CONSTRUCTION RISK INSURANCE: AT CROSSROADS BETWEEN CONSTRUCTION AND INSURANCE INDUSTRIES

A thesis submitted in partial fulfillment of

the requirements for the degree of

Master of Science

in

Construction Engineering & Management

by

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(2019)

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CONSTRUCTION RISK INSURANCE: AT CROSSROADS BETWEEN CONSTRUCTION AND INSURANCE INDUSTRIES

Submitted by

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has been accepted towards the partial fulfillment

of the requirements for the degree

of

Master of Science in Construction Engineering & Management

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This thesis is dedicated to my respected teachers and my family!

ACKNOWLEDGEMENTS

I am thankful to Almighty ALLAH, who gave me strength to complete my research. I would like to pay debt of gratitude to my advisor Dr. Muhammad Jamaluddin Thaheem, for his fathomless guidance, valuable time and encouragement, to complete my research work. I also owe my special thanks to my GEC members and other fellows for their support. I pay my earnest gratitude with sincere sense of respect to my parents, my wife and my sisters for their unending encouragement, prayers and patience. I would like to thank my dear friends and colleagues for their continuous support and patience that helped me in completing this study.

ABSTRACT

Construction industry all over the world faces many uncertainties and risks. Firms have to manage risk on daily basis. In order to run the project smoothly and make it profitable, risk should be properly managed. Out of various prime stakeholders, contractors take the major responsibility to deal with risk during construction process. One of the methods to transfer risk is through insurance to insurance companies. This study has performed an extensive literature synthesis to investigate the local insurance practices in the construction industry and the factors effecting the estimation of insurance premium. Additionally, construction experts were surveyed to assess their confidence in transferring the risks to insurance and get their perception on the risk factors to be considered in estimating the premium to enhance the effectiveness of insurance. Second survey was conducted form the insurance companies to assess the factors based upon which premium is estimated and investigate their perception about the construction industry. The data was analyzed to check how much risk construction companies are transferring to the insurance companies. Data from both the industries was analyzed to check the level of confidence of construction companies on insurance infrastructure and its effectiveness, enforcing the use of insurance on the construction industry and the need to regulate the insurance policies to effectively serve the construction industry.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Chapter 1

1. INTRODUCTION

1.1 PREAMBLE

Uncertainty and risk are involved in all human endeavors. We don't know what future brings to us and we act based on our knowledge and past experience related to that event. Risks and uncertainties are naturally associated with the construction work and have either negative or positive effect upon contracting parties and project objectives.(El-Adaway et al., 2009)

Construction industry all over the world faces many uncertainties and risks. To deal with or to reduce the effect of uncertainty, at least financially, risk management is essential. One of the possible options in risk management is transferring of designated potential risks to financially strong institutions i.e. insurance companies.(Griffis et al., 2000).

1.2 SIGNIFICANCE OF THIS STUDY

Like other businesses construction business is risky. As in a construction business many parties are involved such as client, consultants, contractors, and suppliers etc. which make it more risky. Construction projects are unique and their size and complexity is increasing with time which adds more risks. New teams are formed which includes different companies, countries, cultures (in case of joint ventures) etc. Also the effect of cultural, political , and economical scenarios is to be considered.(El-Sayegh, 2008)

Risk management is a systematic approach that comprises of “finding”, “examining” and “responding” to risks to achieve project goals.(PMBOK, 2004) Current risk management techniques include: Risk identification and its characterization in the design process; Developing a methodology in case of such risks are matured; Transferring of risks for effective management which would not be possible if risk is endured by single party only; and Risk allocation is based on the principle that each party which can have the ability to manage the consequences. Through development of organizational strategies of risk management the negative effects of constructions risks can be reduced. One method of transferring risk is Insurance which is defined as the transferring of potential risk to the financially strong entity, who accept the financial responsibility of any loss occurred for agreed premium cost.(El-Adaway et al., 2009)

Construction firms have to deal and manage risks on regular basis. If these risks are managed properly projects will run smoothly and become profitable. Out of various prime stakeholders, the major responsibility to deal with the risk comes on the shoulder of the contractors (Liu et al., 2007). Insurance in construction industry plays a vital role in transferring risks related to construction projects to insurance companies. (Liu et al., 2004).

