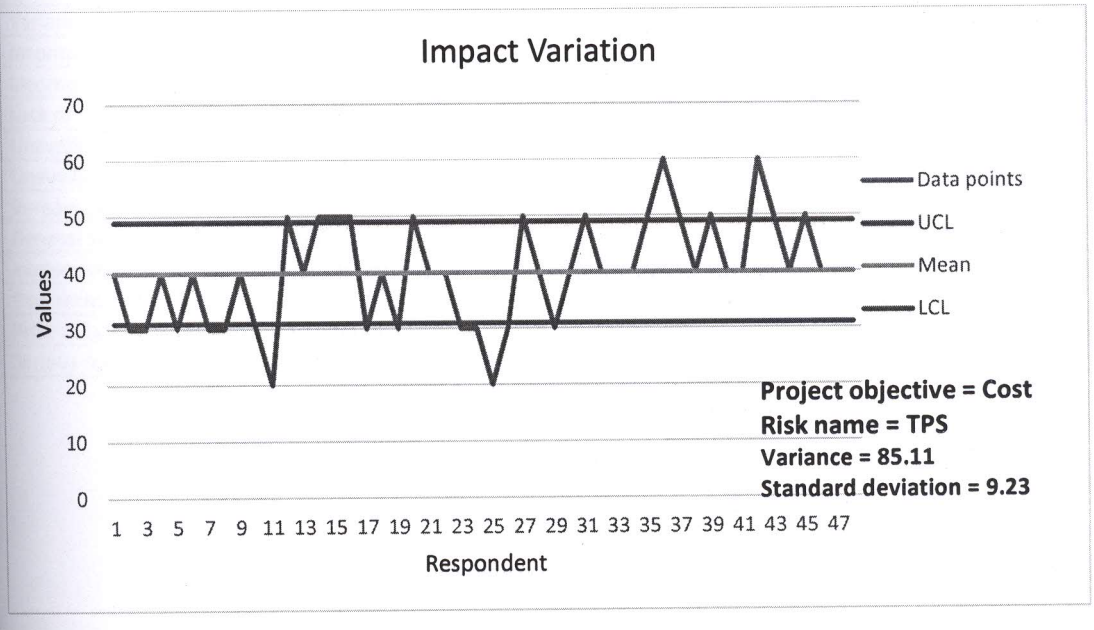


Figure 20: Impact Variation

4.5.2 Risk Ranking

Risk ranking is conducted on the basis of risk number/risk score for each project objective (cost, time, quality, environment and safety) and illustrated through the following tables and graphs.

Table 16: Risk ranking w.r.t cost

Sr#	Identified Risks	Abbreviations	Probability	Impact On Cost	Risk Score
1	Tight project schedule	TPS	80	40	0.32
2	Design variations	DV	60	40	0.24
3	Excessive approval procedures in administrative government departments	EAP	70	30	0.21
4	High performance or quality expectations	HPQE	50	40	0.20
5	Inadequate program scheduling	IPS	60	30	0.18
6	Unsuitable construction program planning	UCPP	55	30	0.17
7	Variations of construction programs	VCP	40	40	0.16
8	Low management competency of subcontractors	LMCS	40	30	0.12
9	Variations by the client	VC	60	20	0.12
10	Incomplete approval and other documents	IAD	50	10	0.05
11	Incomplete or inaccurate cost estimate	ICE	60	50	0.30
12	Lack of coordination between project participants	LCP	70	20	0.14
13	Unavailability of sufficient professionals and managers	UPM	50	30	0.15
14	Unavailability of sufficient amount of skilled labour	USL	70	20	0.14
15	Bureaucracy of government	BG	60	10	0.06
16	General safety accident occurrence	GSAO	60	20	0.12
17	Inadequate or insufficient site information (soil test and survey report)	ISI	60	30	0.18
18	Occurrence of dispute	OD	50	40	0.20
19	Price inflation of construction materials	PICM	60	10	0.06
20	Serious noise pollution caused by construction	SNP	40	5	0.02

Figure 21: Chart; Risk ranking w.r.t. cost

Table 17: Risk ranking w.r.t time

Sr#	Identified Risks	Abbreviations	Probability	Impact On Time	Risk Score
1	Tight project schedule	TPS	70	40	0.28
2	Design variations	DV	60	10	0.06
3	Excessive approval procedures in administrative government departments	EAP	70	5	0.04
4	High performance or quality expectations	HPQE	50	10	0.05
5	Inadequate program scheduling	IPS	80	40	0.32
6	Unsuitable construction program planning	UCPP	70	40	0.28
7	Variations of construction programs	VCP	40	10	0.04
8	Low management competency of subcontractors	LMCS	40	5	0.02
9	Variations by the client	VC	60	35	0.21
10	Incomplete approval and other documents	IAD	50	5	0.03
11	Incomplete or inaccurate cost estimate	ICE	60	5	0.03
12	Lack of coordination between project participants	LCP	70	10	0.07
13	Unavailability of sufficient professionals and managers	UPM	50	20	0.10
14	Unavailability of sufficient amount of skilled labour	USL	70	10	0.07
15	Bureaucracy of government	BG	60	10	0.06
16	General safety accident occurrence	GSAO	60	5	0.03
17	Inadequate or insufficient site information (soil test and survey report)	ISI	60	2	0.01
18	Occurrence of dispute	OD	50	20	0.10
19	Price inflation of construction materials	PICM	60	2	0.01
20	Serious noise pollution caused by construction	SNP	40	2	0.01

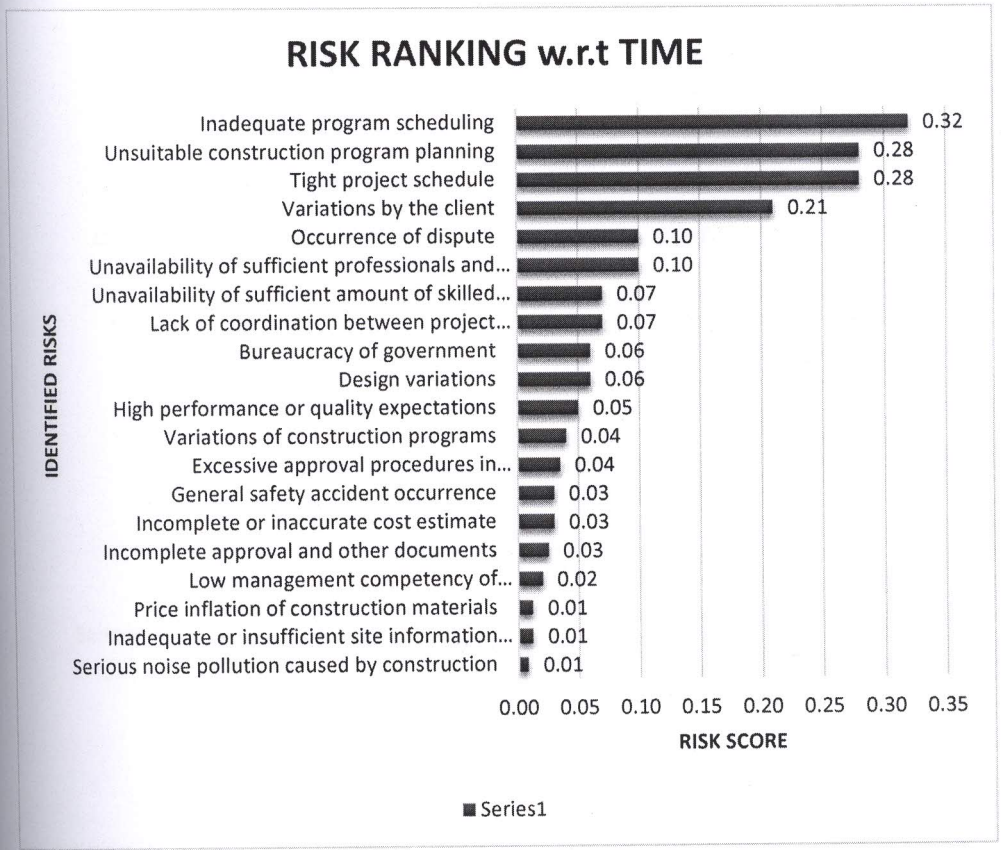


Figure 22: Chart; Risk ranking w.r.t. time

Table 18: Risk ranking w.r.t quality

Sr#	Identified Risks	Abbreviations	Probability	Impact On Quality	Risk Score
1	Tight project schedule	TPS	70	50	0.35
2	Design variations	DV	60	20	0.12
3	Excessive approval procedures in administrative government departments	EAP	70	10	0.07
4	High performance or quality expectations	HPQE	50	40	0.20
5	Inadequate program scheduling	IPS	60	40	0.24
6	Unsuitable construction program planning	UCPP	55	30	0.17
7	Variations of construction programs	VCP	40	20	0.08
8	Low management competency of subcontractors	LMCS	40	10	0.04
9	Variations by the client	VC	60	20	0.12
10	Incomplete approval and other documents	IAD	50	30	0.15
11	Incomplete or inaccurate cost estimate	ICE	60	40	0.24
12	Lack of coordination between project participants	LCP	70	20	0.14
13	Unavailability of sufficient professionals and managers	UPM	50	40	0.20
14	Unavailability of sufficient amount of skilled labour	USL	70	30	0.21
15	Bureaucracy of government	BG	60	10	0.06
16	General safety accident occurrence	GSAO	60	20	0.12
17	Inadequate or insufficient site information (soil test and survey report)	ISI	60	30	0.18
18	Occurrence of dispute	OD	50	20	0.10
19	Price inflation of construction materials	PICM	60	20	0.12
20	Serious noise pollution caused by construction	SNP	40	10	0.04

