Critical External Risks in International Construction Projects in Pakistan

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By

Afia Razzaq

(NUST201362140MSCEE15413F**)**

Department of Construction Engineering and Management
National Institute of Transportation (NIT)
School of Civil and Environmental Engineering (SCEE)
National University of Sciences and Technology (NUST),
Islamabad, Pakistan.
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This is to certify that the

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Submitted By

Afia Razzaq

(NUST201362140MSCEE15413F**)**

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Dr. M. Jamaluddin Thaheem

Supervisor,

Department of Construction Engineering and Management,
NIT-SCEE, National University of Sciences and Technology (NUST), Islamabad.

This thesis is dedicated to my parents and respected teachers

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ABSTRACT

Managing risk of a construction project is a comprehensive and crucial task that must occur before its commencement. International construction projects face additional risks and thus possess a critical task of assessing and managing them. As the construction industry plays an important role in the socio economic development of any country, international constructors are welcomed to launch the capital ventures for the economic uplift. In doing so, the risk management gains a significant priority on international level for working in the multicultural environment and to achieve project success. During the construction project under International Joint Ventures (IJVs), external risks must be considered significantly hence this will enhance opportunities to complete the project within budget, in a specified time and with the intended quality.

Pakistan is a developing country which can create greater opportunities for international constructors to form JVs with local firms. This gives the importance to the identification and management of the unique or critical external risks that might hinder international contractors/firms to venture in Pakistan. This research determines the critical external risks for cost, quality and time. This study also prioritizes critical external risks discretely for cost, quality and time by using Analytical Hierarchy Process (AHP). It aims at helping the international contractors to form JVs by knowing the trend of critical external risks.

Table of Contents

List of Tables

List of Figures

List of Abbreviations

Cost	= C
Quality	= Q
Time	= T
Joint Ventures	= JVs
International Joint Ventures	= IJVs
Architectural, engineering and construction	= AEC
Gross domestic product	= GDP
Gross national product	= GNP
Analytical Hierarchy Process	= AHP
Multi criteria decision-making	= MCDM

Chapter 1

INTRODUCTION

1.1 Background:

Risk management is very important for all construction projects and its significance rises tremendously in multicultural environment (Jamil et al., 2008). Identification, measurement and management of international business risk are keys to successful international construction business. Multinational contractors are particularly sensitive to quick and abrupt change in the political environment that affects principal elements of their projects (Deng et al., 2014).

International construction projects comprise of Joint Ventures (JVs) that link two organizations. At least one partner of the international joint venture is headquartered outside the host country and these organizations pool their equity and resources for the project. (Geringer, 1988). Such contributions by different firms provide them an opportunity to share their knowledge and experience acquired from previously completed construction projects.

International construction projects are sensitive to world events as these involve political, economic, legal, and cultural and statutory risks. Stakeholders from different political, legal, cultural and economic backgrounds are the participants in international construction projects which enhances the uncertainty level (Bing, 1999) ultimately influences performance of international project (Ozorhon et al., 2007). Hosting construction market is affected by uncertain events eventually effects the business climate and harm the implementation of international projects, thus exposes geopolitical, financial as well as emergent risks to international construction enterprises (Deng et al, 2014).

Pakistan construction industry has experienced a mixed trend of ups and downs in growth during its history. Some megaprojects such as Mangla Dam, Tarbela Dam, AIIAP[1], The Centaurus[2], etc. have involved stakeholders from abroad. Currently, the trend of JVs is on the rise with projects such as JJVL[3], Quaid-e-Azam Solar Power Ltd.[4], Neelum Jhelum Hydropower project, New Islamabad International Airport and many more. This clearly motivates for a study at local level aimed at investigating the external risks faced by such JVs. This study will help in determining the most critical external risks being faced by the international JVs carrying out any project in Pakistan. It will also help in developing a framework for managing international business risks considering Pakistan's current scenario as well as understanding the trend of critical external risks in Pakistan.

1.2 Globally, the role of Construction industry:

Globalization of construction markets allows more local firms to participate in international projects (Han et al., 2005). These projects involve uncertainties emerging from domestic construction industry and the complex risks particular to international business. Firms' intentions to enter in the international market are significantly affected by the lack of understanding of the political, economic, cultural and legal project conditions (Han and Diekmann, 2001). The growth and openness of international construction market has generated progressive prospects for many international engineering and construction firms (Park et al., 2014).

Due to substantial changes in the global economy, business opportunities for architectural, engineering, and construction (AEC) firms throughout the world are enhanced (Hastak and

[1] AIIAP also known as Allama Iqbal International Airport, Lahore, Pakistan. [http://www.lahoreairport.com.pk/]
[2] The Centaurus is a mixed use real estate development in the most prime and central location of Islamabad, Pakistan. [http://www.thecentaurus.com/]
[3] JJVL also known as Jamshoro Joint Venture Limited is Pakistan's premier producer of liquefied petroleum gas [http://www.ag.com.pk/jjvl/]
[4] Quaid-e-Azam Solar Power (Pvt.) Ltd. is a set-up of renewable energy projects particularly Solar Energy Power Projects [http://www.qasolar.com/]

Shaked, 2000). The international construction market allures contractors for more opportunities to enter in international business. Conversely, international projects are susceptible to more types of risks than domestic projects. Often, contractors are threatened by these risks while intending initial entry into international markets (Walewski et al., 2006). They are reluctant because of regional conditions such as currency devaluation, currency exchange restrictions, cultural differences, or changes in law or regulations (Han and Diekmann, 2001).

Due to the internationalization of construction sector, international projects are preferred over the local ones (Berk, 2012). Construction companies preferring international construction projects must identify the risks as early as possible, so they can be managed through suitable strategies before involving in projects (Berk, 2012). Recently, the globalization of construction has strengthened dramatically, driven by the expansion of international investment business. In the global marketplace, many construction companies of varying knowledge and technical ability are always in search of growth opportunities in foreign countries. International projects may provide attractive alternatives, mainly when local markets slow down, and when the significant growth has been experienced in infrastructure of the developing market (Hall et al., 2014). In spite of the development of the local labor and expertise, the international construction continues to grow.

1.3 Construction industry of Pakistan:

Pakistan is a high risk country because of its unstable security situation; political stability index as given by the World Bank in 2013 is -2.59 and economic stability index is 55 according to the Heritage Foundation (MoF, 2014). According to Pakistan economic survey 2013-14, performance of Pakistan is improving quantitatively and qualitatively as the growth is broadly based on almost all sectors of the economy. Growth achievement for 2013-14 is recorded as the highest level since 2008-09 (MoF, 2014). Various national and international organizations appreciated the

achievement and reported that it will increase further in coming years as business climate is improving on fast track. The industrial sector is a major source of tax revenue for the government; it contributes 20.8% in the GDP and remarkable job opportunities for the labor force. Construction sector is done of the potential components of industrial sector. It has registered a growth of 11.31% against a -1.68% growth for the year 2012-2013 (MoF, 2014). Reasons for the growth escalation are rapid execution of work on various projects, increased investment in small scale construction, and rapid implementation of performance based development schemes and other projects of federal and provincial governments.

The construction industry plays an important role in the employment to millions of unskilled, semi-skilled and skilled workforce. Hence, it has become a prime source for enhancing the economy and for controlling the unemployment rate in any region (Khan, 2008). International projects involve diverse risk factors derived from project phases, project types, firm types, and collaboration characteristics (Park et al., 2014).

1.4 Research Problem:

International construction projects invariably involve political, economic, cultural and natural risks which ultimately effect project success (Al-Sabah, 2012). Management of international construction risks is considered as a comprehensive and essential task that must take place before the acceptance of project.

JVs are facing numerous issues/hurdles during the progress of ongoing projects in Pakistan due to the day to day changing conditions and the governmental instability. Another potential issue with joint ventures is overly opportunistic behavior of local partners; they tend to increase their profit margins unrealistically and treat this opportunity as one-time event (Maqsoom et al., 2013). These triggers lead to delays in projects and financial losses, and discourage international constructors to

invest in a country like Pakistan. Ultimately, the hesitant attitude of foreign investors has resulted in slow growth and underdevelopment of local construction industry.

Construction projects are unpredictable by nature. In order to achieve project objectives in terms of time, cost and quality, risk management has become an important process (Zou et al., 2007). Hence, there is a need of identifying critical external risks and their influence on project objectives. Consequently, a prioritization chart of critical external risks will facilitate international firms to join hands with local firms. This study will help to provide a comprehensive understanding of external risks faced by the international contractors during the projects in a developing country. The case of Pakistan will be discussed as the main example.

1.5 Objectives of the Research:

The objective of this research is directly related to the management of external risks faced during International Joint Venture (IJV) project by examining their probability of occurrence and relative impacts on project objectives.

Main objectives are:

- To identify external risks in international construction project.
- To examine the probability of occurrence and the impact of external risks on project objectives of cost, time and quality.
- To determine critical external risks for cost, quality and time.
- To prioritize/formulate a trend of these risks.

1.6 Relevance to National Needs:

Pakistan, a developing country is currently suffering from troubles of law and order, inflation, power crises which are impacting adversely on the construction industry (Maqsoom et al., 2013; Han

et al., 2008). Construction industry plays a vital role in the economic raise and development of any country. Unfortunately, international construction business is not rising as per its potential in Pakistan because firms are not supported by the government and it is a competitive disadvantage for them in the international market.

Research should be carried out to facilitate international firms to invest in Pakistan and provide them a better understanding to cope up with emerging external risks. The understanding coupled with successful management of external risks will provide unique advantage for international firms and therefore creating opportunities in a country.

1.7 Advantages:

This study will broaden the vision of international constructors for commencing construction projects in Pakistan. Current insecurities will be considered and the favorable ranking of the critical external risks will eventually increase the confidence of the investor to initiate by securing the project objectives. As a result of better understanding, international firms may undertake projects in Pakistan by forming JVs with local firms. This will also improve the planning abilities and management capabilities for external risk management while being a part of a joint venture in Pakistan. This will ultimately result in enhancement and development of the construction industry.

1.8 Areas of Application:

The research would be applicable to all construction projects under JVs in Pakistan or to the projects entirely by the international firms.

1.9 Limitations of the research:

This research is limited to determining the influence of critical external risks on traditional success triangle (cost, quality and time), not for all success criteria.

1.10 Summary:

This chapter briefly describes the introduction to risk and risk management in international construction projects. This chapter includes the role of construction industry globally and for the case of Pakistan. Moreover, aim of the research and its benefits to national construction industry are also discussed.

Chapter 2

LITERATURE REVIEW

This chapter focuses on past researches carried on risks faced during International construction projects. This chapter comprises of the basic concepts of risk and risk management, introduction to international joint ventures and the external risks.

2.1 Risk and Risk Management:

2.1.1 Definition of Risk:

Risk occurrence is a usual element in all the construction projects as these involve diverse factors that intensify the complexity of these projects. Risk is a multifaceted perception; it has different meanings to different people/parties, and it is a concept that varies according to the attitude, experience and viewpoints (Baloi and Price, 2003). All the construction projects are affected by risks and uncertainty regardless of their size. However the size of the project can be one of the reasons for risk emergence. Other factors can be location of the project, technology to be used, speed of construction, complexity of the project, and understanding of the work (Dey and Ogunlana, 2004). In case of international construction project, deficient knowledge about the host country is also considered as the major risk causing factor (Zhi, 1995). Risk has been defined, classified and interpreted from various perspectives.

Risk is defined as:

"Likelihood of occurrence and the degree of impact of a negative event adversely affecting an activity" (Chapman, 2001).

"A combination of the probability, the severity, and the exposure of all hazards of an activity" (Jannadi and Almishari, 2003).

"A threat to project success, where the final impact upon project success is not certain" (Barber, 2005).

2.1.2 Risk management:

Risk management is a critical factor to successful project management, as projects tend to be more complex and competition is increasingly getting tougher and tougher. There is a direct relationship between effective risk management and project success. Risks are assessed by their potential effect on the objectives of the project (Baloi and Price, 2003). Uher (2003) described risk management as:

"A systematic way of looking at areas of risk and consciously determining how each should be treated. It is a management tool that aims at identifying sources of risk and uncertainty, determining their impact, and developing appropriate management responses."

Timely completion of the construction project within the specified budget requires proficient risk management. Risk management is a formal and orderly process of systematic identification, analysis and risk response strategies throughout the project life-cycle in order to obtain the optimum degree of risk elimination, mitigation and control (Wang et al., 2004).

Complex construction projects are difficult to manage as they require specials skills and techniques. More risks are involved in the construction industry than other industries due to unique features of construction activities like long period, complex processes and environment, financial intensity, and varied organizational structures. Construction business possesses a very complex and dynamic nature leaving all the participants vulnerable to high degree of risks. Therefore, a

management discipline is required, with goals to protect the reputation, assets and profits of joint ventures by reducing the possibility of the occurrence of losses and damages (Bing et al., 1999). The success of the international projects is significantly based on the management of the risks arising from the host country along with the project-specific risk factors. Successful risk management requires identification, construction of a risk model to be used for assessing the extent of risks and application of response strategies so that an acceptable risk-return balance can be achieved (Dikmen et al., 2007). The risk identification in an inexperienced environment and lack of information about the host country makes the risk management more complicated and critical in an international construction project (Zhi, 1995).

2.2 Introduction to Joint Ventures:

Joint ventures (JVs) are gaining popularity because of their importance in global competition (Ozorhon et al., 2007). Norwood and Mansfield, (1990) defined joint venture as the commercial contract between two or more organizations for the ease of work and cooperation facilitating the achievement of a common goal, by the handling their appropriate resources perceptively. Ozorhon et al. (2007) suggested that while collaborating for a project, all ambiguities between owner and joint ventures must be removed and duties, liabilities, and responsibilities are to be clearly stated to different parties involved, at the start of the project. Allocating risks to the right party i.e. the one who can resolve this risk efficiently can reduce the loss.

2.3 Overview to International Joint Ventures Construction:

Internationally, construction business is getting more competitive due to the complexity of clients requirements and technology advancement. This forces construction organizations to form alliances at various stages to stay in business in this competitive era. They do so by increasing their productivity. In developing countries, international construction companies are progressively

entering in form of joint ventures with native companies in order to discover profiting opportunities abroad. Mostly joint ventures offer profits but it needs to be tackled intelligently for many complexities emerging due to the interaction of number of companies from different regions/countries. It requires a proficient management of political matters, cultural and legal issues, national economic environments, and technical and managerial skills (Ahiaga-Dagbui et al. 2011).

Ozorhon et al. (2007) defined international joint venture (IJV) as a joint venture that involves at least two organizations that contribute equity and resources to a semi-autonomous, legally separate entity with at least one partner headquartered outside the JV's country of operation. Joint Venture formation offers unique opportunities by the combination of characteristic capabilities and the complementary resources of contributing firms. International joint venture is not a new happening in international business (Ozorhon et al. 2007).

International joint ventures (IJVs) undertaking is a great opportunity for broader access to the local market and engineering consultants. Some other advantages are improved capabilities of carrying out work, ability for selecting suitable staff from external market, broadened capabilities, exploring new areas of the world, minimizing the risks and maintaining manageable international workload (Ozorhon et al. 2007). International construction projects are vulnerable to international business risks while operating in other countries.

2.4 International Construction Risks:

International construction risks have been defined differently by different authors. These risks include all possible risks that might occur during the project span. The project success is dependent on the combination of all risks, response strategies for mitigation of these risks and the managing ability of the project team (Dikmen et al., 2007). The types of risks involved are mainly dependent

on nature of the project: local or international. International projects are more exposed to external risks such as lack of awareness of social conditions, political and economic problems, regulatory frameworks, procedural formalities, and supervision problems. These risks are more considerable in international risks (Flanagan and Norman, 1993).

International joint venture construction projects are difficult to manage and complicated in the context to involvement of stakeholders from different cultures and regions (Jamil et al., 2008). International construction projects are much riskier than domestic construction projects as the international environment encounters diverse variables that are not necessarily the part of domestic projects (Gunhan and Arditi, 2005). To encounter all these problems it is preferred to understand and identify risks at early stages in order to reduce their negative impact to minimum (Wang et al., 2004). The performance of the international construction project is based on risks related to openness to foreign business and new ventures such as the government's restriction, sociopolitical conditions, and a country's political and social system (Park H., et al., 2014).

According to Dikmen et al., (2007), the success of international construction projects is sensitively based on the host country's economic, political and legal factors as well as international relations and cultural differences. The experience of the company and existing contracts clauses about country risks allocation between parties are the primary factors that affect the magnitude of country risks. The experience of company personnel assists the proficient manageability of risks. Similar projects may have different risks characteristics based on varying culture, society, economic and political conditions. Therefore, there are no universal categories of international risks (Nawaz and Hood, 2005). Risks for the international projects have been categorized differently by a number of researchers.

2.5 Classification of Risks:

General types of risks for any international construction projects can be classified into following types. Miller (1992) classified the international risks into five types: political, governmental, natural, societal and legal .Broadly international project risks are categorized into *internal* and *external* risks (Zhi, 1995; Songer et al., 1997; Al-Sabah, 2012). Internal risks are those which are within the control of clients, consultants and contractors. While external risks include risk elements which are beyond the control of key stakeholders (Banaitiene and Banaitis, 2012).

According to Bing et al. (1999), the categories that must be considered for international construction project are: political and legal, economic and industrial, societal, and the physical conditions. Political risks contain both societal and legal risks (Al-Khattab et al., 2007). Baloi and Price (2003) identified main global risk factors as political, economic, design, level of competition, construction-specific risk and fraudulent practices. They suggested that global risk factors are more risky to the contractor for any construction project, especially in developing countries. Economic risks such as inflation and the exchange rate are strongly affected by the host country's stability conditions and economic policies, so these must be considered from a political point of view (Dey and Ogunlana, 2001).