The insurance policies provided to construction sector in Pakistan comprises of Contractor’s All Risk (CAR), Erection All Risk (EAR), and Worker’s compensation, Contractor Plant and Machinery and Civil Engineering Completed Risk Insurance. There is strong presence of insurance industry in Pakistan (Arif et al., 2008). Therefore, a study which investigate the role of insurance in which all the related parties i.e.

construction companies and insurance companies are involved will help in improving the overall performance of insurance in construction sector.

1.3 PROBLEM STATEMENT

The construction sector is playing a vital role in economic growth of our country. Construction industry has contributed 2.7% in the country's gross domestic product with its growth rate of 9.1% in year 2017. The signing of the China Pakistan Economic Corridor (CPEC) agreement between two neighboring countries and with the improvement in Pakistan's security situation the construction business in on high. Construction industry is also a major receiver of foreign direct investment (FDI). State Bank's report shows that the construction sector has received a net inflow of 35.7 million dollars in August 2017 (ESOP, 2017).

The changing business trends and advancement in the technology requires the construction industry to improve its aptitude to manage risks. There is a strong presence of insurance in Pakistan but insurance practices do not appear to be deep rooted in the construction sector. The biggest hurdle for developing risk management process is an unsupportive culture in the construction industry. (Arif et al., 2008).

To overcome this problem, this research will focus on the collection of data from risk management department of insurance companies and to get feedback from construction industry about the effectiveness of construction risk insurance on their projects. The data collected will be analyzed and modeled to develop a relationship between insurance policies and their effectiveness on projects.

At present, not much of the work has been carried out on the subject. So assistance from the existing literature and experienced industry professionals will be taken on this subject.

1.4 RESEARCH OBJECTIVES

The following objectives are set forth for this study.

- To investigate practices of insurance and analyze the risk assessment criteria of the insurance companies.
- To assess the level of confidence of construction managers on transferring the risk to insurance companies.
- To investigate the effectiveness of insurance policies on construction projects.
- To formulate guidelines for enhancing the use of construction insurance.

1.5 ADVANTAGES OF STUDY

This study will offer following advantages.

- Evaluation of the behavior of the risk management department of insurance companies will help them to analyze and re-calculate the premium costs.
- Feedback from constructions industry will help insurance companies to improve their insurance policies for projects.
- The effectiveness of insurance policies will help construction industry to get maximum advantage from insurance.
- The above mentioned points will ultimately help better risk management for projects and help construction industry to effectively transfer risks to insurance companies.

1.6 THESIS ORGANIZATION

This thesis has been arranged into five chapters.

Chapter 1 ‘Introduction’ comprises of introduction to research, significant of this study, problem statement, objectives of the study and its advantages.

Chapter 2 ‘Literature Review’ explains the past work which is been carried out regarding the risk management, its techniques and the effectiveness of insurance in risk management in the past.

Chapter 3 ‘Research Methodology’ explains the methodology adopted to achieve the objectives of this study.

Chapter 4 ‘Data Analysis and Results’ contains the statistical analysis of the data, factors analysis and data analysis of scores given by the industry and the discussion of results according to our objectives. It explained how data was collected and analyzed to accomplish the goals of the study.

Lastly, Chapter 5 ‘Conclusions and Recommendations’ provides the conclusions of the study and recommendations for future studies on this subject.

Chapter 2

2. LITERATURE REVIEW

2.1 BACKGROUND

This chapter discusses the previous studies related to the research which is being carried out. It entails a discussion on risk management, techniques of risk management, transfer of risk to insurance companies, insurable risks and effectiveness of insurance in managing risk in the light of previous studies.

Like other trades, construction business is risky. However, due to the involvement of many parties i.e. clients, consultants, contractors, suppliers etc. construction projects apparently have more risks involved in their life cycle. Every construction project is unique. At the start of every project a team is build which comprises of people from different companies, countries, cultures, etc. Furthermore, the size and complexity of construction projects are increasing with time which also increase the risk involved. Also the risks involved due to the economic, political and cultural conditions related to the project location are to be added (El-Sayegh, 2008).

Risk management is a systematic approach of finding, analyzing and developing a strategy to handle risks to achieve the project objectives.(PMBOK, 2004). (Toakley et al., 1991) identified the risk management techniques in the construction industry. These include risk premium, risk adjusted discount rate, subjective probability, decision analysis, sensitivity analysis, Monte Carlo simulation, stochastic dominance, Casper and intuition. If we want high level of risk management in an environment where the awareness of risk management is low we should select insurance weighted transfer strategy for controlling potential risks (Suominen, 1995).