Figure 23: Chart; Risk ranking w.r.t quality

Table 19: Risk ranking w.r.t environment

Sr#	Identified Risks	Abbreviations	Probability	Impact On Environment	Score
1	Tight project schedule	TPS	80	5	0.04
2	Design variations	DV	60	5	0.03
3	Excessive approval procedures in administrative government departments	EAP	70	5	0.035
4	High performance or quality expectations	HPQE	50	30	0.15
5	Inadequate program scheduling	IPS	60	20	0.12
6	Unsuitable construction program planning	UCPP	55	5	0.028
7	Variations of construction programs	VCP	40	5	0.02
8	Low management competency of subcontractors	LMCS	40	5	0.02
9	Variations by the client	VC	60	5	0.03
10	Incomplete approval and other documents	IAD	50	5	0.025
11	Incomplete or inaccurate cost estimate	ICE	60	5	0.03
12	Lack of coordination between project participants	LCP	70	5	0.035
13	Unavailability of sufficient professionals and managers	UPM	50	10	0.05
14	Unavailability of sufficient amount of skilled labour	USL	70	5	0.035
15	Bureaucracy of government	BG	60	35	0.21
16	General safety accident occurrence	GSAO	60	5	0.03
17	Inadequate or insufficient site information (soil test and survey report)	ISI	60	40	0.24
18	Occurrence of dispute	OD	50	10	0.05
19	Price inflation of construction materials	PICM	60	5	0.03
20	Serious noise pollution caused by construction	SNP	40	10	0.04

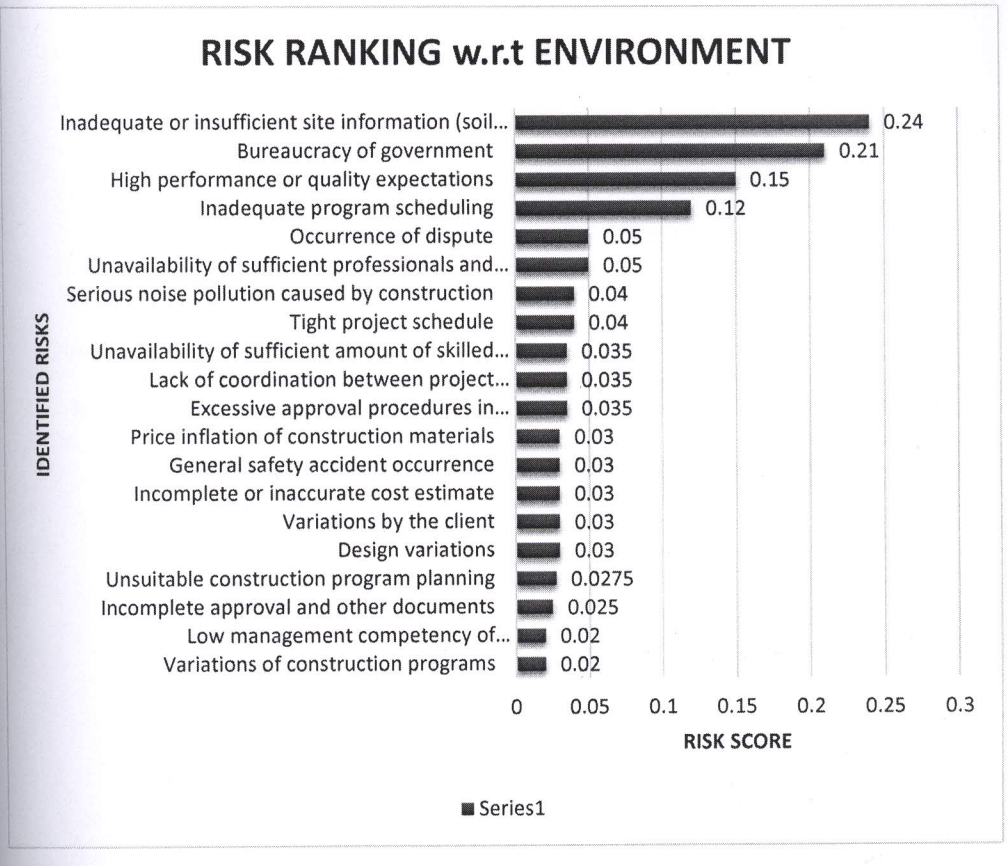


Figure 24: Chart; Risk ranking w.r.t environment

Table 20: Risk ranking w.r.t safety

Sr#	Identified Risks	Abbreviations	Probability	Impact On Safety	Risk Score
1	Tight project schedule	TPS	80	30	0.24
2	Design variations	DV	50	5	0.025
3	Excessive approval procedures in administrative government departments	EAP	60	5	0.03
4	High performance or quality expectations	HPQE	50	10	0.05
5	Inadequate program scheduling	IPS	70	30	0.21
6	Unsuitable construction program planning	UCPP	60	30	0.18
7	Variations of construction programs	VCP	40	5	0.02
8	Low management competency of subcontractors	LMCS	40	10	0.04
9	Variations by the client	VC	60	5	0.03
10	Incomplete approval and other documents	IAD	50	30	0.15
11	Incomplete or inaccurate cost estimate	ICE	60	5	0.03
12	Lack of coordination between project participants	LCP	70	10	0.07
13	Unavailability of sufficient professionals and managers	UPM	50	30	0.15
14	Unavailability of sufficient amount of skilled labour	USL	70	20	0.14
15	Bureaucracy of government	BG	60	30	0.18
16	General safety accident occurrence	GSAO	60	40	0.24
17	Inadequate or insufficient site information (soil test and survey report)	ISI	60	20	0.12
18	Occurrence of dispute	OD	50	10	0.05
19	Price inflation of construction materials	PICM	60	5	0.03
20	Serious noise pollution caused by construction	SNP	50	10	0.05

Figure 25: Chart; Ranking w.r.t safety

It has been found that all the identified risks which were twenty in number has an influence to some extent on each of the project objectives. It is obvious that all these identified risks are repeated in all the predetermined categories which are five in number. For instant, it is evident from the data collected that objectives of the project namely; cost, time, quality and safety can be effected by risks namely, "Tight project schedule" and "Inadequate program scheduling". Risk severity ranging from 0.2 to 0.54 (0.2→0.54) which is the base of our ranking in the analysis shows that there 14 most important risks called as key risks which can influence the objectives of a golf course development project in Pakistan. These key risks are represented in the following table with repeated ones filtered.

Table 21: Key risks

Sr#	Identified Risks	Abbreviations	Probability	Impact On Project objectives	Risk Score
1	Tight project schedule	TPS	70	50	0.35
2	Inadequate program scheduling	IPS	80	40	0.32
3	Incomplete or inaccurate cost estimate	ICE	60	50	0.30
4	Unsuitable construction program planning	UCPP	70	40	0.28
5	Design variations	DV	60	40	0.24
6	Inadequate or insufficient site information (soil test and survey report)	ISI	60	40	0.24
7	General safety accident occurrence	GSAO	60	40	0.24
8	Excessive approval procedures in administrative government departments	EAP	70	30	0.21
9	Variations by the client	VC	60	35	0.21
10	Unavailability of sufficient amount of skilled labour	USL	70	30	0.21
11	Bureaucracy of government	BG	60	35	0.21
12	High performance or quality expectations	HPQE	50	40	0.20
13	Occurrence of dispute	OD	50	40	0.20
14	Unavailability of sufficient professionals and managers	UPM	50	40	0.20

4.5.3 Graphical presentation of the key risks

Further study not only elaborates how many objectives have been effected by a particular risk but also assists us in understanding the comparison of risk score of all identified risks on a specific project objective. For this purpose a modified figure named as radar chart or contour chart has been used for better illustration graphically. In the above paragraph although two key risks have been discussed as an example by viewing their multi facet effect/impact on project objectives. A clearer picture of this observation is shown with the help of following radar chart.