2.6 Identification of External Risks:

The external risks are defined as those changeable factors related to the national market or the local construction industry that influence the project significantly (Zhi, 1995). Al-Sabah (2012) explained further as external risks are beyond the control of the project team and related to natural environment. External risks faced by the foreign firms while undertaking construction project in a joint venture should be the main focus of the international contractors because these risks cannot be managed by the project team. International contractor should remain vigilant to the critical

variables, including host country's government stability, efficiency of legal system, social concerns, racism, currency stability and uncertainty of policies (Xiaopeng & Pheng, 2013).

After the extensive literature review, 57 external risk factors were identified that affect the international construction projects. A total of 50 research publications were studied for identification of risk factors, which were published from 2000 to 2014. Analysis of these published research papers identifies 57 external risks factors which may affect the international construction projects as shown in Table 2-1.

Table 2-1 Identified factors with their references

S. No.	External Risk factor	References		
		2000-2004	**2005-2009**	**2010-2014**
1.	**Altered contract forms**			1) Ozorhon et al., 2010 2) Al-Sabah, 2012
2.	**Authorities and regulations requirements**			1) Al-Sabah, 2012
3.	**Behavior of contractors**	1) Fang et al., 2004	1) Fan and Fox , 2009	1) Adnan et al., 2012, 2) Xiaopeng & Pheng, 2013, 3) Deng et al., 2014.
4.	**Change in government policies**	1) Wang et al., 2000 2) Frynas et al., 2003 3) Baloi & Price, 2003	1) Ozorhon et al., 2007 2) Ling & Hoang, 2009	1) Xiaopeng & Pheng, 2013
5.	**Civil war/ revolution/ political Violence**	1) Frynas et al., 2003 2) Tareq 2004 3) Brick 2004	1) Al-Khattab et al., 2007	1) Anchor and Benešová, 2013 2) Park et al., 2014
6.	**Criminal acts**		1) El-Sayegh, 2007	1) Chan et al., 2011

7.	**Changing social concern**		1) Javernick-Will et al., 2009	1) Zhang, 2011
8.	**Currency inconvertibility**	1) Hastak & Shaked, 2000 2) Wang et al., 2004		1) Anchor and Benešová, 2013
9.	**Complicated bureaucratic system**	1) Pheng & Leong, 2000 2) Wang et al., 2004	1) Ling & Hoang, 2009	
10.	**Corruption/bribery or fraud among employees**	1) Pheng & Leong ,2000 2) Wang et al., 2000 3) Shen et al., 2001 4) Frynas et al., 2003	1) Gunhan & Arditi, 2005 2) Suen et al., 2007.	1) Zhang, 2011 2) Chan et al., 2011 3) Adnan et al., 2012 4) Park et al., 2014
11.	**Degree of stability of government**		1) Ling & Hoang, 2009	1)Xiaopeng & Pheng, 2013
12.	**Delayed payments**		1) Chen and Li, 2006 2)Ling and Lim 2007	
13.	**Delay in approval**	1) Wang et al., 2000 2) Shen et al., 2001	1) El-Sayegh, 2007 2) Javernick-Will et al 2009	1) Chan et al., 2011
14.	**Different policies in local and central government**		1)Ozorhon et al., 2007	1)Xiaopeng & Pheng, 2013 2)Park et al., 2014
15.	**Difference of law or regulations**			1) Zhang, 2011
16.	**Dispute with construction labor**	1) Campbell, 2002		1) Zhang, 2011, 2) Park et al., 2014
17.	**Diversification of the firm**		1) Han et al., 2007 2) Alon & Herbert, 2009	1) Deng et al., 2014
18.	**Experiential knowledge of the political risks**	1) Frynas et al., 2003		1) Xiaopeng & Pheng, 2013.

				2) Deng et al., 2014
19.	**Expropriation/ confiscation**	1) Wang et al., 2000 2) Minor J. 2003 3) Hood & Nawaz, 2004	1) Al-Khattab et al. 2007	1) Chan et al., 2011 2) Anchor and Benešová, 2013
20.	**Existence or reemergence of silo mentality/ Reluctance to share information**	1) Kleffner et al., 2003	1) Simkins, 2008	1) Zhao et al., 2014
21.	**Fluctuations in exchange rates**	1) Dey and Ogunlana, 2001 2) Chua et al., 2003 3) Baloi & Price, 2003 4) Wang et al., 2004	1) Xenidis & Angelides, 2005 2) Gunhan and Arditi 2005 3) Ling & Lim, 2007 4) Ozorhon et al., 2007 5) Ling & Hoang, 2009	1) Chan et al., 2011
22.	**Forth coming elections**		1) Shuying Li, 2009	1)Xiaopeng & Pheng, 2013
23.	**Geological systems (earthquake, volcanic eruption, geotechnical issues)**		1) Ling & Hoi, 2006	
24.	**Inability to co-ordinate with other departments**			1) Gupta et al., 2011 2) Zhao et al., 2014
25.	**Inflation**	1) Dey and Ogunlana, 2001 2) Shen et al., 2001 3) Baloi & Price, 2003 4) Wang et al., 2004	1) Gunhan and Arditi 2005 2) El-Sayegh, 2007 3) Ling & Lim, 2007 4) Ozorhon et al., 2007 5) Ling & Hoang, 2009	1) Ozorhon et al., 2010
26.	**Interest rate fluctuations**	1) Wang et al., 2000 2)Shen et al.,	1) Gunhan and Arditi 2005	1) Park et al., 2014

		2001 3) Baloi & Price, 2003	2) El-Sayegh, 2007 3) Ling & Lim, 2007	
27.	**Import and export restrictions**		1) Xenidis & Angelides, 2005 2) Ling & Lim, 2007 3) Al-Khattab et al. 2007 4) Ozorhon et al., 2007 5) Ling & Hoang, 2009	1) Al-Sabah, 2012
28.	**Insufficient legal infrastructure**	1) Shen et al., 2001	1) Business Monitor, 2007 2) Ling & Lim, 2007 3) Ling & Hoang, 2009	1) Chan et al., 2011 2) Adnan et al., 2012 3) Al-Sabah, 2012
29.	**Interference from the opposition parties (in case of government projects)/factional conflicts**			1) Chan et al., 2011 2)Xiaopeng & Pheng, 2013
30.	**Internationalization of the firm**		1) Al Khattab et al.,2007 2) Han et al., 2007	1) Xiaopeng & Pheng, 2013. 2) Anchor and Benešová, 2013 3) Deng et al., 2014
31.	**Labor and material price fluctuations**	1) Baloi & Price, 2003 2) Smith et al., 2004	1) Xenidis & Angelides, 2005 2) El-Sayegh, 2007 3) Ling & Lim, 2007	
32.	**Language or cultural clash (in case of international projects)**	1) Wang et al., 2004	1) Gunhan & Arditi, 2005 2) Ling & Hoi, 2006 3) Javernick-Will et al., 2009	1) Zhang, 2011 2) Park et al., 2014
33.	**Lack of adequate contractual relationship**			1) Zhang, 2011

	between labor and sub-contractors			
34.	**Lack of legal system**		1) Ozorhon et al., 2007	1) Xiaopeng & Pheng, 2013
35.	**Lack of independent judiciary**	1) Shen et al., 2001 2) Wang et al., 2004		
36.	**Level of democracy**			1)Xiaopeng & Pheng, 2013
37.	**Leverage ratio of the subsidiary**	1) Han & Diekmann, 2001	1) Kesternich & Monika,2010	1) Xiaopeng & Pheng, 2013. 2) Anchor and Benešová, 2013
38.	**Localization of firm**		1) Han et al., 2007 2) Alon & Herbert, 2009	1) Xiaopeng & Pheng, 2013. 2) Deng et al., 2014
39.	**Market conditions**	1) Baloi & Price, 2003 2) Wang et al.,2004	1) Ozorhon et al., 2007	1) Chan et al., 2011 2) Karimi Azari et al., 2011
40.	**Nationalism and protectionism**	1) Fang et al, 2004		1) Al-Sabah, 2012
41.	**Organizational culture**	1) Pheng & Leong ,2000		1) Zhao et al., 2014, 2) Deng et al., 2014
42.	**Organizational turf**			1) Zhao et al., 2014
43.	**Permits and licenses**	1) Shen et al., 2001		1) Zhang, 2011 2)Al-Sabah, 2012
44.	**Problems in project planning phase due to policy changes**	1) Shen et al., 2001		1) Zhang, 2011
45.	**Public acceptance to project**	1) Baloi & Price, 2003.		1)Xiaopeng & Pheng, 2013 2) Deng et al., 2014b

46.	**Protest demonstrations/ strikes**	1) Baloi & Price, 2003 2) Tareq A. 2004	1) Al-Khattab et al., 2007	1) Karimi Azari et al., 2011.
47.	**Relationship with government**	1) Shen et al., 2001 2) Iankova & Katz, 2003 3) Baloi & Price, 2003	1) Al-Khattab et al., 2007	1) Xiaopeng & Pheng, 2013. 2) Deng et al., 2014
48.	**Relations with power groups**	1) Iankova & Katz, 2003 2) Baloi & Price, 2003	1) Al-Khattab et al., 2007	1) Xiaopeng & Pheng, 2013. 2) Deng et al., 2014
49.	**Religious and ethical strife**	1) Campbell, 2002		1) Zhang, 2011 2) Xiaopeng & Pheng,2013.
50.	**Restrictions on repatriation of funds**	1) Chua et al., 2003	1) Xenidis & Angelides, 2005 2) Ling & hoi, 2006 3) Ling & Lim, 2007	
51.	**Restrictive labor markets**	1) Campbell, 2002		1) Zhang, 2011
52.	**Size of the subsidiary**		1) Oetzel, 2005 2)Alon & Herbert, 2009	1) Xiaopeng & Pheng, 2013. 2) Anchor and Benešová, 2013 3) Deng et al., 2014
53.	**Social relations between various project parties**	1) Pheng & Leong ,2000 2) Fang et al., 2004		1) Zhang, 2011
54.	**Supply of local materials**	1) Baloi & Price, 2003.		1) Park et al., 2014
55.	**Unfairness in tendering**		1) Chen and Li., 2006, 2)Ling and Lim 2007	1) Adnan et al., 2012
56.	**Unforeseen site conditions**		1) El-Sayegh, 2007	

57.	**Weather systems (hurricane, typhoon, flood etc.**	1) Hastak & Shaked, 2000 2) Spence, 2004	1) Ling & Hoi, 2006	

2.7 Classification of External risks:

Classification is based on the nature of the identified risk factor. Identified factors are grouped into 5 categories as per Al-Sabah (2012). These groups are as under:

2.7.1. Political Risks:

International construction projects are usually large projects and more vulnerable to political risks as it might take a few years for completion and the political changes that might affect the progress of the project (Ling & Hoi, 2006). Political risks are usually overlapped with the country risk, calling for the need of a clear distinction to be made. All social, cultural, political and economic risks faced by a firm while operating in a particular country are the country risks whereas risks related to government actions or to actions aimed against government are the political risks (Anchor and Benešová, 2013).

Political risks have been defined differently by various researchers focusing on the occurrence of an event and its influence on the task.

Prast and Lax (1982) explained the political risks as:

"In the generic sense, political risk is the probability that the goals of a project will be affected by changes in the political environment."

Root (1972) defined it as:

"Possible occurrence of a political event of any kind (such as war, revolution, expropriation, taxation, devaluation, exchange controls and import restrictions) at home or aboard that can cause a loss of profit potential and/or assets in international business operations."

Political risks are considered as an important part of international business although it is difficult to define in figures. Instability and risk is clearly distinct, taking stability as an observable entity that affects the property of firm or any serious damage to a company's asset caused by a new government legislation. Risk is intangible with lots of expectations regarding potential future instability having market value to determine futuristic earnings (Frynas et al. 2003)

The national and international political environments are realities of life. Likewise, the urge of economic productivity and the value of international trade are also facts of life. Entities or small national organizations are individually insignificant either to affect their environment directly or to be selected as special targets by the political forces. If the political environment is fragile, it is in the self-interest of the individual or small firm to do some basic political predictions earlier (Niebling and Shubik, 1982).

Relationship with host government was found as one of main reason of political risks by Al-Khattab et al. (2007) and Deng et al. (2014). The public construction sector can be directly influenced by the host government when they set rules for contractual relationships and development (Henroid et al., 1984). The problematic environment indirectly affects the public sector construction (Iankova and Katz, 2003). Therefore, the relations with the host government impacts significantly on the project. Establishment of stable and durable relationship with the host government can effectively mitigate political risks (Shen et al. 2001).

Good relationship with the host government, prevents International contractors from discrimination by the government (Deng et al. 2014). Good relationship also helps in obtaining up-to-date information about government policies and plans (Ling and Hoang, 2010). Adequate compensations and negotiation with the government is possible through good relations with the host government (Deng et al. 2014).

In international construction projects misconduct of contractors is considered one of the most important source of political risk. The misconduct of contractors such as environmental pollution, accidents and violations of worker's rights, natives' discrimination, limited social protection and unfair labor practices are violence causative acts (Deng et al., 2014)

2.7.2. Economic risks:

Macroeconomics conditions are the elements in determining the overall performance of construction industry and likewise for International Joint Ventures (IJV) (Bing et al., 1999). Companies intend to venture for international project in order to achieve remarkable financial reward. But this can also lead to bankruptcy if economic factors are not managed skillfully (Kangari, 1995). The inconstant economy, repayment situations in manufacturing sphere, and funding and inflation in the country, defines the economic risks (Zavadskas et al. 2010).

In international construction projects of East Asia, one of the main cause of budget overrun is the fluctuation in exchange rates (Chua et al., 2003). Wang et al. (2004), found that joint ventures consideration for risks arising from the fluctuation of exchange rates varies from company to company. A loss in profit margin occurs as a result of unfavorable change in exchange rate i.e. payment in one currency while production cost is in another currency (Xenidis and Angelides, 2005). The risk of exchange rate fluctuation can be reduced by managing a sufficient cash reserves for working capital, clear contractual provisions for method of payment with agreed exchange rate, and currency of payment and the consultant's exposure to exchange rate fluctuation can be reduced by using front-end loaded payment scheme (Ling and Hoang, 2009).

Ozorhon et al., (2010) considered inflation as an important factor that affects the overall performance of International joint ventures and also the construction industry. Many studies resulted that escalation in inflation rate affects the risk of the construction project (Lam and Chow

1999; Bing et al., 1999; Shen et al., 2001; Wang et al., 2004). Risks of inflation can be avoided by agreeing on adequate contingency in project budget and setting alternative provisions in contract, in case of significant price fluctuation (Ling and Hoang, 2009).

Interest rate is a basic factor in determining the intensity of a debt and internal rate of return, through which the feasibility, construction and operation of a project is affected (Lam and Chow, 1999). An increase in the production cost might be resulted from the economic conditions in the host country (Xenidis and Angelides, 2005). The prices of labor and materials increase with the demand of construction work, ultimately expanding the gap between demand and supply (Chen, 1997). Labor and material costs may become volatile while a host country is experiencing economic reforms (Smith et al., 2004).

Restrictions on imports and exports may be imposed because of insufficient trade balance of the host country (Ling and Lim, 2007). When the project is contracted by joint ventures and design is completed by foreigners, the risk of importing including long lead times and delays in delivery and customs clearance is faced due to unfamiliarity of designer with available materials in host country construction market (Ling and Hoang, 2009). In many countries, it is common to raise tariffs for imported products or restrictive permission for imports of certain products (Xenidis and Angelides 2005).

Repatriation of funds is restricted by the host country and requiring foreign firms to spend their earnings in the host market (Chua et al., 2003). Consequently a loss of profit occurs either preventing misuse of foreign bank accounts privileges or by additional convertibility costs to lift restrictions (Xenidis and Angelides, 2005). Ling and Lim (2007), found that foreign firms can avoid delay in repatriation by providing evidence that tax requirements had been fulfilled.

The economic risks factors could have significant impact on the profit or loss to joint venture. Economic slowdown makes an industry more competitive and also reduces profit for contractor (Bing et al., 1999). Many authors suggested how to deal with economic risks. Wang et al., (2001) suggested that risks of currency fluctuation can be mitigated through proper planning of currency payment in the contract.

2.7.3. Legal Risks:

The strength of the legal system in the host country is vital for the formation and operation of international business. It is the legal system that standardizes the management of conflicts, disagreements, claims, disputes and all contract related problems (Ozorhon et al., 2010). Legal framework, independent judiciary, effective legal system, property rights and intellectual property rights all are considered as the legal issues of a country (Business monitor 2007). Zhaung et al., (1998) found that the most serious threats to foreign firms are the abrupt and frequent changes in laws, current policies and regulations.

In developing countries, foreign firms may come across the insufficient legal infrastructure for administering the legal judgement for resolving problems, inadequacy of laws relating to joint ventures, and unreliable judiciary (Shen et al., 2001). Therefore, foreign firms could not match up with the frequent changes in the law (Ling and Low, 2007). Ling and Hoang (2009) found that the intensity of this legal risk can be decreased by maintaining good relationships and proper networking among local authorities and government officials.

Legal risks can be avoided by an efficient legal system. Zhi (1995) found that common problems in overseas contracting are inappropriate contract forms instead of international standard contract forms, misinterpretation of contractual terms, unfamiliarity with claims and disputes, settlements in contractual provisions and with special local requirements. Legal risks may be caused by

disagreement over flawed contracts documents, inappropriate types of contracts or contractual clauses, and improper tendering procedures (Bing et al., 1999). Ling and Hoang (2009), suggested this type of risk may be mitigated by the exclusion of unpracticed contractual terms and conditions, and by adaptation of conflict-free approach in project execution.