Construction insurance is an effective tool to manage construction risk. Construction all risk policy is the most preferred insurance policy among insurances provided to construction industry (Odeyinka, 2000). Construction insurance plays a vital part in transferring of risks related to construction industry. The changing business trends and advancements in the technology have arisen the need to improve construction industry capability to manage construction risks.(Liu et al., 2004)

Mainly the previous research is usually carried out on the effectiveness of insurance in risk management and issues why this technique of risk transferring is lagging behind. The biggest obstacle for the development of risk management framework is unsupportive attitude to construction industry (Liu et al., 2007).

The attitudes of local contractors towards risk management are not as promising as those in more developed countries. The lack of knowledge about the risk management strategies, their effectiveness and their method of application leaves the space and opportunity to improve the risk management in the industry (Goh et al., 2013).

2.2 RISK MANAGEMENT

Risk is inherent in all human activities, in construction industry many risks are involved due to its diversified and complex nature. In construction risk management activities comprises of planning, prioritization, control techniques and resources are required in order to minimize the impact of these risks. Risk comes in many forms, and its nature depends upon many factors. (Odeyinka, 2000).

Risk management is a systematic approach of finding, analyzing and developing a strategy to handle risks to achieve the project objectives.(PMBOK, 2004). Table 2-1 below shows the stages involved in the risk management (Firmenich, 2017).

Table 2-1 Stages of project risk management.

Risk Management Stages	**Input**	**Output**	**Recommendation**
Identification	Investigation of the cause	List of risks related to project phases, players and tasks	Required at every project
Assessment	Effect assessment	Qualitative / quantitative as well as monetary analysis of identified risks	If the resources are limited qualitative methods are used. Required at every project.
Classification	Prioritization	Ranking of risk based on importance	Only required where necessary.
Mitigation	Plans for risk minimization	Selection strategy (eliminate, reduce, insure or accept risks)	Required in order to achieve risk management goals.
Control	Monitoring / Control	Monitoring and controlling the effectiveness of Risk management.	Required where long term risk management is required with continuous improvement.

Mostly on construction projects risk management is not professionally employed and it techniques based on the professional judgement, personal experience and instinct. Formal risk management is not carried out on construction projects due lack of proper knowledge about its techniques and their subsequent inputs and benefits. (Cretu et al., 2011)

Projects are usually influenced by number of risk factors so the systematic and analytical risk management of a complex and large scale project will identify the potential risks as part of the risk-management procedure (Ghosh et al., 2004). Figure 2-1 below shows the project managemnet model with risk management incorporated in it (Dey, 2002).