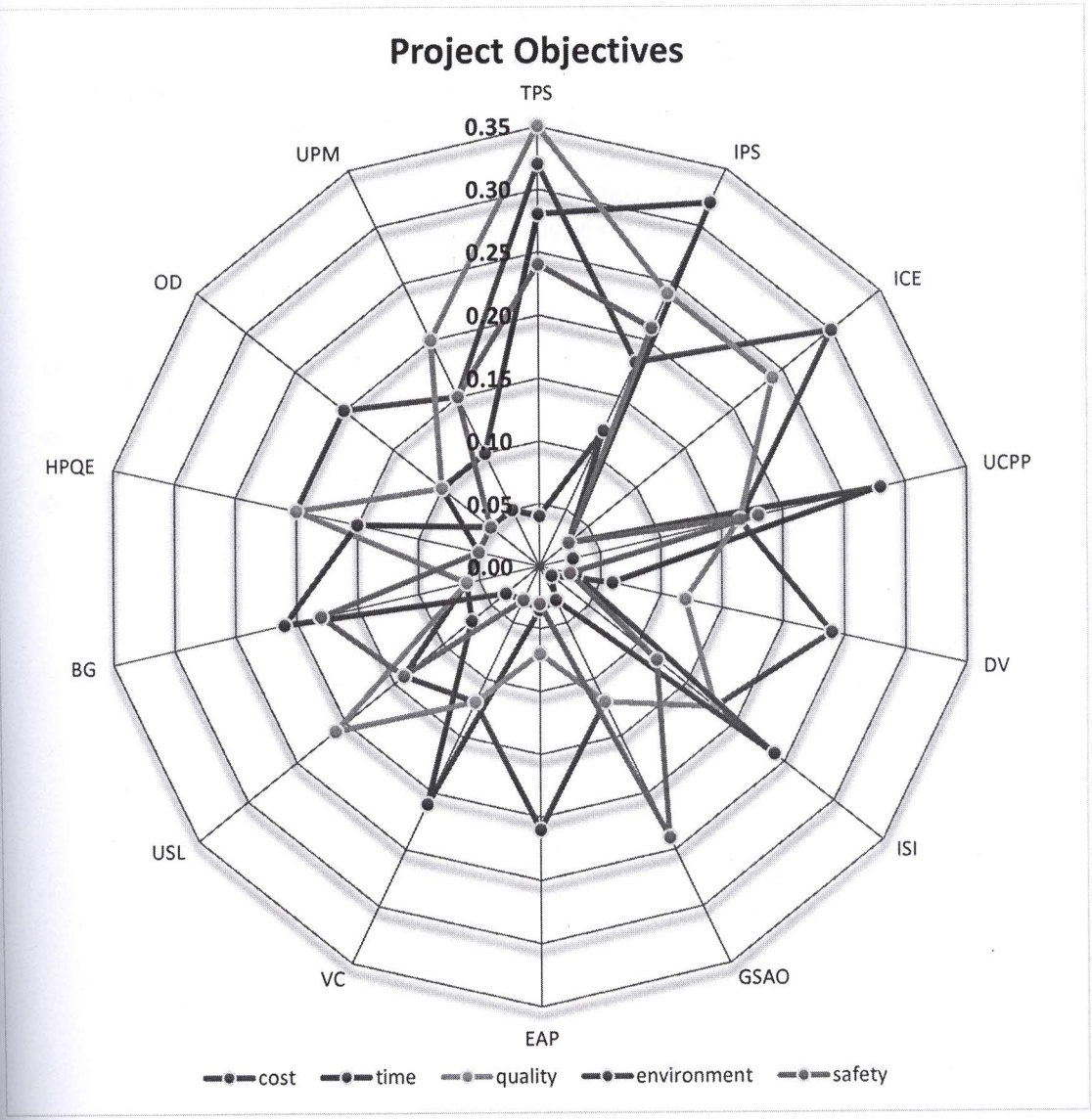


Figure 26: Radar chart; Risks affecting project objectives

- Tight project schedule "TPS" can influence four project objectives namely cost, time, quality, and safety except environment.
- Inadequate program scheduling "IPS" can influence three project objectives namely time, quality, and safety except cost and environment,
- Incomplete or inaccurate cost estimate "ICE" can influence two project objectives namely cost and quality except time, safety and environment,
- Unsuitable construction program planning "UCPP" can influence only one project objectives namely time except cost, quality, safety and environment,
- Design variations "DV" can influence only one project objectives namely cost except time, quality, safety and environment.
- Inadequate or insufficient site information "ISI" (soil test and survey report) can influence only one project objectives namely environment except cost, time, quality, and safety.
- General safety accident occurrence "GSAO" can influence only one project objectives namely safety except cost, time, quality, and environment.

- Excessive approval procedures in administrative government departments "EAP" can influence only one project objectives namely cost, except quality, time, environment and safety.
- Variations by the client "VC" can influence only one project objectives namely time, except cost, quality, environment and safety.
- Unavailability of sufficient amount of skilled labor "USL" can influence only one project objectives namely quality, except cost, time, environment and safety.
- Bureaucracy of government "BG" can influence only one project objectives namely environment except quality, cost, time, and safety.
- High performance or quality expectations "HPQE" can influence two project objectives namely cost and quality, except, time, environment and safety.
- Occurrence of dispute "OD" can influence only one project objectives namely cost, except quality, time, environment and safety.
- Unavailability of sufficient professionals and managers "UPM" can influence only one project objectives namely quality, except cost, time, environment and safety.