2.7.4. Social Risks:

Social risks are equally important for the risk allocation in any project. The outcome of any project is greatly influenced by political and social pressures from parties which is least interested in the project (Zavadskas et al. 2010). Security issues, different cultures and language barriers, religious and customs backgrounds are included in social risks factors (Bing et al. 1999). Al-Sabah (2012) identified social risks as language barriers, cultural barriers, religious differences and holidays and celebrations.

Holmquist (2008) found that the set of key risk factors can help in reducing expected and unexpected losses, concentrating on proactive risk management rather than reactive and most importantly creating risk awareness and provision of early warning metrics. Zhang (2011), ranked top three critical social risks for international players in construction industry of China as local protectionism, poor social relations with different parties in local region, disputes risks with local construction labor.

2.7.5. Natural/ Environmental Risks:

Environmental risks include natural disasters dealing with weather systems like hurricane, typhoon, flood, etc. and geological systems as earthquake, volcanic eruption and geo-technical issues. The environmental force majeure risk could cause the destruction of facilities, equipment, material and labor death. These risks also have a critical impact on international construction joint

ventures (Bing et al. 1999). Al-Sabah (2012) listed few natural risks as: pestilence, inclement climate, natural catastrophic events, and different time zones.

The classification of identified external risks into 5 groups along with their codes is shown in Table 2-2.

Table 2-2 Grouping of Factors with their IDs

Sr. No.	Group	Risk Factor	ID
1.	Political Risks	Relationship with government	PR01
		Relations with power groups	PR02
		Localization of firm	PR03
		Size of the subsidiary	PR04
		Leverage ratio of the subsidiary	PR05
		Internationalization of the firm	PR06
		Experiential knowledge of the political risks	PR07
		Diversification of the firm	PR08
		Complicated bureaucratic system	PR09
		Interference from the opposition parties (in case of government projects)/factional conflicts	PR10
		Degree of stability of government	PR11
		Change in government policies	PR12
		Level of democracy	PR13
		Different policies in local and central government	PR14
		Forth coming elections	PR15
		Public acceptance to project	PR16
		Delay in approval	PR17
		Expropriation/ confiscation	PR18
2.	Economic Risks	Fluctuations in exchange rates	ER01
		Inflation	ER02
		Interest rate fluctuations	ER03
		Labor and material price fluctuations	ER04
		Import and export restrictions	ER05
		Restrictions on repatriation of funds	ER06
		Market conditions	ER07
		Currency inconvertibility	ER08
3.	Legal Risks	Insufficient legal infrastructure	LR01
		Nationalism and protectionism	LR02
		Authorities and regulations requirements	LR03

		Altered contract forms	LR04
		Lack of legal system	LR05
		Lack of independent judiciary	LR06
4.	Social Risks	Organizational culture	SR01
		Behavior of contractors	SR02
		Delayed payments	SR03
		Unfairness in tendering	SR04
		Dispute with construction labor	SR05
		Religious and ethical strife	SR06
		Permit or license	SR07
		Problems in project planning phase due to policy changes	SR08
		Social relations between various project parties	SR09
		Corruption/bribery or fraud among employees	SR10
		Difference of law or regulations	SR11
		Language or cultural clash (in case of international projects)	SR12
		Restrictive labor markets	SR13
		Changing social concern	SR14
		Lack of adequate contractual relationship between labor and sub-contractors	SR15
		Existence or reemergence of silo mentality/ reluctance to share information	SR16
		Inability to co-ordinate with other departments	SR17
		Organizational turf	SR18
		Protest demonstrations/ strikes	SR19
		Civil war/ revolution/ political violence	SR20
		Criminal acts	SR21
		Supply of local materials	SR22
5.	Natural/ Environmental Risks	Weather systems (hurricane, Typhoon, flood etc.)	NR01
		Geological systems (earthquake, Volcanic eruption, geotechnical issues)	NR02
		Unforeseen site conditions	NR03

After grouping of the identified external risks into 5 categories, frequency analysis is carried out for better understanding. Out of these 50 publications, there are few paper which discuss the

particular type of risk among all external risks. For finding out the criticality of each risk factor, its appearance is checked. Political risks are identified from 26 research publications. Economic, legal, social and natural/environmental risks are identified from 21, 12, 32 and 4 research publications, respectively. As mentioned above some papers are very particular to individual risk while some quote the external risks collectively.

In the next step frequency analysis was carried out in order to have an idea about the relative importance given to each risk by the academic experts and researchers' .This frequency analysis is shown in Table 2-3. Furthermore this analysis also helped in analyzing the criticality of each risk based upon the publishing attention given to each risk. The criticality for factors is relatively low the reason being the handsome maturity of external risks identification and amount of work already being carried out on the said topic. The criticality is the appearance percentage of the risks out of the 50 research papers read on the topic.

Table 2-3 Factors with their frequency and criticality

S. No.	Group	Risk Factor	ID	Frequency	Criticality (%)
1.	**Political Risks**	Relationship with government	PR01	6	12
2.		Relations with power groups	PR02	5	10
3.		Localization of firm	PR03	4	8
4.		Size of the subsidiary	PR04	5	10
5.		Leverage ratio of the subsidiary	PR05	4	8
6.		Internationalization of the firm	PR06	5	10
7.		Experiential knowledge of the political risks	PR07	3	6
8.		Diversification of the firm	PR08	3	6
9.		Complicated bureaucratic system	PR09	3	6

10.		Interference from the opposition parties (in case of government projects)/factional conflicts	PR10	2	4
11.		Degree of stability of government	PR11	2	4
12.		Change in government policies	PR12	6	12
13.		Level of democracy	PR13	1	2
14.		Different policies in local and central government	PR14	3	6
15.		Forth coming elections	PR15	2	4
16.		Public acceptance to project	PR16	3	6
17.		Delay in approval	PR17	5	10
18.		Expropriation/ confiscation	PR18	6	12
19.	**Economic Risks**	Fluctuations in exchange rates	ER01	10	20
20.		Inflation	ER02	10	20
21.		Interest rate fluctuations	ER03	7	14
22.		Labor and material price fluctuations	ER04	6	12
23.		Import and export restrictions	ER05	6	12
24.		Restrictions on repatriation of funds	ER06	4	8
25.		Market conditions	ER07	5	10
26.		Currency inconvertibility	ER08	3	6
27.	**Legal Risks**	Insufficient legal infrastructure	LR01	7	14
28.		Nationalism and protectionism	LR02	2	4
29.		Authorities and regulations requirements	LR03	1	2
30.		Altered contract forms	LR04	2	4
31.		Lack of legal system	LR05	2	4
32.		Lack of independent judiciary	LR06	2	4
33.		Organizational culture	SR01	3	6
34.		Behavior of contractors	SR02	5	10
35.		Delayed payments	SR03	2	4

36.	**Social Risks**	Unfairness in tendering	SR04	3	6
37.		Dispute with construction labor	SR05	3	6
38.		Religious and ethical strife	SR06	3	6
39.		Permit or license	SR07	3	6
40.		Problems in project planning phase due to policy changes	SR08	2	4
41.		Social relations between various project parties	SR09	3	6
42.		Corruption/bribery or fraud among employees	SR10	10	20
43.		Difference of law or regulations	SR11	1	2
44.		Language or cultural clash (in case of international projects)	SR12	6	12
45.		Restrictive labor markets	SR13	2	4
46.		Changing social concern	SR14	2	4
47.		Lack of adequate contractual relationship between labor and sub-contractors	SR15	1	2
48.		Existence or reemergence of silo mentality/ reluctance to share information	SR16	3	6
49.		Inability to co-ordinate with other departments	SR17	2	4
50.		Organizational turf	SR18	1	2
51.		Protest demonstrations/ strikes	SR19	4	8
52.		Civil war/ revolution/ political violence	SR20	6	12
53.		Criminal acts	SR21	2	4
54.		Supply of local materials	SR22	2	4
55.	**Natural Risks**	Weather systems (hurricane, Typhoon, flood etc.	NR01	3	6
56.		Geological systems (earthquake, Volcanic eruption, geotechnical issues)	NR02	1	2
57.		Unforeseen site conditions	NR03	1	2

It is observed from research publications during 2000-2014, that political and social risks were considered more as compared to economic, legal and natural risks. Therefore, an extensive literature is available on political and social risks during the described time period. From the frequency analysis, risk factors are prioritized on the basis of the literature. In Table 2-4, ranking is done on the bases of top 5 criticalities, through which we get top 22 external risks. See Table 2-2 for risk factors.

Table 2-4: Ranking of identified external risks

Ranking	Risk Factor ID	Number of risks	Criticality (%)
1	ER01, ER02	3	20
	SR10		
2	ER03	2	14
	LR01		
3	PR01, PR12, PR18	7	12
	ER04, ER05		
	SR12, SR20		
4	PR02, PR04, PR06, PR17	6	10
	ER07		
	SR02		
5	PR03, PR05	4	8
	ER08		
	SR19		

2.8 Yearly identification of the factors:

After the risks are arranged as per their criticality the next step in systematic literature review was to organize the literature. For doing so the risks were arranged as per their year of identification.

This led to having a holistic view of the risks as and when they were identified in order to systemize the research process. The yearly distribution is shown in Table 2-5.

Table 2-5: Yearly appearance of the factors

S. No.	Group	Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
1.	Political Risks	PR01		✓		✓				✓						✓	✓
2.		PR02				✓				✓						✓	✓
3.		PR03								✓		✓				✓	✓
4.		PR04						✓				✓				✓	✓
5.		PR05		✓									✓			✓	
6.		PR06								✓						✓	✓
7.		PR07				✓										✓	✓
8.		PR08								✓		✓					✓
9.		PR09	✓				✓					✓					
10.		PR10												✓		✓	
11.		PR11										✓				✓	
12.		PR12	✓			✓				✓						✓	
13.		PR13														✓	
14.		PR14								✓						✓	✓
15.		PR15										✓				✓	
16.		PR16				✓										✓	✓
17.		PR17	✓	✓						✓		✓		✓			
18.		PR18	✓			✓	✓			✓				✓		✓	
19.		ER01		✓		✓	✓	✓		✓		✓		✓			
20.		ER02		✓		✓	✓	✓		✓		✓	✓				
21.		ER03	✓	✓		✓		✓		✓							✓
22.		ER04				✓	✓	✓		✓							✓
23.		ER05						✓		✓		✓			✓		
24.		ER06				✓		✓	✓	✓							
25.		ER07				✓	✓			✓				✓			

26.	Economic Risks	ER08	✓				✓									✓	
27.	Legal Risks	LR01		✓						✓		✓		✓	✓		
28.		LR02					✓								✓		
29.		LR03													✓		
30.		LR04											✓		✓		
31.		LR05								✓						✓	
32.		LR06		✓			✓										
33.	Social Risks	SR01	✓														✓
34.		SR02					✓					✓			✓	✓	✓
35.		SR03							✓	✓							
36.		SR04							✓	✓					✓		
37.		SR05			✓									✓			✓
38.		SR06			✓									✓		✓	
39.		SR07		✓										✓	✓		
40.		SR08		✓										✓			
41.		SR09	✓				✓							✓			
42.		SR10	✓	✓		✓		✓		✓				✓	✓		✓
43.		SR11												✓			
44.		SR12					✓	✓	✓			✓		✓			✓
45.		SR13			✓									✓			
46.		SR14										✓		✓			
47.		SR15												✓			
48.		SR16				✓					✓						✓
49.		SR17												✓			✓
50.		SR18															✓
51.		SR19				✓	✓			✓				✓			
52.		SR20								✓				✓			
53.		SR21								✓				✓			✓
54.		SR22				✓											✓
55.		NR01	✓				✓		✓								
56.		NR02							✓								

57.	Natural Risks	NR03								✓							

After the yearly identification of risk factors, a year-wise chart was developed to observe the identification of new risk factor each year. It is observed that maximum external risks were identified in year 2000, 2001, 2003 and 2007. No external risk factor was identified in year 2008. All economic risks were identified till 2005 later on none of the study recognized any new risk of this category. Due to the considerable importance political and social risks have been identified through the span (2000-2014). In the Figure 2-1 and Figure 2-2, the underlined factors are the factors identified in that respective year. A trend can be observed in the following chart.

2000	2001	2002	2003	2004	2005	2006	2007
Political	Political	Political	Political	Political	Political	Political	Political
PR09, PR12, PR17, PR18	PR09, PR12, PR17, PR18, **PR01, PR05**	PR09, PR12, PR17, PR18, PR01, PR05	PR09, PR12, PR17, PR18, PR01, PR05, **PR02, PR07, PR16**	PR09, PR12, PR17, PR18, PR01, PR05, PR02, PR07, PR16	PR09, PR12, PR17, PR18, PR01, PR05, PR02, PR07, PR16, **PR04**	PR09, PR12, PR17, PR18, PR01, PR05, PR02, PR07, PR16, PR04	PR09, PR12, PR17, PR18, PR01, PR05, PR02, PR07, PR16, PR04, **PR03, PR06, PR08, PR14**
Economic	Economic	Economic	Economic	Economic	Economic	Economic	Economic
ER03, ER08	ER03, ER08, **ER01,ER02**	ER03, ER08, ER01,ER02	ER03, ER08, ER01,ER02, **ER04, ER06, ER07**	ER03, ER08, ER01,ER02, ER04, ER06, ER07	ER03, ER08, ER01,ER02, ER04, ER06, ER07, **ER05**	ER03, ER08, ER01,ER02, ER04, ER06, ER07, ER05	ER03, ER08, ER01,ER02, ER04, ER06, ER07, ER05
Legal	Legal	Legal	Legal	Legal	Legal	Legal	Legal
	LR01, LR06	LR01, LR06	LR01, LR06	LR01, LR06, **LR02**	LR01, LR06, LR02	LR01, LR06, LR02	LR01, LR06, LR02, **LR05**
Social	Social	Social	Social	Social	Social	Social	Social
SR01, SR09, SR10	SR01, SR09, SR10**, SR07, SR08**	SR01, SR09, SR10, SR07, SR08**, SR05, SR06, SR13**	SR01, SR09, SR10, SR07, SR08, SR05, SR06, SR13, **SR16, SR19, SR22**	SR01, SR09, SR10, SR07, SR08, SR05, SR06, SR13, SR16, SR19, SR22, **SR02, SR12**	SR01, SR09, SR10, SR07, SR08, SR05, SR06, SR13, SR16, SR19, SR22, SR02, SR12	SR01, SR09, SR10, SR07, SR08, SR05, SR06, SR13, SR16, SR19, SR22, SR02, SR12, **SR03, SR04**	SR01, SR09, SR10, SR07, SR08, SR05, SR06, SR13, SR16, SR19, SR22, SR02, SR12, SR03, SR04, **SR20, SR21**
Natural	Natural	Natural	Natural	Natural	Natural	Natural	Natural
NR01	NR01	NR01	NR01	NR01	NR01	NR01**, NR02**	NR01, NR02, **NR03**

Figure 2-1: Year-wise factor identification chart (2000-2007)

Political	Political	Political	Political	Political	Political	Political
PR09, PR12, PR17, PR18, PR01, PR05, PR02, PR07, PR16, PR04, PR03, PR06, PR08, PR14	PR09, PR12, PR17, PR18, PR01, PR05, PR02, PR07, PR16, PR04, PR03, PR06, PR08**,** PR14, **PR11, PR15**	PR09, PR12, PR17, PR18, PR01, PR05, PR02, PR07, PR16, PR04, PR03, PR06, PR08, PR14 PR11, PR15	PR09, PR12, PR17, PR18, PR01, PR05, PR02, PR07, PR16, PR04, PR03, PR06, PR08, PR14, PR11, PR15, **PR10**	PR09, PR12, PR17, PR18, PR01, PR05, PR02, PR07, PR16, PR04, PR03, PR06, PR08, PR14, PR11, PR15, PR10	PR09, PR12, PR17, PR18, PR01, PR05, PR02, PR07, PR16, PR04, PR03, PR06, PR08, PR14, PR11, PR15, PR10, **PR13**	PR09, PR12, PR17, PR18, PR01, PR05, PR02, PR07, PR16, PR04, PR03, PR06, PR08, PR14 PR11, PR15, PR10, PR13
Economic	Economic	Economic	Economic	Economic	Economic	Economic
ER03, ER08, ER01,ER02, ER04, ER06, ER07, ER05	ER03, ER08, ER01,ER02, ER04, ER06, ER07, ER05	ER03, ER08, ER01,ER02, ER04, ER06, ER07, ER05	ER03, ER08, ER01,ER02, ER04, ER06, ER07, ER05	ER03, ER08, ER01,ER02, ER04, ER06, ER07, ER05	ER03, ER08, ER01,ER02, ER04, ER06, ER07, ER05	ER03, ER08, ER01,ER02, ER04, ER06, ER07, ER05
Legal	Legal	Legal	Legal	Legal	Legal	Legal
LR01, LR06, LR02, LR05	LR01, LR06, LR02, LR05	LR01, LR06, LR02, LR05, **LR04**	LR01, LR06, LR02, LR05, LR04	LR01, LR06, LR02, LR05, LR04, LR03	LR01, LR06, LR02, LR05, LR04, LR03	LR01, LR06, LR02, LR05, LR04, LR03
Social	Social	Social	Social	Social	Social	Social
SR01, SR09, SR10, SR07, SR08, SR05, SR06, SR13, SR16, SR19, SR22, SR02, SR12, SR03, SR04, SR20, SR21	SR01, SR09, SR10, SR07, SR08, SR05, SR06, SR13, SR16, SR19, SR22, SR02, SR12, SR03, SR04, SR20, SR21, **SR14**	SR01, SR09, SR10, SR07, SR08, SR05, SR06, SR13, SR16, SR19, SR22, SR02, SR12, SR03, SR04, SR20, SR21, SR14	SR01, SR09, SR10, SR07, SR08, SR05, SR06, SR13, SR16, SR19, SR22, SR02, SR12, SR03, SR04, SR20, SR21, SR14 **SR11,SR15, SR17**	SR01, SR09, SR10, SR07, SR08, SR05, SR06, SR13, SR16, SR19, SR22, SR02, SR12, SR03, SR04, SR20, SR21, SR14, SR11,SR15, SR17	SR01, SR09, SR10, SR07, SR08, SR05, SR06, SR13, SR16, SR19, SR22, SR02, SR12, SR03, SR04, SR20, SR21, SR14, SR11, SR15, SR17	SR01, SR09, SR10, SR07, SR08, SR05, SR06, SR13, SR16, SR19, SR22, SR02, SR12, SR03, SR04, SR20, SR21, SR14, SR11, SR15, SR17, **SR18**
Natural	Natural	Natural	Natural	Natural	Natural	Natural
NR01, NR02, NR03	NR01, NR02, NR03	NR01, NR02, NR03	NR01, NR02, NR03	NR01, NR02, NR03	NR01, NR02, NR03	NR01, NR02, NR03
2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**

Figure 2-2: Year-wise factor identification chart (2008-2014)

2.9 Impact of external risks on Project success:

In construction sector, successful project is defined in a unique way. Project performance in terms of time, cost and quality are currently used for measuring its success (Phua and Rowlinson, 2004). These three components of project performance were initially identified by Atkinson (1999), who named it as 'Iron Triangle' as shown in Figure 2-2.