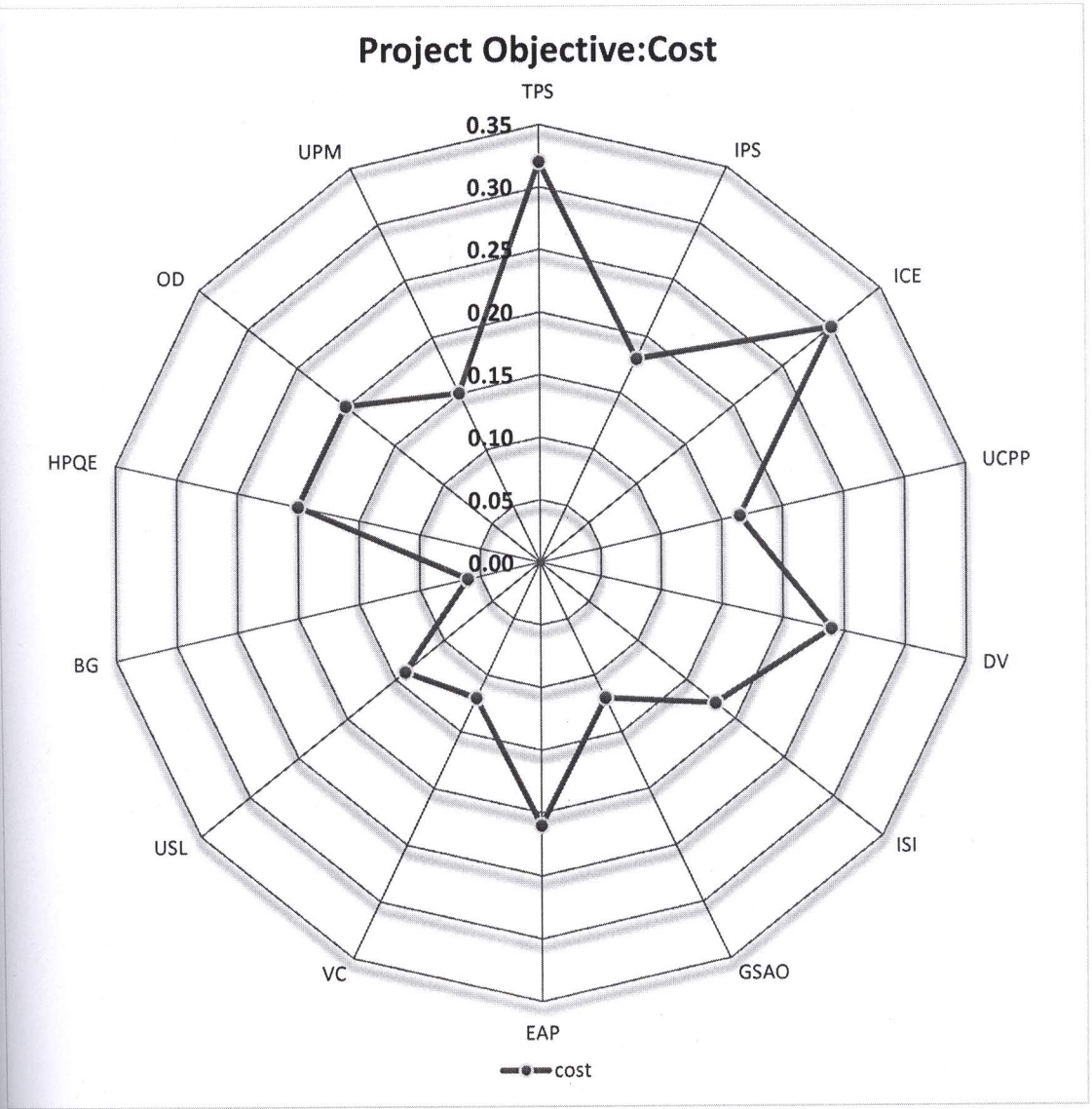


Figure 27: Radar chart; Risks affecting cost

0.3→0.54	Very high	2
0.2→0.28	High	4
≥0.1<0.20	Moderate	10

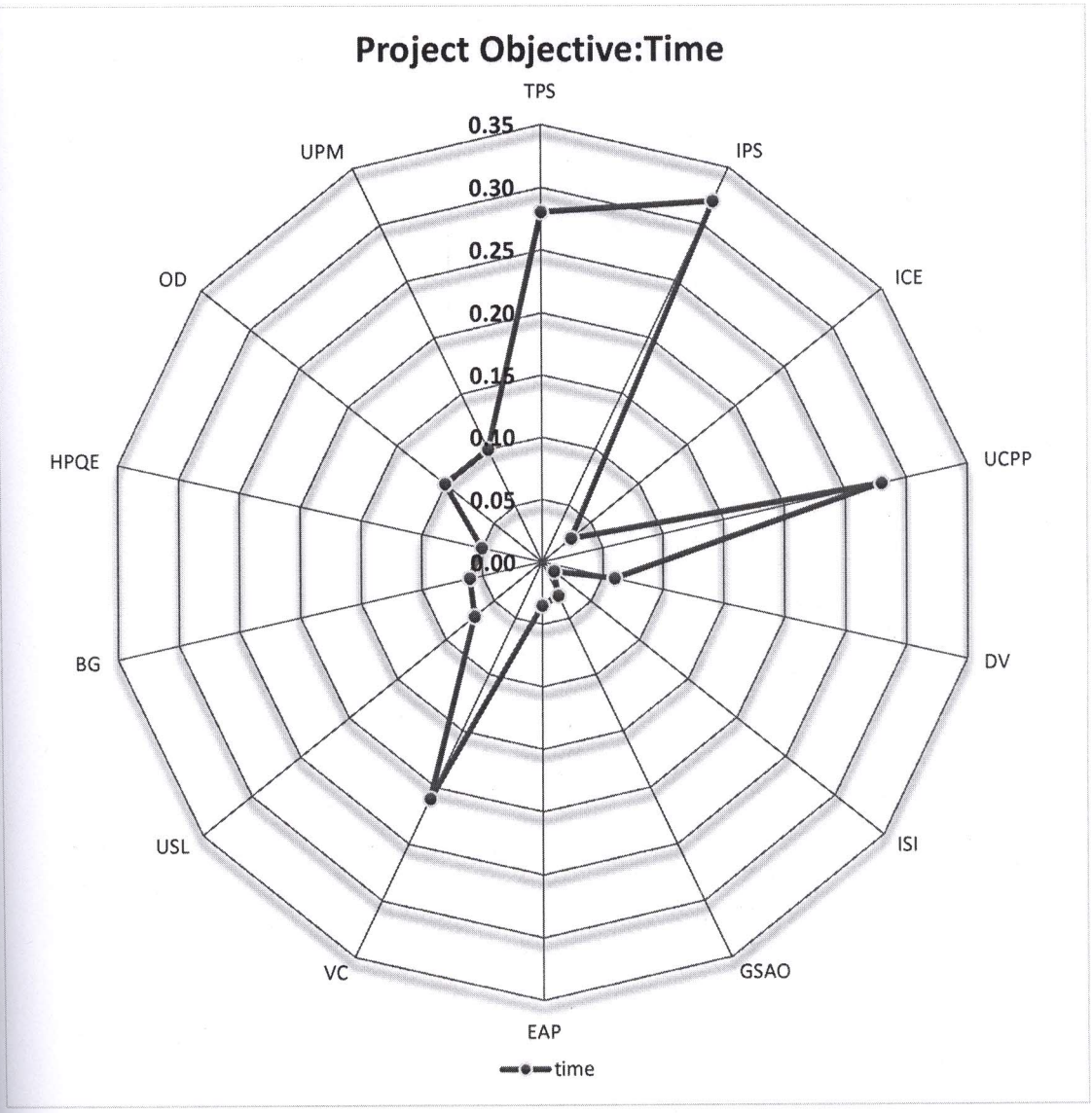


Figure 28: Radar chart; Risks affecting time

0.3→0.54	Very high	1
0.2→0.28	High	3
≥0.1<0.20	Moderate	2

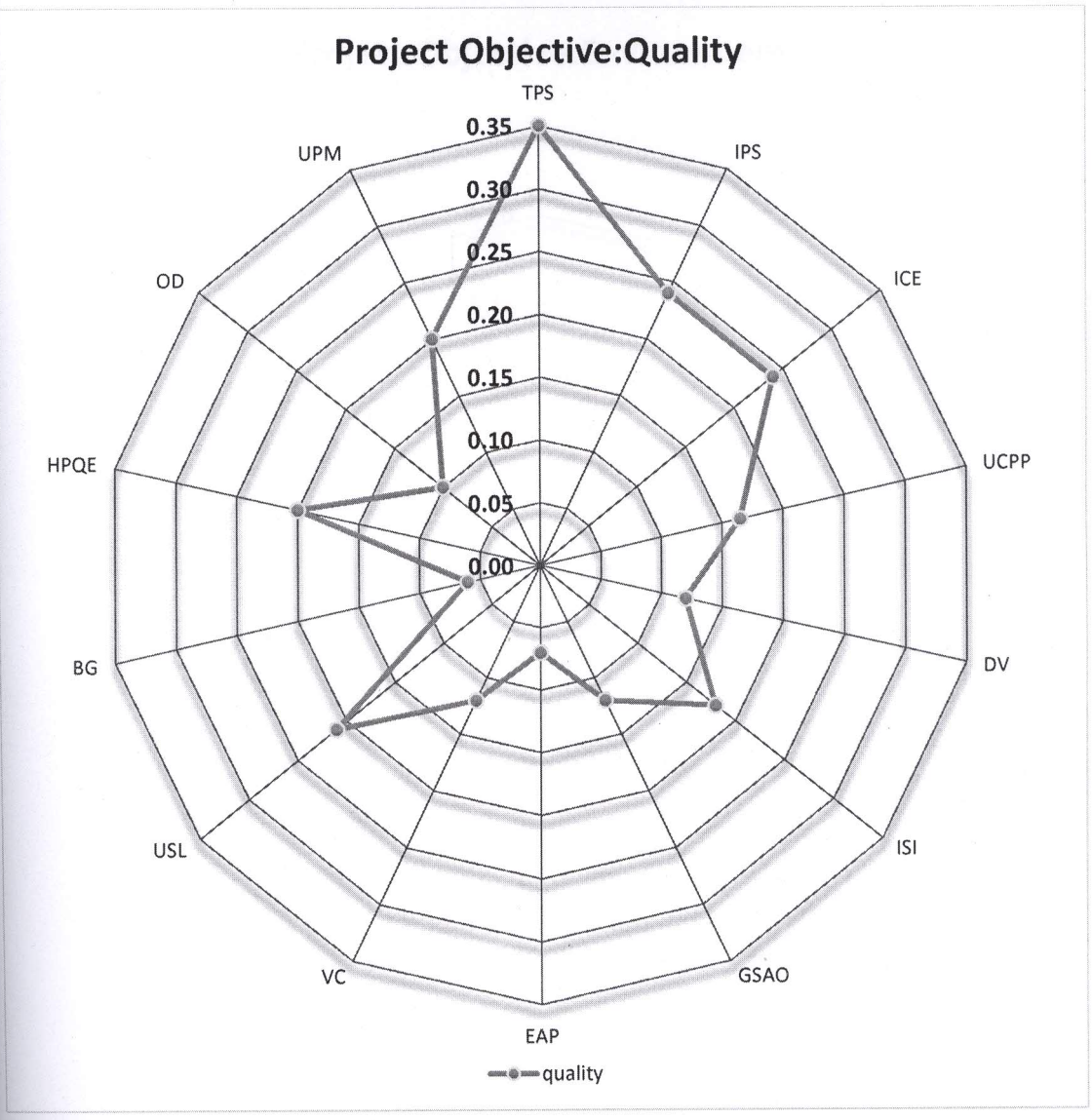


Figure 29: Radar chart; Risks affecting quality

0.3→0.54	Very high	1
0.2→0.28	High	5
≥0.1<0.20	Moderate	9

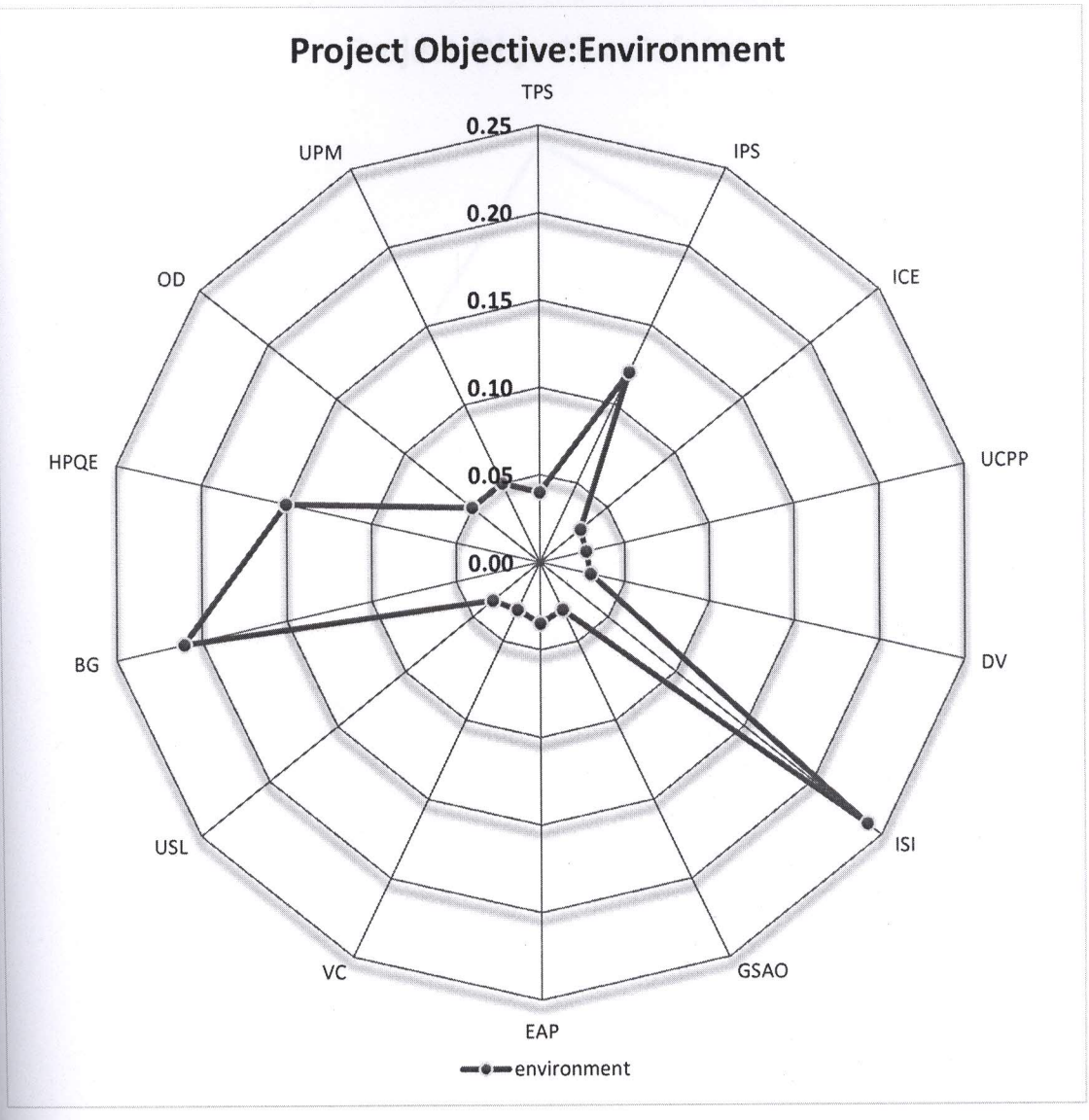


Figure 30: Radar chart; Risks affecting environment

0.3→0.54	Very high	0
0.2→0.28	High	2
≥0.1<0.20	Moderate	2

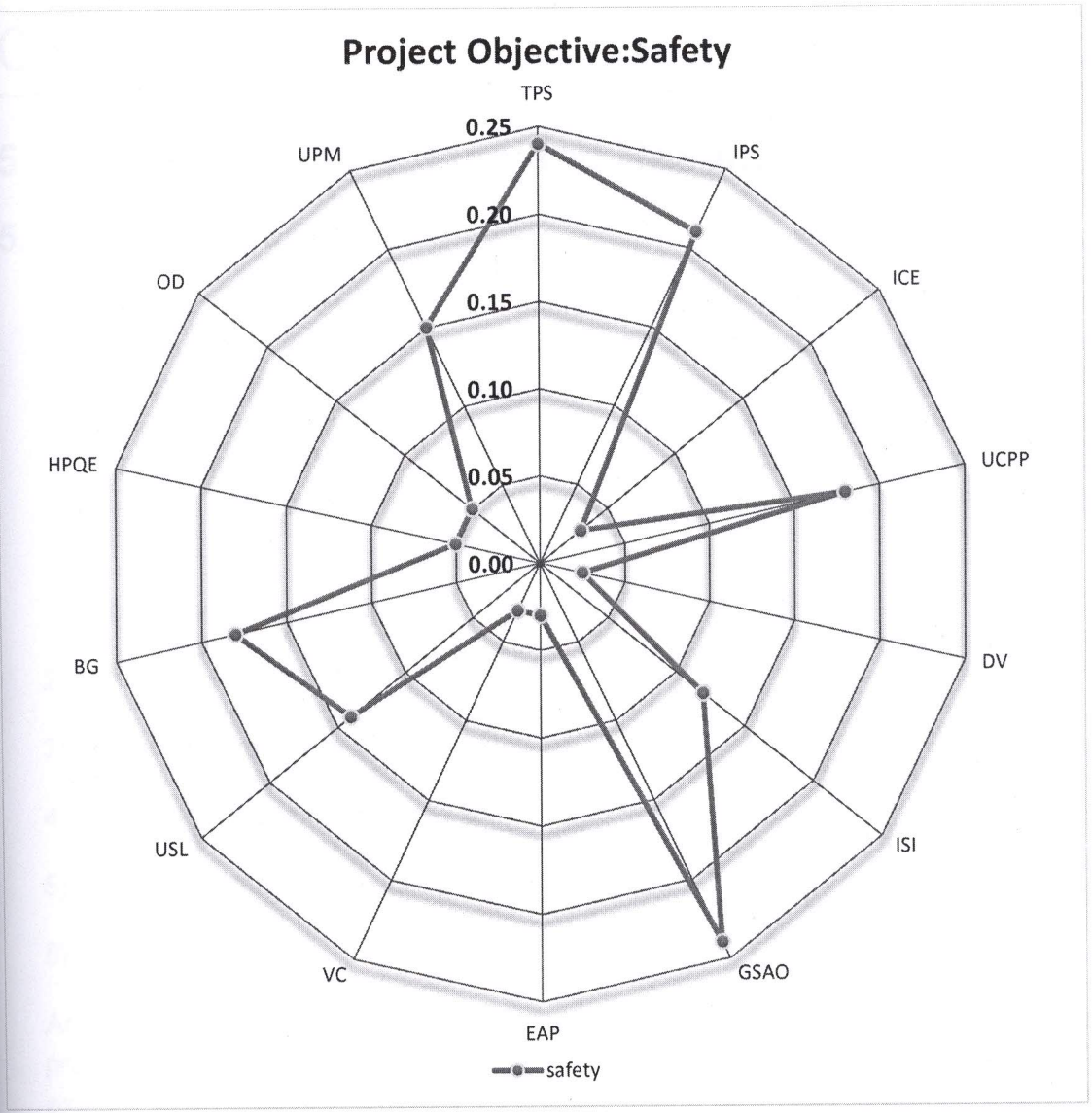


Figure 31: Radar chart; Risks affecting safety

0.3→0.54	Very high	0
0.2→0.28	High	3
≥0.1<0.20	Moderate	6

Chapter # 5

5 Analysis, Conclusions and Recommendations

5.1 Summary of Findings

This part of our research has been associated with the collection and summarizations of facts and findings from the combined and collected data which have been discussed in the previous areas. Summarization of the data has been done in this chapter. We will mainly focus on the following six points for better understanding of the topics. Conclusions and recommendations will be discussed and explore in the next portion of the study. This portion of study basically include the following:

1) Objectives of the study
2) Respondents
3) Sampling procedures
4) Method of research employed
5) Statistical treatment applied
6) Results

As stated earlier, to identify and appreciate the typical risks (Threats) affecting project's objectives in term of cost, time, quality, environment and safety. To explore and compare different risk assessment and management models as presented by former researchers. Development of risk register for golf course development project and risk mitigation strategies. To develop a risk assessment and management model/framework especially for golf course development projects in Pakistan; were our research objectives.

From the survey data it has been found that there 14 key risks that can occur and cause serious impact on the objectives (cost, time, quality, environment and safety) of a golf course development project which are presented below in tabular form along their category.

Table 22: Identified key risks w.r.t category

Sr#	Identified Risks	Abbreviations	Category	Risk Score
1	Tight project schedule	TPS	Management	0.35
2	Unsuitable construction program planning	UCPP	Management	0.28
3	Unavailability of sufficient amount of skilled labour	USL	Management	0.21
4	Unavailability of sufficient professionals and managers	UPM	Management	0.20
5	Design variations	DV	Design	0.24
6	Variations by the client	VC	Design	0.21
7	Incomplete or inaccurate cost estimate	ICE	Construction	0.30
8	High performance or quality expectations	HPQE	Construction	0.20
9	Excessive approval procedures in administrative government departments	EAP	Legal	0.21
10	Occurrence of dispute	OD	Legal	0.20
11	Inadequate program scheduling	IPS	Logistic	0.32
12	Bureaucracy of government	BG	Political	0.21
13	Inadequate or insufficient site information (soil test and survey report)	ISI	Environment	0.24
14	General safety accident occurrence	GSAO	Physical	0.24

Risks related to the management are four in number, risks related to the design are two in number, risks related to the construction are two in number, risks related to the legal matters are two in number, risks related to the logistics is one in number, risks related to the political issues is one in number, risks related to the environmental issues is one in number, risks related to the physical area is one in number.