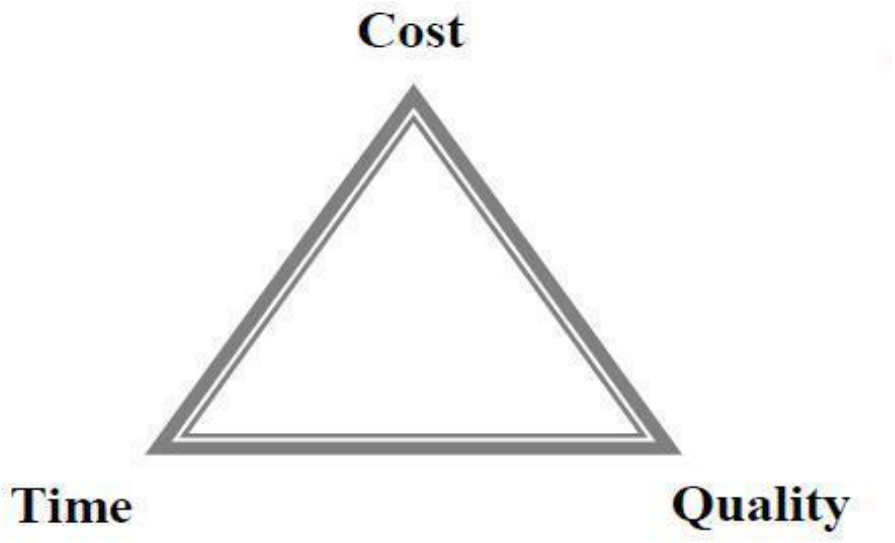


Figure 2-3: Relationship between time, cost and quality

Large construction project are unprotected from uncertain environment due to involvement of different stakeholders at different phases of the construction project. Stakeholders involved in planning, design and construction complexity, for the availability of resources are client, consultant, contractor, suppliers etc. (Banaitiene and Banaitis, 2012).

International joint venture construction projects are prominently affected by the external risks, and it affects both local and international partner. Relation with the host government is a critical risk for both local and international partner. Typically government is the principal client for

international contractors in developing countries. Poor relations with the host government can have adverse impacts upon the project (Deng et al., 2014). Ultimately it effects some of the project objectives.

2.10 Summary:

This chapter covers the literature review on International construction and related risks and eventually their effect on project success. It also focuses on external risks emerged as a hurdle in achieving project success. External risks were identified through the extensive literature review and then further grouped into 5 groups. Frequency analysis was carried out to prioritize the external risks on the bases of literature. A year-wise trend was obtained to observe the identification of several external risks year-wise.

Chapter 3

RESEARCH METHODOLOGY AND DESIGN

This chapter thoroughly explains the research methodology and the steps that are taken to propose it. Initiating from the literature collection to formulating a trend of external risk factors in Pakistan, it involves the study tools used, methods of data collection employed, and the data analysis tools applied. Interviews and questionnaire are the main source of information gathering.

3.1 Methodology:

As per the plan, an introductory study of the topic was performed at the beginning, followed by a comprehensive literature review. Different questionnaires and interview guides from the studies related to this topic were explored and studied. Based on their input, the particular interview questions for this study were formulated. The schematic plan of the research is shown in Figure 3-1.

After the literature review a comprehensive list of external risk factors was developed those emerged through the International joint ventures construction projects eventually affects the cost, quality and time; three of the project success criteria. The method of factor identification was mainly focused on literature review. A frequency analysis was done through which top 22 external risks were obtained. In the next step, a survey was conducted through a specially designed questionnaire to know about the risk knowledge of both, the local and international firms progressing in Pakistan.

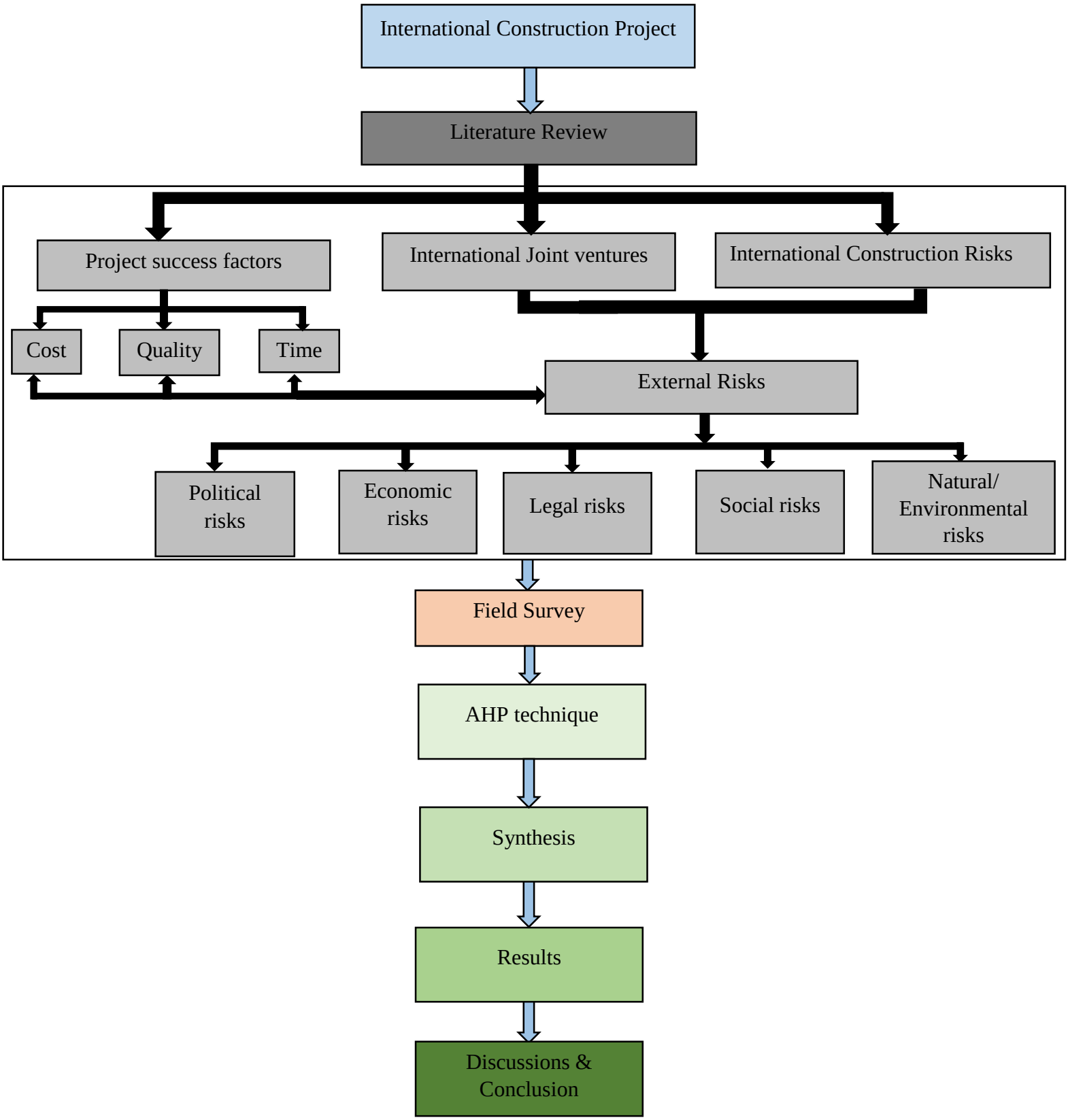


Figure 3-1: Schematic plan of the research

3.2 Data Collection:

3.2.1 The Questionnaire:

After risk identification, comprehensive surveys were developed for the evaluation of each risk factor from the perspective of multinational firms working on international construction projects. Questionnaire was broken down into four main sections.

The first section gathers general information about the organization/ firm such as type of the firm, role of the firm, experience of the firm then its local and international experience. The respondents include constructors from different countries of the world, joint venturing in Pakistan.

The second section contains the participant's knowledge about risk and risk management and their consideration of external risks while joint venturing in Pakistan. And how influential are external risks in achieving project financial objectives, completely on schedule and according to specifications.

In the third and fourth sections, the participants were requested to rate probability for all the 57 identified external risks as well as their impact on project cost, quality and time. Questionnaire survey was conducted for all 57 identified factors instead of concentrating only on top 22 external risks obtained from literature review in order to have a broader opinion about external risks being faced in case of Pakistan. In the next half question was asked to apprehend the influence of external risks on C, Q and T in attaining project success. The impact of each individual external risk on C, Q and T was asked on a Likert scale of 1-5, where 1= very low impact and 5= very high impact. This questionnaire has been shown in Appendix 1. After the field survey was completed, analysis was carried out to figure out critical external risks and lastly the analytical hierarchy process (AHP) was applied upon this data acquired.

3.3 AHP Introduction:

Analytical hierarchy process helps to establish decision models through a process that contains both qualitative and quantitative components. Qualitatively, it helps to decompose a decision problem from the top overall goal to a set of manageable clusters, sub-clusters, and so on down to the final level that usually contains scenarios or alternatives. The clusters or sub-clusters can be forces, attributes, criteria, activities, objectives, etc. Quantitatively, it uses pair-wise comparison to assign weights to the elements at the cluster and sub-cluster levels and finally calculates 'global' weights for assessment taking place at the final level. Each pair-wise comparison measures the relative importance or strength of the elements within a cluster by using a ratio scale. One of the main functions of AHP is to calculate the consistency ratio to ascertain that the matrices are appropriate for analysis (Saaty, 1988).

3.3.1 AHP Methodology:

The main objective of this study is to prioritize the critical external risks for keeping the project within budget, within schedule and according to the prescribed specifications. Multi-criteria decision-making (MCDM) technique is very beneficial in solving complex problems that cannot be solved directly. The important rule of using MCDM is that the solution should be based on simple criterion that is by considering more than one attribute (Cheng et al., 2005). As there are numerous risk factors that contributes to more than one criteria of project success.

AHP is a mathematical decision-making technique introduced by (Saaty, 2008) to solve complex decision-making problems that are ambiguous and complex (Yang and Huang, 2000). AHP helps in disintegrating the complex problem into a hierarchy of simple factors and sub-factors and with the help of a comparative analysis, it makes their measurement easier (Saaty, 1988). One of the most important features of AHP is that it can be applied to both subjective and objective kinds of

problem (Saad, 2001). The main objective behind the development of this technique was to decompose a compound, multi-criteria problem into different levels of hierarchy with the top level of hierarchy as the goal or objective of the problem, middle level as the criteria and sub-criteria and the lowest level as alternative design in a hierarchy structure (Saaty, 1988). Current literature provides an idea about the use of AHP particularly in ranking and priority of different criteria and sub-criteria (Chin and Pun, 2002).

3.3.2 AHP steps:

The steps of the AHP are as follows.

Step 1:

The 1st step is to define and state the objectives of the complex and ambiguous problem clearly. So accordingly the goal for this research is to figure out the success factor which is more affected by any given critical risk factor.

Step 2:

The multifaceted problem is decomposed into a hierarchal structure with the help of group decision or survey technique. The hierarchal structure is divided into multiple levels. The top level hierarchy represents the goal of the problem which is the evaluating the success of international construction projects. This goal is sub-divided into various criteria in the next level. In the current research, the criteria align with the project success criteria of cost, time and quality. The criteria are further divided into sub-criteria levels which highlight the details of the criteria. This research recognizes all the critical external risk factors as sub-criteria of analysis.

Step 3:

To illustrate the importance of one criterion over other, a pairwise comparison can be made through decision matrix. With the help of decision makers and experts, the decision making matrix is constructed on the basis of (Saaty, 1994) nine point scale. In the hierarchal structure, the elements which underlie the common node are compared with the other elements of the same node. For example, if there are "n" elements under the node, then n (n-1)/2 comparisons takes place under that node.

Let there are X1, X2, X3, ….., Xn elements under the node "M" and their numerical weights are w_1, w_2, w_3, …. w_n. The pairwise comparison of these elements in accordance to their relative weights are shown in the form of a matrix, where Z is the comparison matrix (n x n) which represents pairwise comparisons among the elements X_1, X_2, X_3, ….. X_n:

$$Z = \begin{array}{c} \\ X_1 \\ X_2 \\ \vdots \\ X_n \end{array} \begin{array}{c} \begin{array}{cccc} X_1 & X_2 & \dots & X_n \end{array} \\ \begin{bmatrix} \frac{w_1}{w_1} & \frac{w_1}{w_2} & \dots & \frac{w_1}{w_n} \\ \frac{w_2}{w_1} & \frac{w_2}{w_2} & \dots & \frac{w_1}{w_n} \\ \vdots & \vdots & \vdots & \vdots \\ \frac{w_n}{w_1} & \frac{w_n}{w_2} & \dots & \frac{w_n}{w_n} \end{bmatrix} \end{array}$$

$$Z = \begin{array}{c} \\ X_1 \\ X_2 \\ \vdots \\ X_n \end{array} \begin{array}{c} \begin{array}{cccc} X_1 & X_2 & \dots & X_n \end{array} \\ \begin{bmatrix} a_{11} & a_{12} \dots & a_{1n} \\ a_{21} & a_{22} \cdots & a_{2n} \\ \vdots & \vdots \ \vdots & \vdots \\ a_{n1} & a_{n2} \cdots & a_{nn} \end{bmatrix} \end{array}$$

Where aij = wi/wj (i, j = 1, 2 … n) represents the quantified comparative importance among the pair of elements X_i and X_j. If i =j then $a_{ij} = 1$ and $a_{ij} = 1/a_{ji}$ for $a_{ij}>0$.

Step 4:

After the formation of decision making matrix, the next step is to identify the priority weights of the elements through the maximum eigenvectors and eigenvalues.

According to (Saaty, 1994): λ_{max}

$$\boldsymbol{\lambda_{max} = \sum_{j=1}^{i} a_{ij} \frac{W_j}{W_i}}$$

Step 5:

The consistency of the pairwise comparisons is checked in this step. In the pairwise comparison, the inconsistency is measured by consistency index (CI) and the coherence is measured by consistency ratio (CR) and is computed with the help of given formula:

$$\boldsymbol{CI = \frac{\lambda_{max} - n}{n - 1}}$$

$$CR = \frac{CI}{RI}$$

Where n is the rank of matrix and random index (RI) which is the CI of matrices which are generated randomly. The maximum acceptance limit of CI and RI is 0.1 (Saaty, 1994). If the values are more than 0.1, it will highlight that the pairwise comparison is inconsistent and hence

discarded. For different values of ‘n’, the respective values of RI are depicted in the Table 3.1 (Saaty, 1994):

Table 3-1 Respective values of RI

N	2	3	4	5	6	7	8	9
RI	.00	.58	.90	1.12	1.24	1.32	1.41	1.45

Step 6:

After identifying the priority weights of each elements, that are local weights of elements, the next step is to identify the global weights of all elements with respect to the goal defined in the AHP model.

Step 7:

Finally, after calculating the global weights, all the elements are rearranged in the decreasing order according to the global prioritization.

3.4 Summary:

This chapter has discussed the research methodology and the technique to be used for analysis. The methodology of the applied technique, AHP is also described in detail which results in the prioritization of risks; therefore achieving the goal of the research and the results were compiled as shown in the following chapter.

Chapter 4

RESULTS AND SYNTHESIS

This chapter explains the results deduced from both questionnaire surveys. First half of the questionnaire consists of the organizational information. It gives information about the type, role and local and international experience of the organization/firm. Second half comprises of the questions based on external risks. Then analysis is done and results are obtained. This chapter sums up with the achievement of research objectives.

4.1 General Information:

A total of 35 multinational construction firms were contacted, all were associated with joint venture construction projects. 48% of the responses were collected from international construction firms while rest from local. Origin of responding multinational firms are China, France, Germany, Hong Kong, UK and US.

4.2 Characteristics of responding firms:

The characteristics of multinational firms/organizations responded to the survey are shown in Figure 4-1. A large number of the responding organizations ventured in Pakistan was as a contractor (44%) in IJV construction project while rest participated as both contractor and consultant (24%), consultant (20%) and client (12%).