As far respondent were concerned, majority respondents were engineers (42 per cent) followed by the project managers (21per cent). Then quantity surveyors (21 per cent) followed by architects (5 per cent).The minority of the respondents (6 per cent) were drawn from the 'others' category comprising 1 managing director, 1 construction managers and 1 contracts manager.

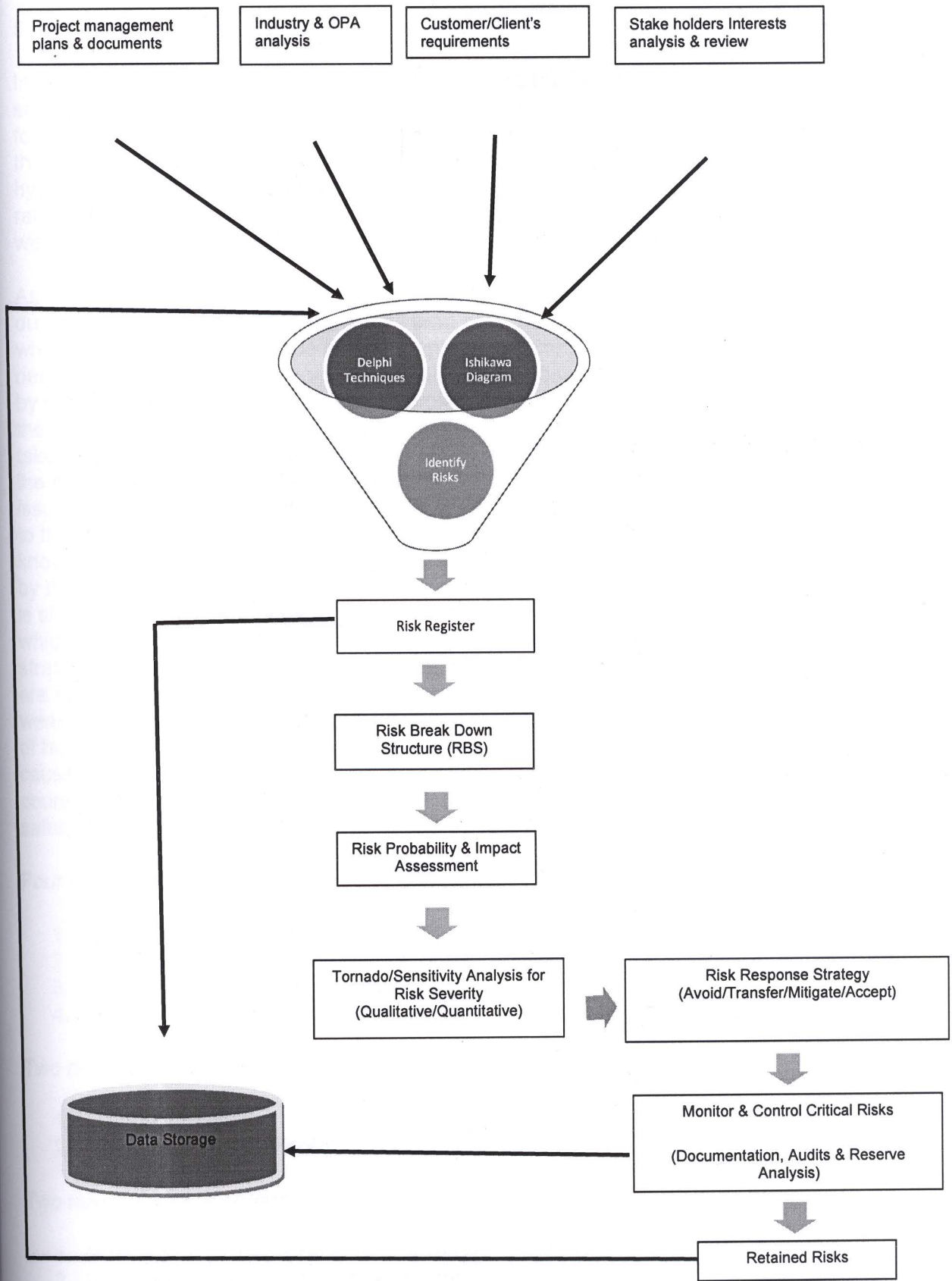
Convenience sampling has been done for the purpose of this study. Sample size was based on accessibility and convenience. 100 questionnaires were send to the professionals from construction and development industry and the appreciable feedback was received.

This research was conducted by using the methodology comprising of vast literature review of related articles, a postal questionnaire which were send to sufficient number of professionals and valuable feedback has been received. The collected data has been subjected to statistical analysis for validity.

Statistical analysis of the survey data was conducted by the application of statistical process control chart (SPCC) for confidence interval (CI) of 68.268% again assuming the data was normally distributed.

As far as results are concerned they exactly meat our study objectives of risk identification, assessment, management and provide base for risk assessment model for golf course development project which was our focus of study. In the upcoming part of this chapter we will draw the conclusions based on these findings.

Figure 32: Proposed Risk Assessment/Management Model (RAM) for Golf Course Development Projects in Pakistan



5.2 Conclusions and Recommendations

5.2.1 Conclusions

In this part of our research thesis we will discusses the issues, reaffirm the thesis statement, and reach a final judgment. In fact this is the belief which has been formed on the basis the evidences and causes which the researcher has collected through the collected data. Findings of our study gives the answer to research hypothesis and the questions which were raised in the start of this research and reinforced our thesis statement. It also provide justifications to the approach which was selected for this particular study and platform for further studies in this area.

As discussed earlier: there is lack of interest in the planning of development projects due to demand of physical progress instead of written or reported daily progress which leads to the occurrence of risk events in the execution phase. Ambiguity in the design and progressive elaboration has also been observed in most of the projects by the researcher in the early stage of project execution causing valuable effect on the objectives of the project. Environmental and physical conditions has not been taken into consideration in the planning phase of the project. Hence failure to explore the potential risks due to these two factors. Legal, logistics, political and financial issues has not been well understood due to which poor identification of risks relating to these areas. Thereby improper management of such hidden threats. Lack of knowledge about risk and the risk management methodologies has been observed by the developers and the contractors which favors the risk events to happen. There is shortage of sufficient number of qualified professionals and project team members which is also a major reason of not properly understanding risks and their mitigation strategies and causing problems during construction stage. It seems stakeholders are not properly engaged and managed, communication among stakeholders is weak and not recorded in a proper manner. Similarly risks associated with the area of human resource and procurement are not addressed well which are the main causes of risks events to occur and hinder while availing the objectives of a golf course development project in term of cost, time, quality, environment and safety.Our findings support the hypothesis as the study investigates:

Four risks related to management namely:

1. Tight project schedule
2. Unsuitable construction program planning
3. Unavailability of sufficient amount of skilled labor
4. Unavailability of sufficient professionals and managers

Two risks related to design namely:

1. Design variations
2. Variations by the client

Two risks related to construction namely:

1. Incomplete or inaccurate cost estimate
2. High performance or quality expectations

Two risks related to legal category namely:

1. Excessive approval procedures in administrative government departments
2. Occurrence of dispute

One risk related to logistics namely:

1. Inadequate program scheduling

One risk related to political category namely:

1. Bureaucracy of government

One risk related to environment category namely:

1. Inadequate or insufficient site information (soil test and survey report) and

One risk related to physical category namely:

1. General safety accident occurrence

were the most significant risks and have high impact on objectives (cost, time, quality, environment and safety) of a golf course development project. The performance of a golf course development project is often affected by the inherent risks existing within the organization and external to the project. Risk assessment and management practices can be used to identify these risks and propose appropriate strategies to mitigate them. This could lead to the development of risk register (see appendix), risk assessment and management model, thereby, enabling construction and development organizations to remain competitive.

The identified risk categories has been used as a platform for the development of risk register (see appendix) and suitable solutions for the successful and effective implementation of the proposed risk assessment model (RAM) for a golf course development project, and to facilitate the better decision making activities of development and construction companies. In addition, findings, understanding and results of risk management activities would contributte in identifying and managing potential risk effectively. The effect would lead to the attaining of project objectives in terms of cost, time, quality, environment and safety.

5.2.2 Recommendations

In the context of Pakistan, the relevant regulatory bodies (Pakistan Golf Federation, Pakistan Engineering Council) play a crucial role in making and implementing standards for its existing members. Within the Pakistan construction and development industries, mindset of relevant and major stakeholders and members of top management board need to be changed in order to make them aware of the benefits of the implementation of this RAM. In addition, utilization of risk auditors internally by the application of enterprise risk management (ERM) as crucial element for implementation of this RAM. The government should also take a necessary step by launching training programs and internships opportunities for the concerned professionals and technical staff to give capacity building facility in the country in order to assist and guide the respective contractors, supervision and design consultant and sponsors facing the issues while during or in pre-implementation of this RAM. This would prove as an origin of skills learning for the major proportion of professionals and technical staff associated with the construction and development industry of Pakistan.

Another avenue which is worth pursuing is the making of joint venture contracts with the foreign companies and contractors. Remaining competitive is the quest of the construction and development industry of Pakistan despite it is facing a scarcity of qualified and experienced professionals and skilled workers which also reinforce the research hypothesis positively. No doubt these difficulties have an important impact while implementing the practices of risk management. Other risks like " poor management skills, inadequate experience, unavailability of desired resources, low capacities and abilities of in house contractors and developers" in contrast to its risk number causing negative impact in the form of deterioration and poor efficiency to the development and construction industry of Pakistan. Identification of risks for development of risk register and RAM for golf course development projects in Pakistan is one of the major additions of this research by the researcher in the area of risk. Another notable addition of this research is that it throws light and inner view for understanding risks associated with golf course development projects in Pakistan and provides a platform for investigating the validity and barriers affecting the implementation of this RAM. Furthermore, this study makes a valuable addition to the body of knowledge on the subject within a context which was previously unexplored.

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APPENDICES

Research Study: Risks in Golf Course Development Projects in Pakistan

This survey is being carried out to collect data for my MS research study as a requirement of MS degree in Project Management at Bahria University Islamabad (Lahore Campus). Based on your experience with golf course development projects, you are requested to answer these questions on the basis of your professional experience. Thank you.

PART – A: DEMOGRAPHICS

1. Which of the following best describes your role in the project?

- ☐ Project manager.
- ☐ Project leader / assistant project leader.
- ☐ Member of the development team.
- ☐ Member of the quality assurance team.
- ☐ System analyst.
- ☐ Member of the implementation team.
- ☐ Other [please specify] _____

2. Which of the following best describes your most recently completed project?

- ☐ Golf course developed by your organization for internal use in your organization.
- ☐ Golf course developed by your organization for the internal use of the client.
- ☐ Golf course developed for golf playing only by your organization.
- ☐ Golf course developed for golf playing and multipurpose activities e.g. parties e.t.c.
- ☐ Other [please specify] _____

3. The golf course developed was:

- ☐ Stand-alone golf courses.
- ☐ Integrated golf course with resort.
- ☐ Integrated golf course with communities.
- ☐ Integrated golf course with resort and communities.
- ☐ Other [please specify] _____

8. By approximately what percentage, if any, did actual costs for the project exceeded originally budgeted costs? _____%

9. By approximately what percentage, if any, did actual completion time for the project exceeded originally budgeted completion time? _____%

10. What is the approximate number of employees in your organization? _____

11. How do you describe your company?

- ☐ A locally registered company with domestic business.
- ☐ A locally registered company with international business.
- ☐ Branch / unit of a company with operations across Pakistan.
- ☐ Branch / unit of a multinational company.
- ☐ Other [please specify] _____

12. The major focus of your company is:

- ☐ Domestic market.

☐ International market.

13. How old is your company (in years)? _____

14. The major construction and development activities of your company are related to:

☐ Golf course development.
☐ Building constructions.
☐ Road works.
☐ Infrastructural works.
☐ Bridges and highway.
☐ Other [please specify] _____

15. What are the certifications (such as ISO, EMS) your company has?

_____

16. How many years of experience do you have in the golf course development field?

☐ < 3 years.
☐ 3-6 years.
☐ 7-10 years.
☐ 11-14 years.
☐ 15-18 years
☐ > 18 years

17. How many years of experience do you have in the present organization? _____

18. How many projects have you completed in your career before this project? _____

19. Your age group:

☐ Under 25 years old.
☐ 26-35 years old.
☐ 36-45 years old.
☐ 46-55 years old.
☐ 56 years or older.

20. Gender?

☐ Male.
☐ Female.

21. Educational qualification: _____

22. International certifications (PMP, RMP etc) you possess: _____

Part-B, Risk Assessment

Cost related risks:

Instructions:

i) Kindly follow the following tables while filling the questionnair.

ii) Write additional risks/opportunities and their probability & impact in the blanks provided at the end.

Probability of occurance	Negligible	Minor	Moderate	High	Very high
Symbol	N	MR	MT	H	VH
Given %age	Up to 10%	>10%≤30%	>30%≤50%	>50%≤70%	>70%≤90%

Impact	Negligible	Minor	Moderate	High	Very high
Symbol	N	MR	MT	H	VH
Given %age cost increase	Up to 5%	>5%≤10%	>10%≤20%	>20%≤40%	>40%

Questionnair:

Sr#	**Risk describtion:**	**Abbreviation**	**Threat**	
			Probability	**Impact**
1	Tight project schedule	TPS		
2	Design variations	DV		
3	Excessive approval procedures in administrative government departments	EAP		
4	High performance or quality expectations	HPQE		
5	Inadequate program scheduling	IPS		
6	Unsuitable construction program planning	UCPP		
7	Variations of construction programs	VCP		
8	Low management competency of subcontractors	LMCS		
9	Variations by the client	VC		
10	Incomplete approval and other documents	IAD		
11	Incomplete or inaccurate cost estimate	ICE		
12	Lack of coordination between project participants	LCP		
13	Unavailability of sufficient professionals and managers	UPM		
14	Unavailability of sufficient amount of skilled labour	USL		
15	Bureaucracy of government	BG		
16	General safety accident occurrence	GSAO		
17	Inadequate or insufficient site information (soil test and survey report)	ISI		
18	Occurrence of dispute	OD		
19	Price inflation of construction materials	PICM		
20	Serious noise pollution caused by construction	SNP		

Time related risks:

Instructions:

i) Kindly follow the following tables while filling the questionnair.

ii) Write additional risks and their probability & impact in the blanks provided at the end.

Probability of occurance	Negligible	Minor	Moderate	High	Very high
Symbol	N	MR	MT	H	VH
Given %age	Up to 10%	>10%≤30%	>30%≤50%	>50%≤70%	>70%≤90%

Impact	Negligible	Minor	Moderate	High	Very high
Symbol	N	MR	MT	H	VH
Given %age time increase	Up to 2%	>2%≤5%	>5%≤10%	>10%≤20%	>20%

Questionnair:

Sr#	**Risk describtion:**	**Abbreviation**	**Threat**	
			Probability	**Impact**
1	Tight project schedule	TPS		
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16	General safety accident occurrence	GSAO		
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18	Occurrence of dispute	OD		
19	Price inflation of construction materials	PICM		
20	Serious noise pollution caused by construction	SNP		

Quality related risks:

Instructions:

i) Kindly follow the following tables while filling the questionnair.

ii) Write additional risks and their probability & impact in the blanks provided at the end.

Probability of occurance	Negligible	Minor	Moderate	High	Very high
Symbol	N	MR	MT	H	VH
Given %age	Up to 10%	>10%≤30%	>30%≤50%	>50%≤70%	>70%≤90%

Impact	Negligible	Minor	Moderate	High	Very high
Symbol	N	MR	MT	H	VH
Quality degradation	barely noticeable (10%)	only very demanding applications are affected (20%)	quality reduction requires sponsor approval (30%)	quality reduction unacceptable to sponsor (40%)	project end/item is effectively useless (50%)

Questionnair:

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16	General safety accident occurrence	GSAO		
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18	Occurrence of dispute	OD		
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Environment related risks:

Instructions:

i) Kindly follow the following tables while filling the questionnair.

ii) Write additional risks and their probability & impact in the blanks provided at the end.

Probability of occurance	Negligible	Minor	Moderate	High	Very high
Symbol	N	MR	MT	H	VH
Given %age	Up to 10%	>10%≤30%	>30%≤50%	>50%≤70%	>70%≤90%

Impact	Negligible	Minor	Moderate	High	Very high
Symbol	N	MR	MT	H	VH
Given %age cost increase	Up to 5%	>5%≤10%	>10%≤20%	>20%≤40%	>40%

Questionnair:

			Threat	
Sr#	**Risk describtion:**	**Abbreviation**	**Probability**	**Impact**
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16	General safety accident occurrence	GSAO		
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18	Occurrence of dispute	OD		
19	Price inflation of construction materials	PICM		
20	Serious noise pollution caused by construction	SNP		

Safety related risks:

Instructions:

i) Kindly follow the following tables while filling the questionnair.

ii) Write additional risks and their probability & impact in the blanks provided at the end.