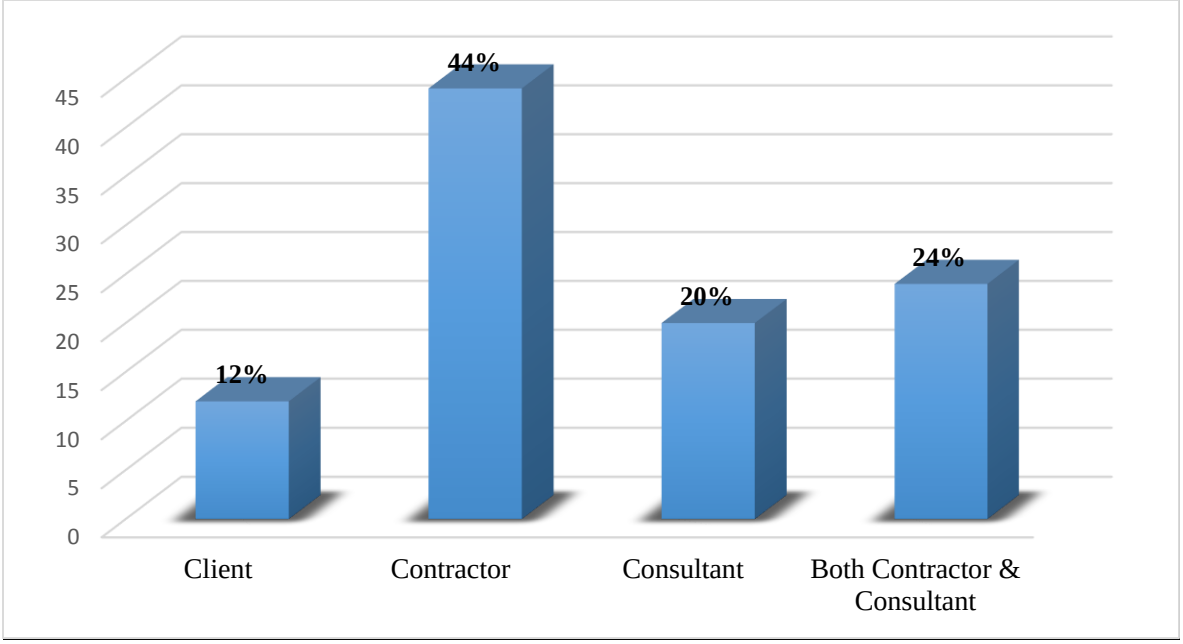


Figure 4-1: **Role of responding organization in IJV project**

Before the respondents rate the probability of occurrence and its effect on cost, quality and time, they were asked about their local and international experience in construction industry. As shown in Figure 4-2, maximum weightage was scored by the range of 'more than 20 years', 60% of the respondents gained local experience while 42% of the respondents had an international experience.

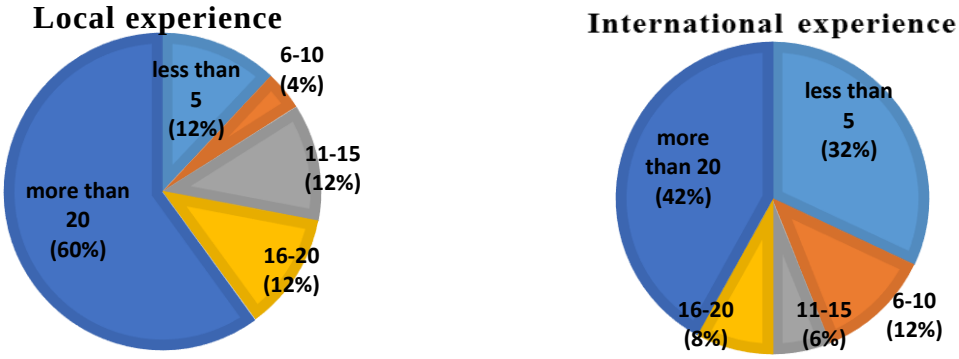


Figure 4-2: Local & International experience of respondents

After knowing about the local and international experience of the respondents, they were requested to rate their understanding about risk and risk management on the scale of 1-5 where 1=no

understanding at all, 2=slight, 3=somewhat, 4=moderate and 5=exceptional understanding. From the chart below in Figure 4-3(a), it shows that 22% of the respondents have exceptional knowledge of risk and risk management for a construction project, a large number of respondents (48%) are moderately aware of risk management. Figure 4-3(b) is showing external risk consideration during international joint venture construction project on the scale of 1-5 where 1 stood for 'not at all' and 5 stood for 'extremely'. 36% of the respondents gave extreme consideration to the external risk management and a small chunk (6%) does not consider external risks.

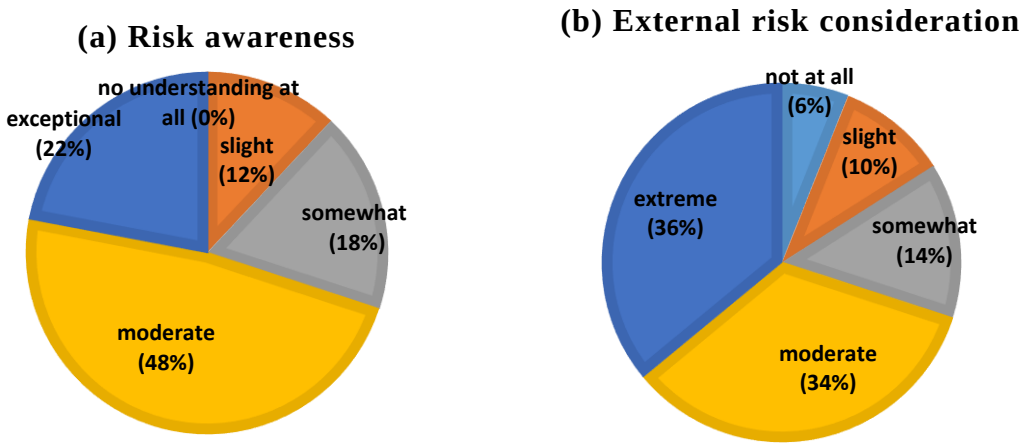
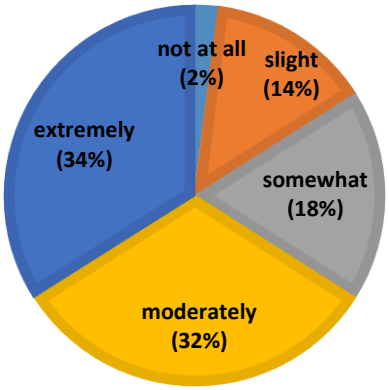


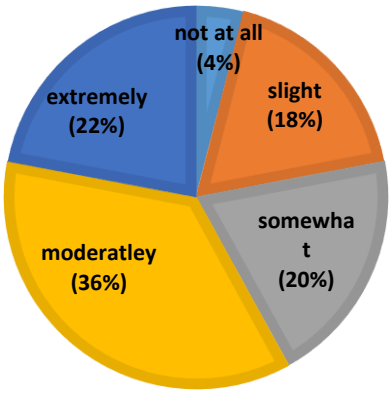
Figure 4-3: Risk awareness and external risk consideration

In the last of the characteristics of the responding organizations, a general view of the influence of external risks on achieving financial, schedule and quality objectives was solicited. Figure 4-4(a) shows that 34% of the respondents were of the opinion that cost is extremely effected by external risks and only 2% rated for no influence of external risks in achieving financial objectives during IJV project. Figure 4-4(b) is showing the influence on quality, 22% reflects if external risks influenced extremely while 36% respondents have faced moderate effect on quality. Time is the most influenced by these risks, as shown in Figure 4-4(c) the maximum percent of the respondents lies in the area of extremely (32%) and moderately (44%). From an overview, it is observed from Figure 4-4 that the most influenced success factors are time, cost and quality respectively.

(a) Influence on Cost



(b) Influence on Quality



(c) Influence on Time

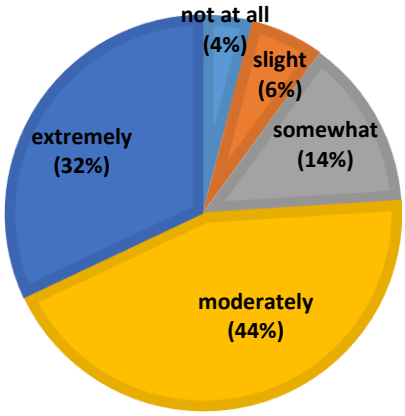


Figure 4-4: Influence on project success factors

4.3 Critical external risks:

As a result of third section of the questionnaire survey, the following tables are obtained. The percentage shown in Table 4-1, Table 4-2 and Table 4-3 refers to the probability of occurrence assigned by the respondents to the identified external risk factors. The probabilities were asked for each factor affecting cost, quality and time.

As a result of last section of the questionnaire, impacts of external risks on cost, quality and time were asked on the Likert scale of 1-5. The average for each impact cost, quality and time are shown in Table 4-1, Table 4-2 and Table 4-3 respectively. After having probabilities and impact, risk scores were calculated for each risk factor, in order to find critical external risks for each of the success factors. Risk score are shown in Table 4-1 for cost, Table 4-2 for quality and Table 4-3 for time.

Among the identified factors, there were quite a few with very low risk score therefore discarding them would not change the overall analysis and effectiveness much. Also owing to the huge complexity these low ranking factors will induce in overall process, discarding these factors and using the remaining risk factors was done as suggested by Egemen and Mohamed (2008). Thus, factors dictating 50 % and above of the decision were considered most influential which means that after finding out the weightage of each individual factor, group wise cumulative score was calculated.

Risk scores are calculated for each success criteria and group wise criticalities are found. Criticalities are found group-wise so that none of the group gets neglected. Observing Table 4-1 we came to know that 5 factors becomes critical under political risk group contributing to cost, 3 factors under economic, 3, 8 and 2 factors under legal, social and natural risk group respectively. As the number of critical factors in a group increases it lessens the severity for risk factors.

Table 4-1: Critical risk factors for 'Cost' with their risk scores

Sr. No.	Risk Factors	Probability (%)	Impact	Risk Score	Weightage	Cumulative
	Political Risks					
1.	Complicated bureaucratic system	0.8	3.45	2.8	12.56	12.56
2.	Relations with power group	0.68	3.95	2.7	12.23	24.79
3.	Leverage ratio of subsidiary	0.6	3.1	1.9	8.47	33.25
4.	Size of subsidiary	0.52	3.55	1.8	8.40	41.66
5.	Change in govt. policies	0.44	4.1	1.8	8.21	49.87

	Economic Risks					
6.	Inflation	0.92	4.3	4.0	18.76	18.76
7.	Fluctuations in exchange rate	0.88	4.15	3.7	17.32	36.08
8.	Interest rate fluctuation	0.88	4.1	3.6	17.11	53.19
	Legal Risks					
9.	Insufficient legal infrastructure	0.4	3.4	1.4	25.27	25.27
10.	Altered contract forms	0.36	3.35	1.2	22.41	47.68
11.	Nationalism & protectionism	0.32	3.25	1.0	19.32	67.00
	Social Risks					
12.	Religious and ethical strife	0.8	2.65	2.1	9.64	9.64
13.	Corruption/bribery or fraud among employees	0.4	4	1.6	7.28	16.91
14.	Problems in project planning phase due to policy changes	0.4	3.6	1.4	6.55	23.46
15.	Criminal acts	0.48	3	1.4	6.55	30.01
16.	Supply of local materials	0.4	3.55	1.4	6.46	36.47
17.	Changing social concerns	0.36	3.55	1.3	5.81	42.28
18.	delayed payments	0.28	4.1	1.1	5.22	47.50
19.	Civil war/ revolution/ political violence	0.28	4.1	1.1	5.22	52.72
	Natural/ Environmental risks					
20.	Geological systems	0.4	3.8	1.5	36.59	36.59
21.	Weather systems	0.36	4.05	1.5	35.10	71.69

Observing Table 4-2, a total of 19 factors found to be influential in completing project according to prescribed specifications. 5 factors are critical under political group, 2,3,7,2 factors comes under economic, legal, social and natural risks groups, respectively.

Table 4-2: Critical risk factors for 'Quality' with their risk scores

Sr. No.	**Risk Factors**	**Probability (%)**	**Impact**	**Risk Score**	**Weightage**	**Cumulative**
	Political Risks					
1.	Relationship with Govt.	0.8	3.2	2.5	15.41	15.41
2.	Delay in approval	0.8	2.8	2.2	13.45	28.86
3.	Internationalization of the firm	0.44	3.7	1.6	9.82	38.67
4.	Size of subsidiary	0.36	3.4	1.2	7.37	46.05
5.	Localization of firm	0.4	2.9	1.2	7.09	53.14
	Economic Risks					
6.	Currency inconvertibility	0.8	3.2	2.6	26.88	26.88

7.	Fluctuations in exchange rate	0.8	2.8	2.2	23.52	50.40
	Legal Risks					
8.	Insufficient legal infrastructure	0.32	3.0	1.0	19.25	19.25
9.	Altered contract forms	0.28	3.2	0.9	17.69	36.94
10.	Lack of legal system	0.28	3.0	0.8	16.85	53.79
	Social Risks					
11.	Civil war/ revolution/ political violence	0.8	3.4	2.7	9.50	9.50
12.	Behavior of contractors	0.72	3.7	2.7	9.30	18.80
13.	Existence/re-emergence of silo mentality	0.64	3.3	2.1	7.38	26.18
14.	Organizational culture	0.64	3.2	2.0	7.15	33.33
15.	Unfairness in tendering	0.64	3.2	2.0	7.04	40.37
16.	Corruption/bribery or fraud among employees	0.48	3.7	1.8	6.20	46.58
17.	Lack of adequate contractual relationship b/w labor and sub-contractor	0.4	4.0	1.6	5.59	52.17
	Natural/ Environmental risks					
18.	Unforeseen site conditions	0.16	3.6	0.6	40.11	40.11
19.	Geological systems	0.16	3.1	0.5	34.46	74.58

A total of 21 factors were found critical affecting time, 6 factors under political risk group, 3, 3, 7 and 2 factors comes under economic, legal, social and natural risks groups, respectively. Critical risk factors for time are shown in Table 4-3.

Table 4-3: Critical risk factors for 'Time' with their risk scores

Sr. No.	Risk Factors	Probability (%)	Impact	Risk Score	Weightage	Cumulative
	Political Risks					
1.	Delay in approval	0.72	4.4	3.2	11.36	11.36
2.	Complicated bureaucratic system	0.72	3.6	2.6	9.17	20.53
3.	Relationship with Govt.	0.60	3.9	2.3	8.39	28.92
4.	Forth coming elections	0.64	3.4	2.1	7.69	36.61
5.	Expropriation/ confiscation	0.52	3.7	1.9	6.81	43.42
6.	Different policies in local & central govt.	0.60	3.2	1.9	6.78	50.20
	Economic Risks					
7.	Inflation	0.80	3.2	2.6	21.36	21.36

8.	Interest rate fluctuation	0.80	2.9	2.3	19.36	40.72
9.	Import & export restrictions	0.36	3.7	1.3	11.11	51.84
	Legal Risks					
10.	Authorities & regulations requirements	0.76	3.9	2.9	26.45	26.45
11.	Insufficient legal infrastructure	0.64	3.6	2.3	20.83	47.28
12.	Lack of independent judiciary	0.48	3.8	1.8	16.27	63.55
	Social Risks					
13.	Behavior of contractors	0.80	3.9	3.1	9.30	9.30
14.	Permit or license	0.64	4.4	2.8	8.39	17.69
15.	Civil war/ revolution/ political violence	0.64	4.4	2.8	8.30	25.99
16.	Protest demonstrations/ strikes	0.68	3.8	2.6	7.60	33.59
17.	delayed payments	0.56	4.4	2.5	7.34	40.93
18.	Dispute with construction labor	0.60	3.2	1.9	5.63	46.56
19.	Difference of law or regulations	0.60	3.2	1.9	5.63	52.20
	Natural/ Environmental risks					
20.	Unforeseen site conditions	0.56	4.3	2.4	37.93	37.93
21.	Weather systems	0.52	4.2	2.2	33.99	71.93

After finding out critical factors, which comes out be 43 factors, influencing C, Q and T. It can be observed from Table 4-1, 4-2 and 4-3 that there are few factors which are repeating in all three success criteria, while some are common in two of them. Only two factors, *insufficient legal infrastructure* and *civil war/revolution/political violence* have influence on all success criteria. And 14 factors are either common among C and T, C and Q or Q and T as detailed in the subsequent sections. Critical external risks with their occurrence has been shown in Table 4-4;

Table 4-4: Symbols of critical risks with their occurrence

Sr. No.	Symbols	Risk factors	Occurrence	Criteria
	CR00-X	**Political**		
1.	CR01-P	Delay in approval	2	Q, T
2.	CR02-P	Complicated bureaucratic system	2	C, T

3.	CR03-P	Relationship with Govt.	2	Q, T
4.	CR04-P	Relations with power group	1	C
5.	CR05-P	Size of subsidiary	2	C,Q
6.	CR06-P	Change in govt. policies	1	C
7.	CR07-P	Leverage ratio of subsidiary	1	C
8.	CR08-P	Forth coming elections	1	T
9.	CR09-P	Expropriation/ confiscation	1	T
10.	CR10-P	Different policies in local & central govt.	1	T
11.	CR11-P	Internationalization of the firm	1	Q
12.	CR12-P	Localization of firm	1	Q
		Economic		
13.	CR13-E	Inflation	2	C, T
14.	CR14-E	Interest rate fluctuation	2	C, T
15.	CR15-E	Currency inconvertibility	1	Q
16.	CR16-E	Import & export restrictions	1	T
17.	CR17-E	Fluctuations in exchange rate	2	C, Q
		Legal		
18.	CR18-L	Authorities & regulations requirements	1	T
19.	CR19-L	Insufficient legal infrastructure	3	C, Q, T
20.	CR20-L	Altered contract forms	2	Q, C
21.	CR21-L	Nationalism & protectionism	1	C
22.	CR22-L	Lack of independent judiciary	1	T
23.	CR23-L	Lack of legal system	1	Q
		Social		
24.	CR24-S	Behavior of contractors	2	Q, T
25.	CR25-S	Permit or license	1	T
26.	CR26-S	Civil war/ revolution/ political violence	3	C, Q, T
27.	CR27-S	Existence/re-emergence of silo mentality	1	Q
28.	CR28-S	Religious and ethical strife	1	C
29.	CR29-S	Corruption/bribery or fraud among employees	2	C, Q
30.	CR30-S	Problems in project planning phase due to policy changes	1	C
31.	CR31-S	Criminal acts	1	C
32.	CR32-S	Supply of local materials	1	C
33.	CR33-S	Changing social concerns	1	C
34.	CR34-S	Delayed payments	2	C, T

35.	CR35-S	Protest demonstrations/ strikes	1	T
36.	CR36-S	Dispute with construction labor	1	T
37.	CR37-S	Organizational culture	1	Q
38.	CR38-S	Unfairness in tendering	1	Q
39.	CR39-S	Lack of adequate contractual relationship b/w labor and sub-contractor	1	Q
40.	CR40-S	Difference of law or regulations	1	T
		Natural		
41.	CR41-N	Unforeseen site conditions	2	Q, T
42.	CR42-N	Weather systems	2	C, T
43.	CR43-N	Geological systems	2	C, Q

4.4 Criteria score:

Respondents were asked to rate contribution of cost, quality and time in a project success. Table 4-5 shows their scores.

Table 4-5: Scores of Cost, Quality and Time

Project success criteria	Score (%)
Cost (C)	34
Quality (Q)	27
Time (T)	39

It is observed from critical factors that there are few factors which are occurring twice or thrice. To find out the factors prioritization according to project success criteria, an Analytical Hierarchy Process (AHP) technique is used. It is understood that out of 43 critical factors, ones repeating are considered to be more influential. To find out the factors prioritization according to project success criteria, AHP is used. Prioritization is done for 16 common critical factors influencing at least two

of the success criteria at the same time. AHP's aim is to find the critical area for the risk influencing more than one criterion.

4.5 Prioritization of external risk factors contributing to a successful IJV project:

A hierarchy can be developed by creative thinking, recollection and using people's perception (Saaty, 2000). In the hierarchical structure, number of levels and structure is not specified as it depends upon the nature of the managerial decision (Zahedi, 1986). In order to structure the goal, criteria and sub-criteria into hierarchical form, firstly, goal of the study is defined and criteria and sub-criteria are decided for achieving that goal. A hierarchy is formed starting from the goal at the top and various criteria and sub-criteria in subsequent levels. The procedure for the selection of various levels of criteria and development of hierarchical structure has been recommended by Saaty (2000). An AHP framework is formed with the help of these guidelines for the achievement of the goal. Figure 4-5 demonstrates a three-level decision hierarchy integrating these criteria and sub-criteria. Table 4-6 shows critical repeating factors with abbreviation, this is done for the ease of factor dealing in AHP method.

Table 4-6: Repeating factors with their abbreviations

Symbols	Factors	Abbreviation
CR01-P	Delay in approval	DA
CR02-P	Complicated bureaucratic system	CBS
CR03-P	Relationship with Govt.	RG
CR05-P	Size of subsidiary	SS
CR14-E	Fluctuations in exchange rate	FER
CR13-E	Inflation	Inf.
CR17-E	Interest rate fluctuation	IRF
CR20-L	Altered contract forms	ACF
CR19-L	Insufficient legal infrastructure	ILI
CR24-S	Behavior of contractors	BoC
CR26-S	Civil war/ revolution/ political violence	CW/R/PV
CR29-S	Corruption bribery/ fraud among employees	C/B/F
CR34-S	Delayed payments	DP
CR43-N	Geological systems	GS
CR41-N	Unforeseen site conditions	USC
CR42-N	Weather systems	WS

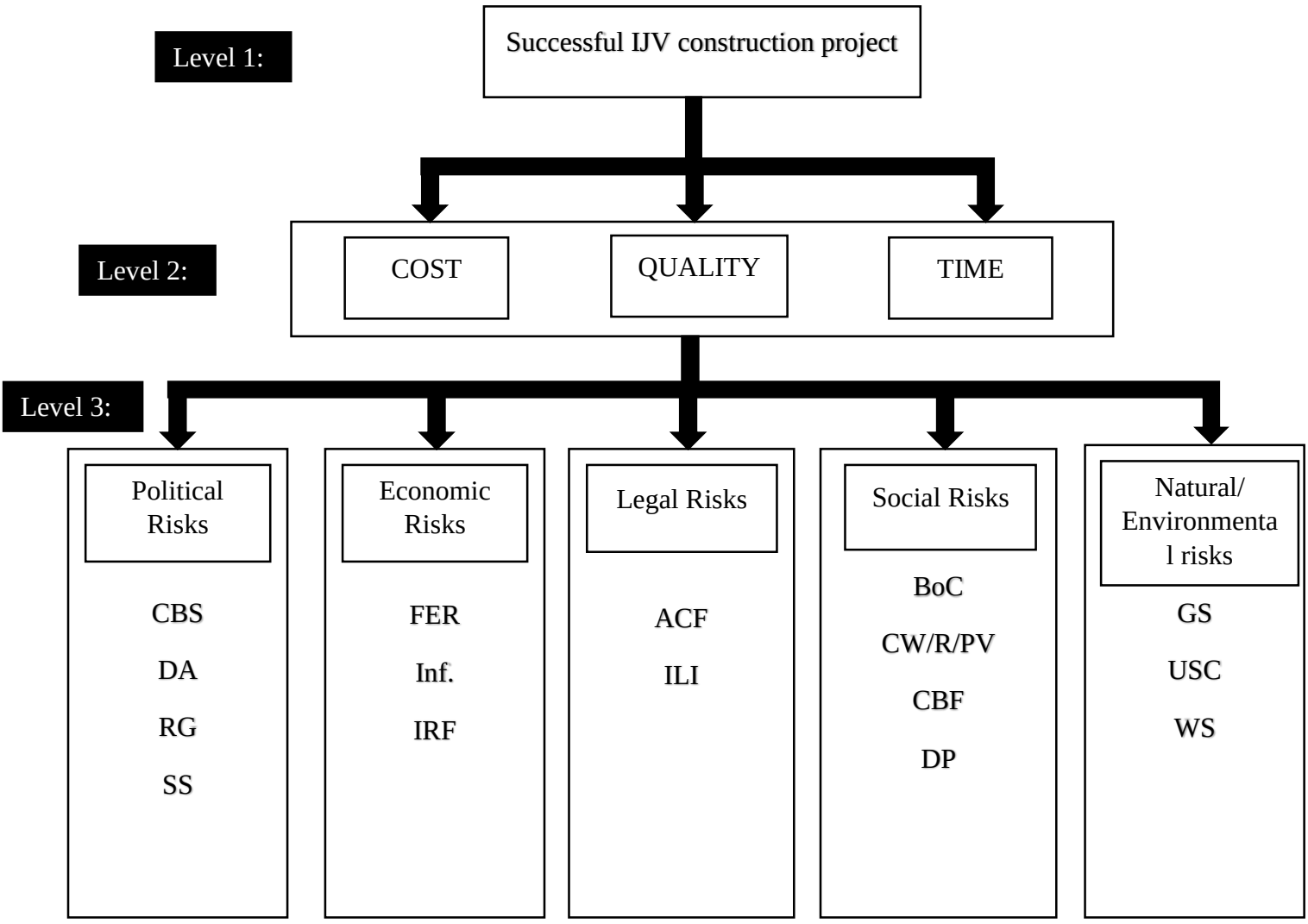


Figure 4-5: An AHP based model for determination of priorities

4.5.1 Assigning Relative Weights:

In the AHP process, factors are compared by assigning a weight to their relative importance. After the formation of hierarchy, a comparison matrix was developed. This matrix is a priority statement from the individual respondent. All the respondent were asked to compare the criteria and factors

very carefully by assigning the impact of particular risk on criteria, later on it is transformed into a relative value on a 9-point scale proposed by Saaty (1988), keeping goal or objective of the model in mind. The comparison is based on the relative importance of 'i^{th}' factor over the 'j^{th}' factor. The outcome of this pairwise comparison was a positive reciprocal matrix, where the diagonal $a_{ii} = 1$, and another factor has the reciprocal property. For example, if factor 'i' is "*p*-times" important than Factor 'j', then according to the rule of reciprocity, factor 'j' is "1/*p* times" more important than Factor 'i'. The 1-9 scale is used to come out with the relative importance of a pair of factors. In this case questions were asked on a scale of 1 to 5, which are later transformed into the 1-9 scale point. The intensity of importance of each of the values of the scale is shown in Table 4-7 (Saaty, 1994):

Table 4-7 **: Scale of comparison *transformed into impact scale***

Verbal scale	**Intensity of importance**	**Impacts range**
Extremely importance	9	5
Very strong importance	7	4
Strong importance	5	3
Moderate importance	3	2
Equal importance	1	1
Intermediate importance	2,4,6,8	1-2, 2-3, 3-4, 4-5

4.5.2: Pairwise comparison of Criteria:

The pairwise comparison of all three criteria of this study with respect to the goal that is determination of priorities of external risks contributing to the successful IJV construction project is carried out. It highlights the relative importance of each criteria against the goal of the model. The synthesized matrix is shown in Table 4-8.

Table 4-8: Pairwise comparison of criteria

Consistency Ratio (0.0516)	**Cost**	**Quality**	**Time**
Cost	1	2	1/4
Quality	1/2	1	1/4
Time	4	4	1

4.5.3 Pairwise comparison of Factors:

Alike to the pairwise comparison of criteria, the pairwise comparison of critical external risks is also done. The factors are compared group wise with respect to cost, quality and time. The pairwise comparison has been made as: the political factors; *size of subsidiary* and *complicated bureaucratic system* have been compared with respect to 'cost' criteria. *Relationship with government*, *delay in approval* and *size of subsidiary* have been compared with respect to 'quality' criteria. *Delay in approval*, *relationship with government* and *complicated bureaucratic system* have been compared with respect to 'time' criteria. For economic risk factor group, *inflation*, *fluctuations in exchange rate* and *interest rate fluctuations* have been compared with respect to 'cost' criteria. None of the economic risk factors influence 'quality', *interest rate fluctuation* and *fluctuations in exchange rate* have been compared with respect to 'time'. For legal risk group,

insufficient legal infrastructure and *altered contract forms* have been compared with respect to 'cost' and 'quality', and no such comparison is seen for 'time'. For social risk group, *corruption/bribery or fraud among employees*, *civil war/ revolution/ political violence* and *delayed payments* has been compared with respect to 'cost' criteria. Comparison between *corruption/bribery or fraud among employees*, *civil war/ revolution/ political violence* and *behavior of contractors* is shown for 'quality'. *Civil war/ revolution/ political violence*, *behavior of contractors* and *delayed payments* has been compared with respect to 'time'. Lastly, for natural/ environmental group, *weather* and *geological systems* are compared for 'cost', *unforeseen site conditions* and *geological systems* has been compared with respect to 'quality', and *unforeseen site conditions* and *weather conditions* has been compared for 'time'. Table 4-9, 4-10, 4-11, 4-12 and 4-13 shows comparisons for 'Cost', Table 4-14, 4-15, 4-16 and 4-17 shows comparisons for 'Quality' and 4-18, 4-19, 4-20 and 4-21 are showing comparisons for 'Time'

Table 4-9: Pairwise comparison matrix of "Political risk" factors w.r.t Cost

Consistency Ratio (0.00)	**Size of subsidiary**	**Complicated bureaucratic system**
Size of Subsidiary	1	½
Complicated bureaucratic system	2	1

Table 4-10: Pairwise comparison matrix of "Economic risk" factors w.r.t Cost

Consistency Ratio (0.0716)	**Inflation**	**Interest rate fluctuations**	**Fluctuations in exchange rate**
Inflation	1	1/4	3
Interest rate fluctuations	4	1	1/2
Fluctuations in exchange rate	1/3	2	1

Table 4-11: Pairwise comparison matrix of "Legal risk" factors w.r.t Cost

Consistency Ratio (0.00)	**Insufficient legal infrastructure**	**Altered contract forms**
Insufficient legal infrastructure	1	2
Altered contract forms	1/2	1

Table 4-12: Pairwise comparison matrix of "Social risk" factors w.r.t Cost

Consistency Ratio (0.0516)	**Corruption/bribery or fraud among employees**	**Civil war/ revolution/ political violence**	**Delayed payments**
Corruption/bribery or fraud among employees	1	½	3
Civil war/ revolution/ political violence	2	1	3
Delayed payments	1/3	1/3	1

Table 4-13: Pairwise comparison matrix of "Natural/ Environmental risk" factors w.r.t Cost

Consistency Ratio (0.00)	**Weather systems**	**Geological systems**
Weather systems	1	2
Geological systems	1/2	1

Table 4-14: Pairwise comparison matrix of "Political risk" factors w.r.t Quality

Consistency Ratio (0.0707)	**Relationship with Govt.**	**Size of subsidiary**	**Delay in approval**
Relationship with Govt.	1	1/3	4
Size of subsidiary	1/3	1	3
Delay in approval	1/4	1/3	1

Table 4-15: Pairwise comparison matrix of "Legal risk" factors w.r.t Quality

Consistency Ratio (0.00)	**Insufficient legal infrastructure**	**Altered contract forms**
Insufficient legal infrastructure	1	1/2
Altered contract forms	2	1

Table 4-16: Pairwise comparison matrix of "Social risk" factors w.r.t Quality

Consistency Ratio (0.0089)	**Civil war/ revolution/ political violence**	**Behavior of contractors**	**Corruption/bribery or fraud among employees**
Civil war/ revolution/ political violence	1	1/2	2
Behavior of contractors	2	1	3
Corruption/bribery or fraud among employees	1/2	1/3	1

Table 4-17: Pairwise comparison matrix of "Natural/ Environmental risk" factors w.r.t Quality

Consistency Ratio (0.00)	**Unforeseen site conditions**	**Geological systems**
Unforeseen site conditions	1	½
Geological systems	2	1

Table 4-18: Pairwise comparison matrix of "Political risk" factors w.r.t Time

Consistency Ratio (0.0516)	**Delay in approval**	**Relationship with Govt.**	**Complicated bureaucratic system**
Delay in approval	1	2	7
Relationship with Govt.	1/2	1	7
Complicated bureaucratic system	1/7	1/7	1

Table 4-19: Pairwise comparison matrix of "Economic risk" factors w.r.t Time

Consistency Ratio (0.00)	**Interest rate fluctuation**	**Inflation**
Interest rate fluctuation	1	1/2
Inflation	2	1

Table 4-20: Pairwise comparison matrix of "Social risk" factors w.r.t Time

Consistency Ratio (0.0089)	**Civil war/ revolution/ political violence**	**Delayed payments**	**Behavior of contractors**
Civil war/ revolution/ political violence	1	3	5
Delayed payments	1/3	1	1/2
Behavior of contractors	1/5	2	1

Table 4-21: Pairwise comparison matrix of "Natural/ Environmental risk" factors w.r.t Time

Consistency Ratio (0.00)	**Weather systems**	**Unforeseen site conditions**
Weather systems	1	2
Unforeseen site conditions	1/2	1

4.6.4 Normalized Matrix:

Normalization is a method of computing numbers that takes into account the overall values. Normalized matrix is formulated in two stages:

- First is the summation of each column of the reciprocal matrix.
- Then we divide each element of matrix with the sum of its column and obtain a normalized matrix.

The sum of each column is 1. The normalized matrix of criteria is shown in Table 4-22, factors of political, economic, legal, social and natural/ environmental risks for cost are shown in Table 4-23, 4-24, 4-25, 4-26 and 4-27 respectively. Normalized matrices of quality for political factors are

shown in Table 4-28, legal factors in Table 4-29, social factors in Table 4-30 and natural/ environmental factors are shown in Table 4-31. Table 4-32, 4-33, 4-34 and 4-35 are showing normalized matrices political, economic, social and natural/ environmental risks for time.