Probability of occurance	Negligible	Minor	Moderate	High	Very high
Symbol	N	MR	MT	H	VH
Given %age	Up to 10%	>10%≤30%	>30%≤50%	>50%≤70%	>70%≤90%

Impact	Negligible	Minor	Moderate	High	Very high
Symbol	N	MR	MT	H	VH
Given %age cost increase	Up to 5%	>5%≤10%	>10%≤20%	>20%≤40%	>40%

Questionnair:

			Threat	
Sr#	**Risk describtion:**	**Abbreviation**	**Probability**	**Impact**
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15	Bureaucracy of government	BG		
16	General safety accident occurrence	GSAO		
17	Inadequate or insufficient site information (soil test and survey report)	ISI		
18	Occurrence of dispute	OD		
19	Price inflation of construction materials	PICM		
20	Serious noise pollution caused by construction	SNP		

Name:

Signature:

Contact#:

LIST OF GOLF ASSOCIATIONS AND GOLF CLUBS AFFILIATED WITH PAKISTAN GOLF FEDERATION		
S.No.	**ADDRESS**	**Telephone/Fax**
PUNJAB GOLF ASSOCIATION		
	Pubjab Golf Association, C/o Defence Raya Golf & Country Club, Plot No.1, Sector-M, Phase-VI, Lahore Cantt	042-36162772, Fax:042-35692743
1	**ATTOCK**	
	Indus Golf Club, C/O 3 Training Battalion, Artillery Centre Attock	057-680-36274, Fax: 33722
2	**BAHAWALPUR**	
	Sunset Golf Club Bahawalpur C/O 35 Punjab Regiment (HAWI), Bahawalpur Cantt	062-0891-6790 (Mil)
3	**DEFENCE RAYA GOLF & COUNTRY CLUB**	
	Defence Raya Golf & Country Club Plot No.1 Sector M, Phase VI Lahore Cantt	042-36162772, Fax:042-35692743
4	**GARDEN CITY GOLF & COUNTRY CLUB**	
	Garden City Golf & Country Club, Main Boulevard Garden City Phase VII, Bahria Town, Rwp	7172500,4492661,Fax: 5730118
5	**GUJRANWALA**	
	Gujranwala Golf & Country Club C/o 23 Cavilry Frontier Force, Gujranwala Cantt	055-269-36721-Mil Fax:055-269-36721
6	**GOTH MACHHI**	
	Goth Machhi Golf Club, C/O Fauji Fertilizer Company Ltd. P.O Goth Machhi-64450, Sadiqabad, Dist Rahim Yar Khan	068-5873001-9 Extn: 3570
7	**JHELUM**	
	River View Golf Club, C/O 14 Field Regt Arty Jhelum Cantt	0544-8041-36721(Mil), 35016
8	**KHARIAN**	
	Kharian Golf Club C/O 11 NLI Regiment, Kharian Cantt	05771-5333 (Mil)
9	**LAHORE GYMKHANA**	
	Lahore Gymkhana Golf Club, Upper Shahraha-e-Quaid-e-Azam Lahore	042-35750301 Fax:042-35756696
10	**LAHORE GARRISON**	
	Lahore Garrison Golf & Country Club, Ch.Amjad Ali Road, Lahore Cantt	042-669932375
11	**LYALLPUR**	
	Lyallpur Golf Club, Race Course Road, Near Stadium, Faisalabad	041-2600573, Fax 041-8727167
12	**MULTAN**	
	Multan Golf Club, C/O 169 (SP) Medium Regt Arty, Multan Cantt	061-531-36721, Fax: 531-38038
13	**MANGLA**	
	Mangla Golf Club, 101 Lite Air Defence, Mangla Cantt	054469936721 Fax:0544-69935400
14	**MIANWALI**	
	Mianwali Golf Club C/o PAF Base Mianwali	0459-3600 (Ext)
15	**MURREE**	
	Chinar Golf Club C/o 30 Signal Battalion, Gharial Camp Murree Cantt	051-41935224, 051-3355598
16	**MUSHAF GOLF CLUB**	
	Mushaf Golf Club, C/o PAF Base Sargodha	048-9505071
17	**OKARA**	

	Garrison Golf Club Okara, C/O 173 Medium Regt Arty, Okara Cantt	044-5030 (Mil)
18	**RAWALPINDI**	
	Rawalpindi Golf Club, Jhelum Road, Rawalpindi	5584830,561-31346 Fax: 5516873
19	**ROYAL PALM GOLF & COUNTRY CLUB, LAHORE**	
	Royal Palm Golf & Country Club, Bungalow 52, Canal Bank Lahore-54840	UAN-111-602-602,Fax: 042-36871965
20	**SARGODHA**	
	Ibex Golf Club Sargodha, C/O 52 Medium Army Air Defence Regt, Sargodha Cantt	Tel: 048-73035467
21	**SIALKOT**	
	Garrison Golf Club Sialkot, 8 Aziz Bhatti Shaheed Road, Sialkot Cantt	Tel: 052-4269373
22	**SHORKOT**	
	Rafiqui Golf Club, PAF Base Shorkot	041-5217, 2511
23	**POF WAH**	
	POF Wah Golf Club, Mahmud Ali Durrani Road, Wah Cantt	051-9314101-20, Extn 22400
24	**PAC GOLF CLUB, KAMRA**	
	PAC Golf Club, Pakistan Aeronautical Complex, Kamra Distt Attock	2256, 2459
	BALOCHISTAN GOLF ASSOICTAION	
	Balochistan Golf Association C/O Quetta Golf Club, Club Road, Quetta Cantt	081-2490-6701 (Mil)
25	**QUETTA**	
	Quetta Golf Club, Club Road, Quetta Cantt	081-6506028, 6701 (Mil)
	FEDERAL GOLF ASSOCIATION	
	Federal Golf Association C/O Islamabad Golf Club, Murree Road, Islamabad	2829320-1
26	**ISLAMABAD**	
	Islamabad Golf Club, Murree Road Islamabad	2829321, Fax: 2829320
27	**PAF ISLAMABAD**	
	PAF Islamabad Golf Club, PAF Complex, E-9 Sector, Islamabad	051-9507979, Fax: 9260890
28	**MARGALLA GREENS GOLF CLUB**	
	Margalla Greens Golf Club, Sector E-8, Naval Complex, Islamabad	Tel: 051-20064443, 20064440
	KHYBER PUKHTOONKHWA GOLF ASSOCIATION	
	Khyber Pukhtoonkhwa Golf Association C/O Peshawar Golf Club, Shami Road, Peshawar Cantt	091-5286820, 9210777 Fax:091-20134700
29	**ABBOTTABAD**	
	Piffer Golf Club C/O Frontier Force Regt Centre (Training Wing), Abbottabad	0992-351-36721, 506507
30	**D.I.KHAN**	
	Dera Ismail Khan Golf Club, C/O Corps of Military Police School & Centre, D.I.Khan Cantt	
31	**KOHAT**	
	Dodha Golf Club, C/O 23FF, OTS Road, Kohat Cantt	0922-521-35369 (Mil)
32	**MARDAN**	
	Punjab Golf Club, C/O Punjab Centre, Mardan Cantt	0937-63028 (Mil)
33	**NOWSHERA**	

	River Side Golf Club, C/O Sup Training Bn ASC Centre, Nowshera Cantt	0923-3754, 0923-6836702 (Mil)
34	**PAF PESHAWAR**	
	PAF Golf Club Peshawar, Shami Road, Peshawar Cantt	091-5275805
35	**RISALPUR**	
	PAF Academy Golf Club C/O PAF Academy Risalpur	456469 -PAF
36	**CEDAR GOLF RESORT**	
	Cedar Golf Resort Swat, C/o 26 Cavilry (MUSTANGS) Kabal ,Swat	0946-8711-36601, Fax: 755026
37	**TARBELA**	
	Tarbela Golf Club, Tarbela Dam Colony, Dist Hripur, N.W.F.P	660571
	SINDH GOLF ASSOCIATION	
	Sindh Golf Association C/o Karachi Golf Club (Pvt) Limited, PNS Karsaz Habib Ibrahim Rahimtullah Road, Shahrah-e-Faisal P.O.Box 2003- Karachi-75350	021-99240200-1 Fax: 021-99240251
38	**ARABIAN SEA & COUNTRY CLUB KARACHI**	
	Arabian Sea & Counrty Club Limited, Bin Qasim P.O. Pakistan Steel, Karachi	021-34729301- 4 Fax 021-34729214, 34724111
39	**AIRMEN GOLF COURSE**	
	Airmen Golf Course PAF Base Korangi Creek Karachi	021-35092001, Fax:021-35090251
40	**DEFENCE HOUSING AUTHORITY , KARACHI**	
	DHA Golf Club, Zulfiqar Street No.1, Phase-VIII, Defence Housing Authority Karachi-75500	021-35845304 & 9, 35340405 Fax: 021-35250462
41	**DREAMWORLD RESORT & GOLF CLUB KARACHI**	
	Dreamworld Resort, Hotel & Golf Club, Dreamworld Tower, 65-AM Strachan Road, Oppsite Arts Council, Behind Sindh Assembly, Karachi	021-36350494, Fax 021-36350503
42	**HYDERABAD**	
	SRC Golf Club, C/O Sind Regimental Centre, Autobahn, Hyderabad	022-2791-33103, Fax:2791-33711
43	**KARACHI**	
	Karachi Golf Club (Pvt) Limited, PNS Karsaz Habib Ibrahim Rahimtullah Road, Shahrah-e-Faisal P.O.Box 2003- Karachi-75350	021-99240200-1, 021-99245186 Fax: 021-99240251
44	**WESTERN WIND GOLF CLUB**	
	Western Wind Golf Club, Weapons & Aammunition Hub River Road, Karachi	021-48509513
45	**PANO AQIL**	
	Mehran Golf & Country Club C/O 24 Sindh Regt (MIB) LAJPAL, Pano Aqil Cantt	071-291-5331