Table 4-22: Normalized matrix of criteria

Consistency Ratio (0.0516)	**Cost**	**Quality**	**Time**	**Priority Vector**
Cost	2/11	2/7	1/6	0.208
Quality	1/11	1/7	1/6	0.131
Time	8/11	4/7	2/3	0.661

Table 4-23: Normalized matrix of "Political risk" factors for Cost

Consistency Ratio (0.00)	**Size of subsidiary**	**Complicated bureaucratic system**	**Priority Vector**
Size of Subsidiary	1/3	1/3	0.333
Complicated bureaucratic system	2/3	2/3	0.667

Table 4-24: Normalized matrix of "Economic risk" factors for Cost

Consistency Ratio (0.0716)	**Inflation**	**Interest rate fluctuations**	**Fluctuations in exchange rate**	**Priority Vector**
Inflation	3/16	1/13	2/3	0.625
Interest rate fluctuations	3/4	4/13	1/9	0.137
Fluctuations in exchange rate	1/16	8/13	2/9	0.238

Table 4-25: Normalized matrix of "Legal risk" factors for Cost

Consistency Ratio (0.00)	Insufficient legal infrastructure	Altered contract forms	Priority Vector
Insufficient legal infrastructure	2/3	2/3	0.667
Altered contract forms	1/3	1/3	0.333

Table 4-26: Normalized matrix of "Social risk" factors for Cost

Consistency Ratio (0.0516)	Corruption/bribery or fraud among employees	Civil war/ revolution/ political violence	Delayed payments	Priority Vector
Corruption/bribery or fraud among employees	3/10	3/11	3/7	0.333
Civil war/ revolution/ political violence	6/10	6/11	3/7	0.528
Delayed payments	1/10	2/11	1/7	0.1397

Table 4-27: Normalized matrix of "Natural/ Environmental risk" factors for Cost

Consistency Ratio (0.00)	Weather systems	Geological systems	Priority Vector
Weather systems	2/3	2/3	0.667
Geological systems	1/3	1/3	0.333

Table 4-28: Normalized matrix of "Political risk" factors for Quality

Consistency Ratio (0.0707)	Relationship with Govt.	Size of subsidiary	Delay in approval	Priority Vector
Relationship with Govt.	12/19	1/5	1/2	0.614
Size of subsidiary	4/19	3/5	3/8	0.268
Delay in approval	3/19	1/5	1/8	0.117

Table 4-29: Normalized matrix of "Legal risk" factors for Quality

Consistency Ratio (0.00)	Insufficient legal infrastructure	Altered contract forms	Priority Vector
Insufficient legal infrastructure	1/3	1/3	0.333
Altered contract forms	2/3	2/3	0.667

Table 4-30: Normalized matrix of "Social risk" factors for Quality

Consistency Ratio (0.0089)	Civil war/ revolution/ political violence	Behavior of contractors	Corruption/bribery or fraud among employees	Priority Vector
Civil war/ revolution/ political violence	2/7	3/11	1/3	0.296
Behavior of contractors	4/7	6/11	1/2	0.163
Corruption/bribery or fraud among employees	1/7	2/11	1/6	0.5396

Table 4-31: Normalized matrix of "Natural/ Environmental risk" factors for Quality

Consistency Ratio (0.00)	**Unforeseen site conditions**	**Geological systems**	**Priority Vector**
Unforeseen site conditions	1/3	1/3	0.333
Geological systems	2/3	2/3	0.667

Table 4-32: Normalized matrix of "Political risk" factors for Time

Consistency Ratio (0.0516)	**Delay in approval**	**Relationship with Govt.**	**Complicated bureaucratic system**	**Priority Vector**
Delay in approval	14/23	7/11	7/15	0.574
Relationship with Govt.	7/23	7/22	7/15	0.361
Complicated bureaucratic system	2/23	1/22	1/15	0.065

Table 4-33: Normalized matrix of "Economic risk" factors for Time

Consistency Ratio (0.00)	**Interest rate fluctuation**	**Inflation**	**Priority Vector**
Interest rate fluctuation	1/3	1/3	0.333
Inflation	2/3	2/3	0.667

Table 4-34: Normalized matrix of "Social risk" factors for Time

Consistency Ratio (0.0089)	Civil war/ revolution/ political violence	Delayed payments	Behavior of contractors	Priority Vector
Civil war/ revolution/ political violence	15/23	1/2	10/14	0.582
Delayed payments	5/23	1/6	1/13	0.309
Behavior of contractors	3/23	1/3	2/13	0.109

Table 4-35: Normalized matrix of "Natural/ Environmental risk" factors for Time

Consistency Ratio (0.00)	Weather systems	Unforeseen site conditions	Priority Vector
Weather systems	2/3	2/3	0.667
Unforeseen site conditions	1/3	1/3	0.333

4.5.5 Calculation of Local weights and Global weights:

After the normalization of matrices, the local weights of each criteria and sub-criteria are calculated. These local weights are the relative value of the element with respect to the particular element which is placed at its immediate above hierarchy level. The main focus of the decision maker is the identification of the relative value for each element with respect to the main goal of the hierarchy. These values are known as global weights. According to Saaty (2008), the local weight and the global weight of the goal of the hierarchy is 1. Global priorities for any hierarchical elements are calculated by weighing their local priorities by the global priorities assigned to the elements they originate from (i.e. at the preceding level), called their parents (Davies, 1994).

4.5.6 Ranking the criteria and sub-criteria:

To clearly identify the impact of all critical success factors on the goal or objective of the hierarchy model, it is required to rearrange the critical risk factors in descending order, because it gets easier for the decision maker to recognize which of the factors are affecting the goal most significantly. The priority weights of factors are shown in Table 4-36.

Table 4-36: Composite priority weights for criteria and factors

Criteria	Local Weights Of Criteria	Groups	Factors	Local Weights Of Factors	Global Weights
Time	0.661	Political risks	Delay in approval	0.574	0.379
			Relationship with Govt.	0.361	0.239
			Complicated bureaucratic system	0.065	0.043
		Economic risks	Interest rate fluctuation	0.333	0.220
			Fluctuations in exchange rate	0.667	0.441
		Social risks	Civil war/ revolution/ political violence	0.582	0.385
			Delayed payments	0.309	0.204
			Behavior of contractors	0.109	0.072
		Natural/ Environmental risks	Weather systems	0.667	0.441
			Unforeseen site conditions	0.333	0.220
Cost	0.208	Political risks	Size of subsidiary	0.333	0.069
			Complicated bureaucratic system	0.667	0.139
		Economic risks	Inflation	0.625	0.130
			Interest rate fluctuations	0.137	0.028
			Fluctuations in exchange rate	0.238	0.050
		Legal risks	Insufficient legal infrastructure	0.667	0.139

			Altered contract forms	0.333	0.069
		Social risks	Corruption/bribery or fraud among employees	0.333	0.069
			Civil war/ revolution/ political violence	0.528	0.110
			Delayed payments	0.1397	0.029
		Natural/ Environmental risks	Weather systems	0.667	0.139
			Geological systems	0.333	0.069
Quality	0.131	Political risks	Relationship with Govt.	0.614	0.080
			Size of subsidiary	0.268	0.035
			Delay in approval	0.117	0.015
		Legal risks	Insufficient legal infrastructure	0.333	0.044
			Altered contract forms	0.667	0.087
		Social risks	Civil war/ revolution/ political violence	0.296	0.039
			Behavior of contractors	0.163	0.021
			Corruption/bribery or fraud among employees	0.5396	0.071
		Natural/ Environmental risks	Unforeseen site conditions	0.333	0.044
			Geological systems	0.667	0.087

This research provides a method for ranking the critical factors that could significantly effect in *cost, quality* and *time* for a successful IJV construction project. For this purpose, analytical hierarchy process is used to rank those factors by comparing their significance upon each other. This technique seems to accomplish sophisticated results that are based purely on the assignation of participants of the absolute priorities of each criterion.

In AHP, the pairwise comparison of criteria and factors are done as shown in tables above. After performing various steps, the local and global weights of all factors are determined as shown in Table 4-36. The second column displays the local weights of success criteria which show *time* with overall weight of 66.1 % stands at the top position. The weightage of *time* is approximately three times more than the weightage of *cost* i.e. 20.8% and five times more than *quality* i.e. 13.1%. The results reveals that despite cost, quality and time are primary for a project success but the success of International joint venture construction project is based on the timely completion. The priorities of factors with respect to success criteria are shown in following charts:

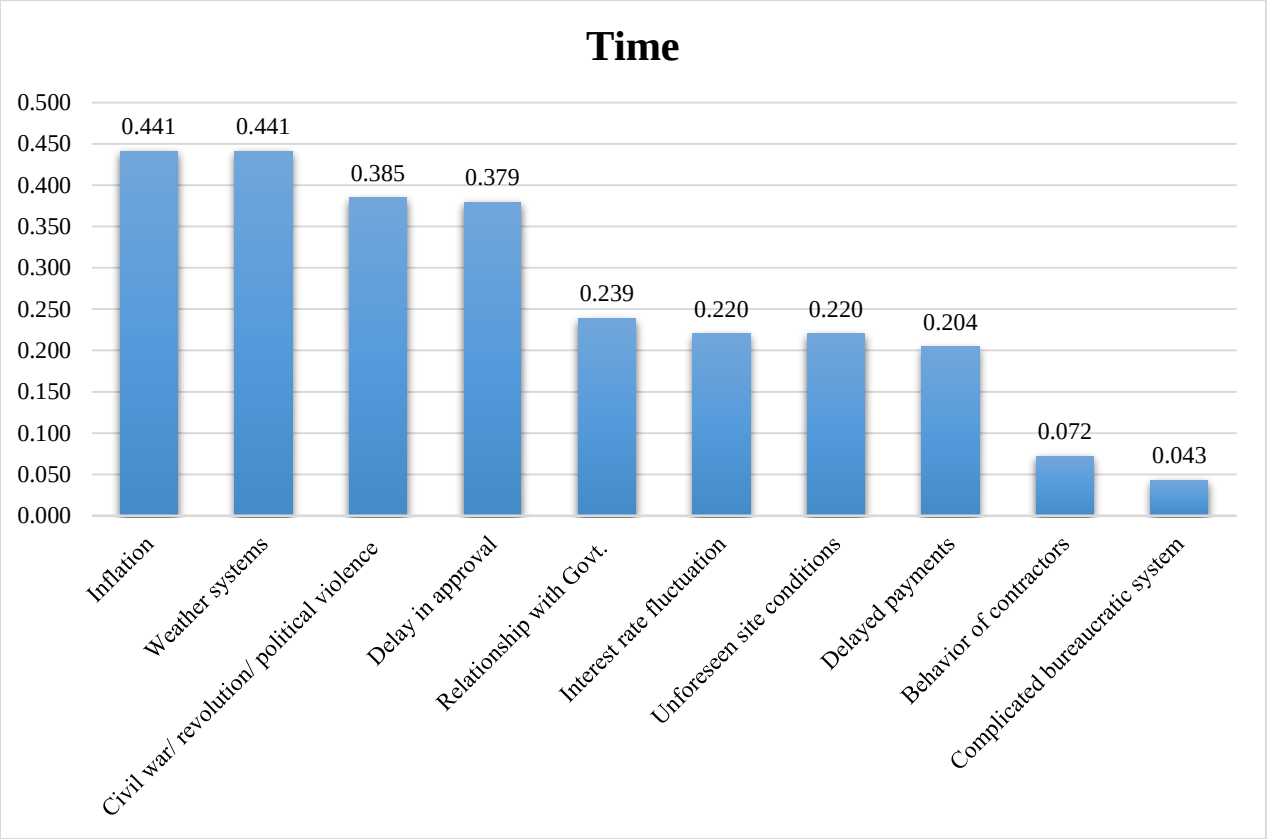


Figure 4-6: Bar Chart of Prioritization of factors influencing "Time"

As explained earlier, 'time' is at the top position and for time the most significant factors are *inflation* and *weather systems* possess maximum weight 0.441. It shows that the *inflation* and

weather system effects time most significantly, ultimately affecting timely completion of an IJV construction project. Wiguna and Scott (2005) also found *Inflation* as the top most critical factor for time. The ranking of external risk factors influencing time has been shown in Figure 4-6. The graphical representation clearly depicts the priority-level of all critical factors for *time.* The factors *civil war/revolution/political violence* (.385), *delay in approval* (.379), *relationship with government* (.239), *interest rate fluctuations* and *unforeseen site conditions* (.220), *delayed payments* (.204) acquires distinctly higher weights than other rest of the two factors. *Behavior of contractor* (.072) and *complicated bureaucratic systems* (.043) have very least effect on time of a project, but it might get significant for other two of the success criteria.

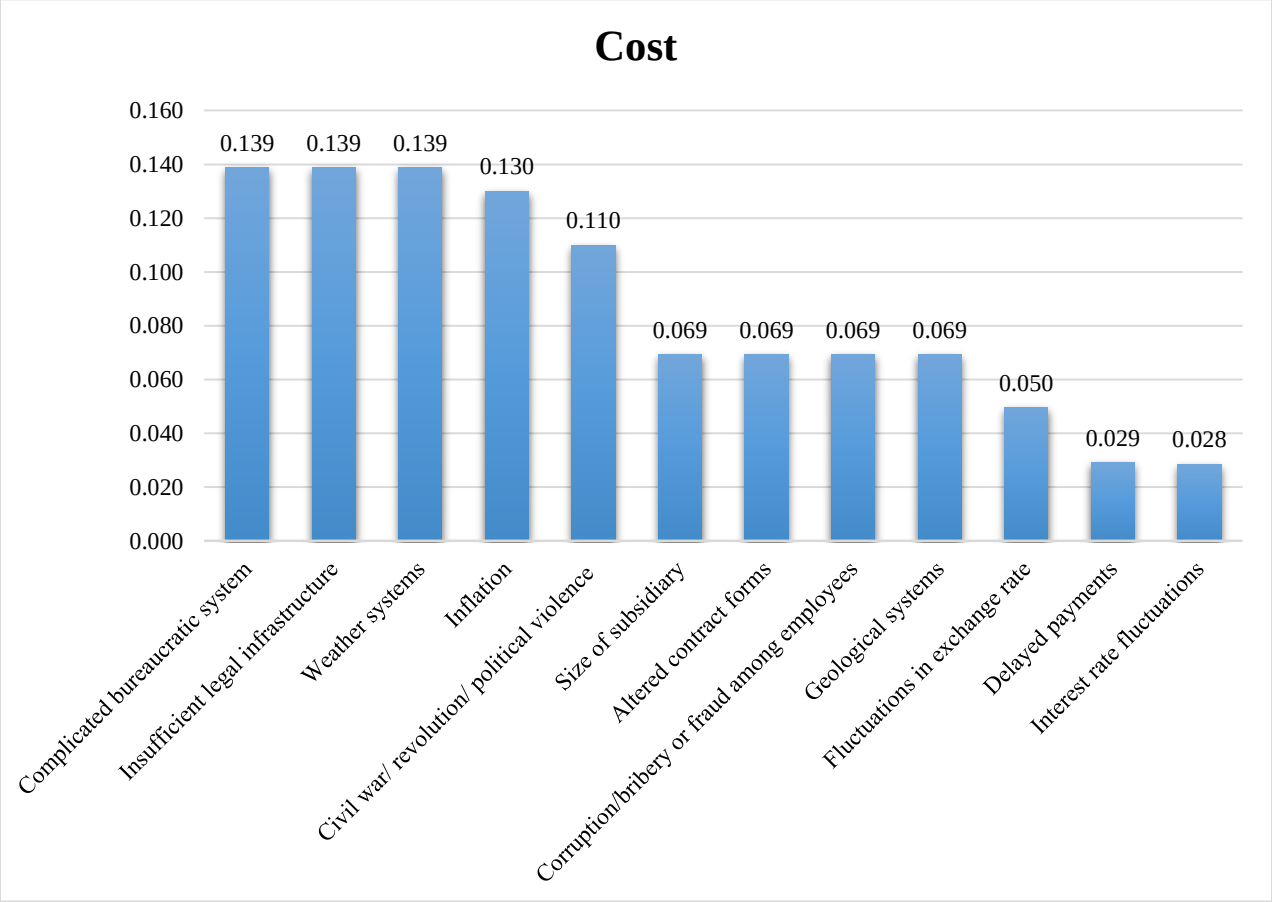


Figure 4-7: Bar Chart of Prioritization of factors influencing "Cost"

From Table 4-17 we know that 'cost' posses 20.8% success of an IJV project. *Cost* is most significantly influenced by three factors, *complicated bureaucratic system, insufficient legal infrastructure* and *weather systems* 0.139. It shows these factors must be considered significantly for completing an IJV construction project within an approved budget. The prioritization of external risks influencing cost has been shown in Figure 4-7. *Inflation* (.130) and *civil war/revolution/political violence* (.110) are next most significant risks. *Size of subsidiary, altered contracts forms, corruption/bribery or fraud among employees, geological systems* (.069) are equally important for cost. *Fluctuations in exchange rate* (.050), *delayed payments* (.029), *interest rate fluctuations* (.028) are least influencing factors for cost.

As explained earlier, there were few factors in common with cost and time; those critical factors are *complicated bureaucratic system, interest rate fluctuations, delayed payments* and *weather systems*. Figure 4-6 and 4-7 shows that *complicated bureaucratic system* is top most significant (0.139) factor for cost and least significant (0.043) for time and *Interest rate fluctuation* is 0.22 significant for time and 0.028 for cost, *Delayed payment* is 0.204 significant for time and 0.029 for cost, *weather systems* is also significant (0.441) for time and (0.139) for cost. From this it is inferred that from common critical factors, three of factors were ranked higher for time and only one factor was ranked higher for cost.

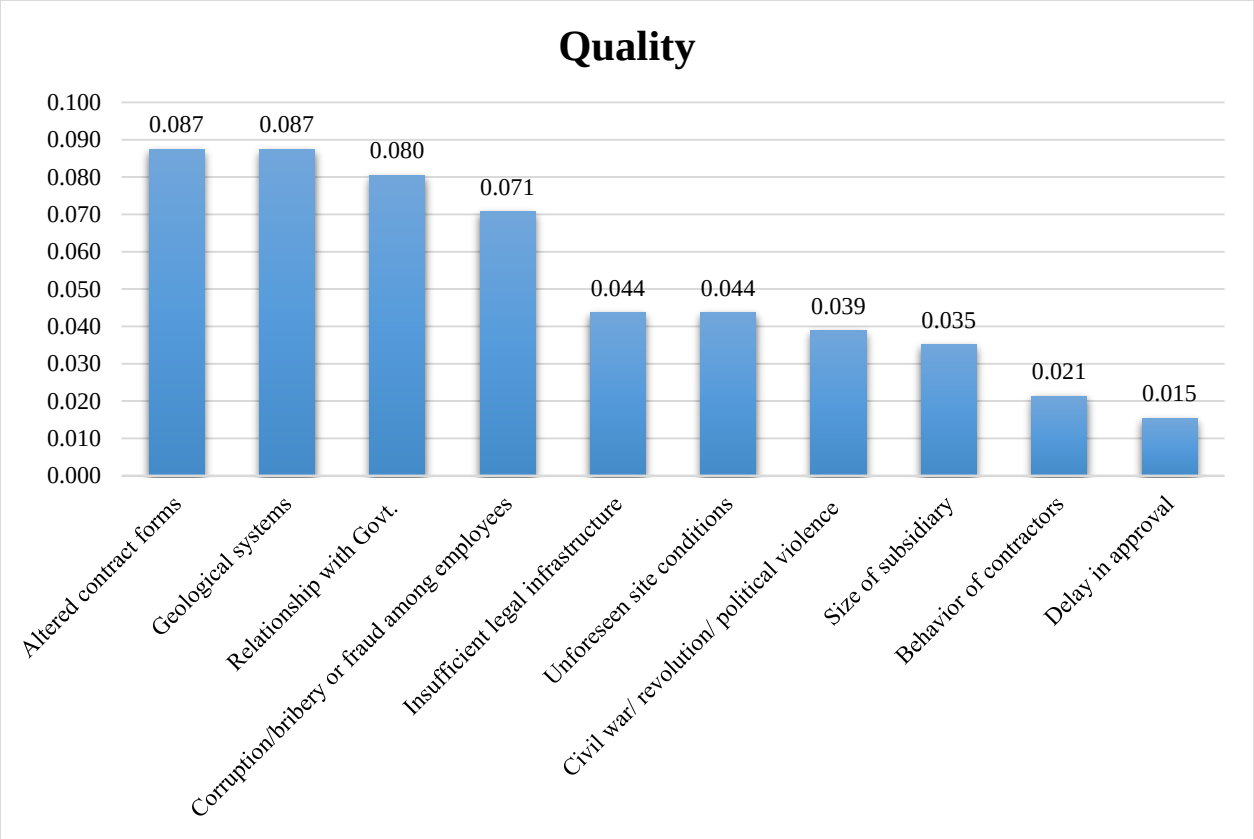


Figure 4-8: Bar Chart of Prioritization of factors influencing "Quality"

'Quality' is the lastly considered criteria for a successful IJV construction project with a share of 13.1%. The most significant factors for quality are *altered contract forms* and *geological systems* with significance of 0.087. Followed by *Relationship with government* (0.08) and *corruption/bribery or fraud among employees* (0.071), *insufficient legal infrastructure* and *unforeseen site conditions* 0.044 are equally significant for quality. The least important external risk factors with respect to quality are *civil war/revolution/political violence* 0.039, *size of subsidiary* 0.035, *behavior of contractors* 0.021 and *delay in approval* 0.015.

Similarly for cost and time, there are few critical risk factors which are common among quality and time, and quality and cost. It can be seen from the tables above that one of the factor is critical in all the three criteria i.e. *civil war/revolution/political violence* is most significant for time with 0.385, for cost 0.11 and for quality it is 0.071.

Common critical factors among quality and time are *delay in approval*, *relationship with government*, *behavior of contractors* and *unforeseen site conditions*. *Delay in approval* is fourth most significant factor for time and least significant for quality, therefore it must be noted considerably for keeping the project within schedule. Same trend of significance is seen for the rest of three common critical risk factors. Common critical risks factors among quality and cost are *size of subsidiary*, *corruption/bribery or fraud among employees* and *geological systems*. *Size of subsidiary* is more significant for cost than quality, while *corruption/bribery or fraud among employees* and *geological systems* are more significant for quality. Hence, it is clear that *corruption//bribery or fraud among employees* can strongly effect the quality of a project.

4.6 Results:

After prioritizing critical risks distinctly for cost, quality and time, a clear picture is seen that comparing between two of the criteria for an individual risk arising during an international construction project. Table 4-37 shows critical risks respective to the most influencing criteria. From the table below the sensitive area for critical risk is shown.

Table 4-37: Critical risks with influenced criteria

Symbols	Factors	Abbreviation	Influenced Criteria
CR01-P	Delay in approval	DA	T
CR02-P	Complicated bureaucratic system	CBS	C
CR03-P	Relationship with Govt.	RG	T
CR05-P	Size of subsidiary	SS	C
CR14-E	Fluctuations in exchange rate	FER	T
CR13-E	Inflation	Inf.	T
CR17-E	Interest rate fluctuation	IRF	T
CR20-L	Altered contract forms	ACF	Q
CR19-L	Insufficient legal infrastructure	ILI	C
CR24-S	Behavior of contractors	BoC	T
CR26-S	Civil war/ revolution/ political violence	CW/R/PV	T

CR29-S	Corruption bribery/ fraud among employees	C/B/F	Q
CR34-S	Delayed payments	DP	T
CR43-N	Geological systems	GS	Q
CR41-N	Unforeseen site conditions	USC	T
CR42-N	Weather systems	WS	T

The table above shows that time must be considered carefully throughout the project span, as it is affected by maximum of the critical risks. It must be noted that critical economic risks, effects both cost and time. But according to AHP results critical economic risks effects more on time rather than cost. Quality is least influenced by external risks.

4.7 Summary:

This chapter summarizes the results of the analysis done by using an AHP technique. It also explains the general information of the professionals and the international and local firms being involved in an IJV construction project. The prioritization of all critical risks has been done in this chapter which was the main goal the research.

Chapter 5

CONCLUSION AND RECOMMENDATIONS

5.1 Literature Review from 2000-2014:

Literature was reviewed for external risks identification in international construction projects. Various trends have been seen in external risks identification during this time span. It has been observed from literature that a good number of research studies have been conducted on political and social risks depicting these two groups vital in achieving project success. Frequency analysis was carried out which resulted in 22 critical external risks based on literature. A year-wise identification of risks has been shown, which tells that maximum of external risks have been identified in year 2000, 2001, 2003 and 2007. Political and social risks were identified throughout the span due to their considerable importance for external risks. Literature has given a trend of yearly identification of external risks.

Literature has shown the influence of external risks on project performance. External risks are unpredictable therefore this study has focused on the influence of external risks on project success triangle i.e. cost, quality and time. Construction is dynamic by nature, and the complexity enhances in international construction projects owing to the contribution of a large number of stakeholders.

The uncertain environment, governmental stability, frequently changing policies and local suppliers augments the complexity for international firm to cope up with local matters.

A total of 43 risks were critical after removing the low ranking risk factors suggested by Egemen and Mohamed (2008). These critical risks were collectively for cost, quality and time. It has been shown in Table 4-6 that out of 43 critical external risks a large number of risk is covered political and social group. 22 factors found critical by frequency analysis through literature are covered in 43 factors.

There were 21 critical risks for cost, 19 risks were critical for quality and 21 for time. From these critical factors, few risks were critical for more than one criteria. For example a social risk *civil war/revolution/political violence* is calculated as critical for all the three success factors, therefore it priority is checked through an AHP method which tells that *civil war/revolution/political violence* for time then for cost and lastly for quality. For obtaining such priorities AHP method was applied.

5.2 Determination of priorities of critical external risks contributing in Project success:

The main aim of this study is the identification and prioritization of critical external risks by using an AHP technique. Sixteen critical risks have been used for prioritization through AHP method. The relative importance of all these factors and their relative impact on success criteria have been identified by applying an AHP technique. Results indicate that critical external risks have big influence on Time, therefore occupy the top priority in success criteria. Results have shown relatively low significance on other two success criteria.

AHP methodology has been proposed because of its application and justification in various real-world complex applications. The methodology and hierarchical structure is simple and can be easily understood at the operational level. It maintains the transparency in decisions by decomposing the complex issues into simple hierarchical structure. AHP assists the group decision makers to identify the complex relationship among the elements of the concerned problem. Therefore, was adopted for prioritizing the Best Value contributing factors according to the specific objective or goal.

The study presents a complete framework of critical factors along with their global weights to the local and international firms. It is not possible to deal with all the factors at the same time. So, with the prioritization gives a thorough understanding that on which criteria they have to work upon depending on their own requirements. Therefore, this relative significance of factors can be very helpful for a risk management plan while joint venturing for a construction project.

The proposed AHP model is simple to use and the computations can be run using available software that is Super Decisions or can be done using spread sheet program. This hierarchy structure allows the user to readily determine the relative contribution and significance of the identified factors for prioritization.

Out of 43 critical external risks, 16 were more influential because of its occurrence in two of success factors. AHP technique was used for the prioritization of following risks; *complicated bureaucratic system* (C&T), *delay in approval* (Q&T), *relationship with government* (Q&T), *size of subsidiary* (C&Q), *fluctuations in exchange rate* (C&Q), *inflation* (C&T), *interest rate fluctuation* (C&T), *altered contract forms* (Q&C), *insufficient legal infrastructure* (C,Q&T), *behavior of contractors* (Q&T), *civil war/revolution/political violence* (C,Q&T), *corruption bribery/ fraud among employees* (C&Q), *delayed payments* (C&T), *geological systems* (C&Q),

unforeseen site conditions (Q&T) and *weather systems* (C&T). The prioritization of critical external risks has been done with respect to cost, quality and time.

The top most critical risks encountered for completing a project within schedule are *inflation, weather systems, civil war/revolution/political violence* and *delay in approval*. Factors those must be observed keenly for achieving project completion within budget are *complicated bureaucratic system, insufficient legal infrastructure, weather systems* and *inflation*.

The study reveals that political risks have big impact on the schedule of a project. It is clear from results that *the complicated bureaucratic system* and *delay in approval* are the major hurdles in a delay of the project. Other major causing delay risks are *forth coming elections, expropriation/ confiscation* and *different policies in local and central government*. Social risks have great impact on 'cost' and 'quality' of the project.

5.3 Findings:

The findings of this research suggested that the external risks are associate with the success of the international projects. International construction projects are more concerned about the host country matters. International firms are exposed to new risks while working abroad. The identified external risks were grouped into five then integrated in a comprehensive survey that was designed to rate their probability of occurrence and impact on cost, time and quality. The study reveals that political and social risks were high importance risks however the legal, economic and natural risks possess moderate importance.

The research has identified two more external risks faced by international joint ventures. One is the "*communication*", it is not just the language to communicate it is about different codes required to deal with authorities between the firms of different origin. And the other identified risk is the

"*change of management of client*", this can also influence the project duration and other success factors.

The growth of global construction has created new business opportunities for both local and international firms. This study investigated 5 types of the external risks that international and local firms face in Pakistan. The impact of these risks was investigated by a comprehensive survey from experts who have experience of International joint venture construction project. This study found prioritization of critical external risks for cost, quality and time for a successful international construction project. This ranking will facilitate foreign firms to manage their budget, duration and quality requirements keeping in view critical risks. Prioritization have been done by applying AHP technique by comparing the significance of critical risks upon each other. This prioritization also provide an ease for the visualization of risks along with a logical and systematic way to deal with them. This can help the international contractors to evaluate the external risks encountered, thus highlight the prioritization to be adopted to manage them. This study will not only help international joint ventures but also local joint ventures to overcome external risks.

5.4 Recommendations:

It is recommended that the international constructors intending to form a joint venture can achieve the project goals by controlling external risks identified. In this research three of the success criteria were considered which incorporates sixteen factors grouped into five. The number of the criteria and categorization could be modified. This is the flexibility of model that number of indicators and hierarchy level could be easily adjusted. Similar study can be performed for specific types of the international construction projects, such as highway projects, dams, high rise buildings etc. under IJV. A research can be carried to determine the influence of external risks on all the critical success factors of construction project.

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Appendix 1

Critical external risks in International construction projects in Pakistan

This survey is intended to collect responses of professionals for the purpose of prioritizing risk factors that have a possible contribution in success of an IJV construction project. For this purpose some external risk factors are presented. Kindly contribute to this survey and help in prioritization of critical external risks and promoting International construction. Your response to this survey is highly appreciated. Kindly answer the following questions keeping your previous project in mind.

Section 1:

PERSONAL & ORGANIZATIONAL INFORMATION:

1. Your name:

2. Name of your organization:

3. Origin of your organization (country):

4. Type of organization:

- Local
- International

5. What is the role of your organization in the construction industry?

- Client
- Contractor
- Consultant
- Both contractor & consultant

6. Your experience in the construction industry (years)?

- Less than 5
- 6-10
- 11-15
- 15-20
- More than 20

7. When your firm was established (year)?

8. Local experience of your firm (years)?

□Less than 5
□6-10
□11-15
□15-20
□More than 20

9. International experience of your firm (years)?

□Less than 5
□6-10
□11-15
□15-20
□More than 20

Section 2:

10. Rate your understanding of risk and risk management?

no understanding at all	Slight	somewhat	moderate	Exceptional

11. How influential are the external risks on achieving project's objectives (time, cost, quality)?

not at all	slightly	somewhat	moderately	extremely

12. Does your organization consider external risks during international joint venture (IJV) construction projects?

not at all	slightly	somewhat	moderately	extremely

13. How influential are the critical external risks on financial objectives of IJV project?

not at all	slightly	somewhat	moderately	extremely

14. How influential are the critical risks on completing IJV projects on schedule?

not at all	Slightly	somewhat	moderately	extremely

15. Do you think that IJV projects have met contract specifications completely?

not at all	Slightly	somewhat	moderately	extremely

16. Considering your previous IJV project, to what extent your project was within approved cost, on time and achieved prescribed quality standards?

	20%	40%	60%	80%	100%
Cost					
Time					
Quality					

Section 3:

17. Considering your previous International joint venture (IJV) construction project, rate the probability of occurrence for following external risks influencing project objectives (Cost, Quality and Time). Mention probability from 0-100%.

Group	Risk Factor	Cost	Quality	Time
Political Risks	Relationship with government			
	Relations with power groups			
	Localization of firm			
	Size of the subsidiary			
	Leverage ratio of the subsidiary			
	Internationalization of the firm			
	Experiential knowledge of the political risks			
	Diversification of the firm			
	Complicated bureaucratic system			
	Interference from the opposition parties (in case of government projects)/factional conflicts			
	Degree of stability of government			
	Change in government policies			
	Level of democracy			
	Different policies in local and central government			
	Forth coming elections			
	Public acceptance to project			
	Delay in approval			
	Expropriation/ confiscation			
Economic Risks	Fluctuations in exchange rates			
	Inflation			
	Interest rate fluctuations			
	Labor and material price fluctuations			
	Import and export restrictions			
	Restrictions on repatriation of funds			
	Market conditions			
	Currency inconvertibility			
	Insufficient legal infrastructure			
	Nationalism and protectionism			

Legal Risks	Authorities and regulations requirements			
	Altered contract forms			
	Lack of legal system			
	Lack of independent judiciary			
Social Risks	Organizational culture			
	Behavior of contractors			
	Delayed payments			
	Unfairness in tendering			
	Dispute with construction labor			
	Religious and ethical strife			
	Permit or license			
	Problems in project planning phase due to policy changes			
	Social relations between various project parties			
	Corruption/bribery or fraud among employees			
	Difference of law or regulations			
	Language or cultural clash (in case of international projects)			
	Restrictive labor markets			
	Changing social concern			
	Lack of adequate contractual relationship between labor and sub-contractors			
	Existence or reemergence of silo mentality/ reluctance to share information			
	Inability to co-ordinate with other departments			
	Organizational turf			
	Protest demonstrations/ strikes			
	Civil war/ revolution/ political violence			
	Criminal acts			
	Supply of local materials			
Natural/ Environmental Risks	Weather systems (hurricane, Typhoon, flood etc.			
	Geological systems (earthquake, Volcanic eruption, geotechnical issues)			
	Unforeseen site conditions			

Section 4:

18. Considering your previous IJV project, how influential were these external risk factors on projects success focusing on Cost, Time and Quality.

Rate according to the scale;

1= not at all, 2= slightly, 3= somewhat, 4= moderately and 5= extremely.

Group	Risk Factor	Cost	Quality	Time
Political Risks	Relationship with government			
	Relations with power groups			
	Localization of firm			
	Size of the subsidiary			
	Leverage ratio of the subsidiary			
	Internationalization of the firm			
	Experiential knowledge of the political risks			
	Diversification of the firm			
	Complicated bureaucratic system			
	Interference from the opposition parties (in case of government projects)/factional conflicts			
	Degree of stability of government			
	Change in government policies			
	Level of democracy			
	Different policies in local and central government			
	Forth coming elections			
	Public acceptance to project			
	Delay in approval			
	Expropriation/ confiscation			
Economic Risks	Fluctuations in exchange rates			
	Inflation			
	Interest rate fluctuations			
	Labor and material price fluctuations			
	Import and export restrictions			
	Restrictions on repatriation of funds			
	Market conditions			
	Currency inconvertibility			
Legal Risks	Insufficient legal infrastructure			
	Nationalism and protectionism			
	Authorities and regulations requirements			
	Altered contract forms			
	Lack of legal system			
	Lack of independent judiciary			
	Organizational culture			

Social Risks	Behavior of contractors			
	Delayed payments			
	Unfairness in tendering			
	Dispute with construction labor			
	Religious and ethical strife			
	Permit or license			
	Problems in project planning phase due to policy changes			
	Social relations between various project parties			
	Corruption/bribery or fraud among employees			
	Difference of law or regulations			
	Language or cultural clash (in case of international projects)			
	Restrictive labor markets			
	Changing social concern			
	Lack of adequate contractual relationship between labor and sub-contractors			
	Existence or reemergence of silo mentality/ reluctance to share information			
	Inability to co-ordinate with other departments			
	Organizational turf			
	Protest demonstrations/ strikes			
	Civil war/ revolution/ political violence			
	Criminal acts			
	Supply of local materials			
Natural/ Environmental Risks	Weather systems (hurricane, Typhoon, flood etc.			
	Geological systems (earthquake, Volcanic eruption, geotechnical issues)			
	Unforeseen site conditions			

Mention if any other unique external risk factor occurred during International JV projects in Pakistan?