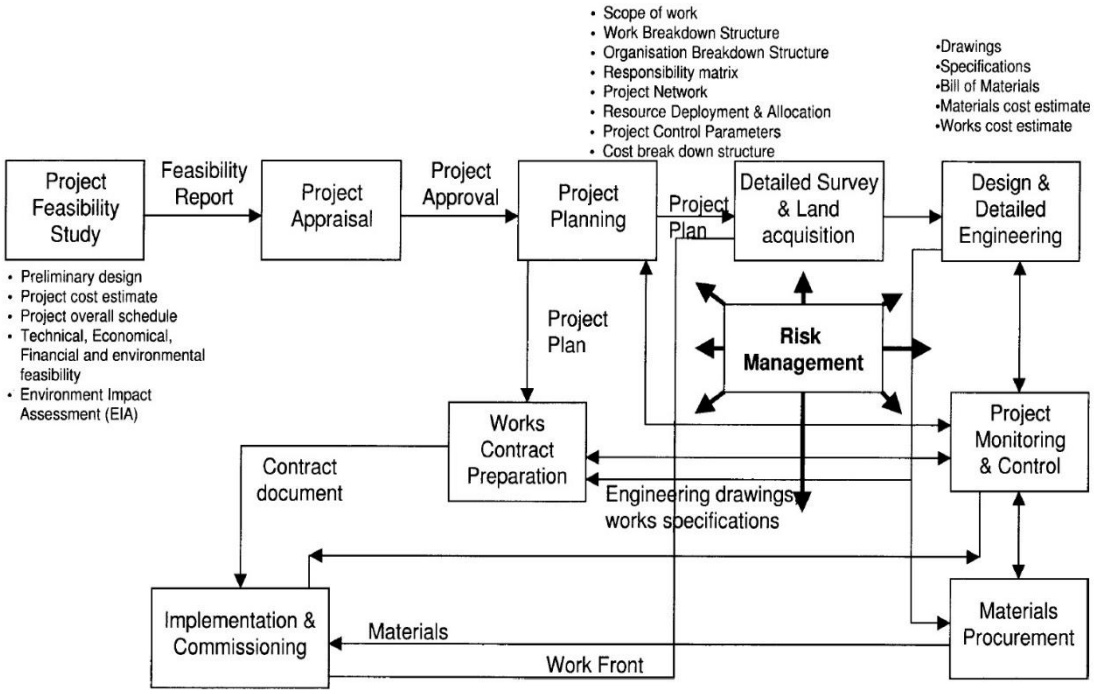

Figure 2-1 Project Management Model

The execution phase of the constucion has highest level of risk in the whole project life as it involves a high levels of investment of money, time and efforts. Informal practices have failed so professional and systematic risk management is required risk reporting is also beneficial for future projects (Goh et al., 2013).

2.2.1 Basic Strategies for Risk Management:

There are four strategies of risk management based on the level of risk management required and the knowledge about its applications (Suominen, 1995) are shown in Table 2-2.

If high level of risk management is required then insurance-weighted transfer strategy or a deliberate control strategy is applied. Whereas risk-aware strategy or a shift strategy are adopted by the companies who have least interest in risk management.

Table 2-2 The Basic Strategies for Risk Management Behavior

The Level of Risk Management	**Strategy Awareness**		
		High	**Low**
	High	Deliberate control strategy	Insurance-weighted transfer strategy
	Low	Risk-aware strategy	Shift strategy

2.2.2. Benefits of Risk Management:

Risk management is very advantageous for construction projects. The advantages of risk management according to (Yirenkyi-Fianko et al., 2015) are as follow:

- Project completed on time
- Project completed within allocated budget
- Product to the required quality
- Reduced site accidents
- Reduction in design/production time

- Improved public perception
- Reduction in claims
- Improved productivity

2.2.3 Risk Transfer and Insurance Mechanism

The basic principle of risk transfer is “the receiving institution must have the capability to properly assess the risk and expertise to deal with it” (Kangari, 1995).

According to (Harrington et al., 1999), in order to classify a risk to be insurable, it should have the following features:

- The number of similar scenarios is large to allow insurers to get benefit from insuring large similar events. Such that the actual consequences are most likely come close to expected outcomes.
- The loss is definite regarding to time and place should have a known cause.
- The loss related to the risk should be accidental.
- The loss in case of maturity of risk is large such that the size of the claim is significant to the insured.
- The loss is related to the risk should be measurable.
- The calculated premium should be affordable and justifiable.

Contractors mostly use three techniques to transfer risk: through insurance, through subcontracting and through amending the contract conditions to insurance companies, subcontractors and clients or other parties respectively. The improved understanding and communication among contracting parties insurance companies will help in the effective management of risks that will benefit the construction sector (Liu et al., 2004).Transferring construction risks in to an insurance company is a globally

accepted technique. Among the insurance policies provided to construction sector, the most preferred or favored is Contractors' All Risks (CAR) policy (Perera et al., 2010).

2.3 INSURANCE IN CONSTRUCTION INDUSTRY:

Insurance is the transfer of risk to a financially strong institution who accept the financial impact of loss at a decided premium cost. (Tsanakas et al., 2005). Construction insurance safeguard the interests of the contracting parties involved on a project against a probable claim for a fixed amount. Construction insurance is a key technique of risk management in the construction sector. Its main purpose is to transfer risks from contracting parties on the construction project to insurance companies so that they can provide financial input in case of any difficulty. Construction insurance plays a significant role by sharing the losses in case of unforeseen events and it helps in the success of projects. However, insurance is sometimes ignored because construction industry practitioners do not have a requisite knowledge of risk allocation and the strategies of risk management through insurance. (Liu et al., 2004)

(Wang et al., 2004) regarded insurance as an effective measure to mitigate the risks at every level i.e. state, market or project level. Insurance is a very significant part of the risk management process. Actually, insurance is also considered as alternative plan after other methods have been taken to reduce risk. The position of insurance in risk management framework for Construction project can be explain using Figure 2-2 (Perera et al., 2010).

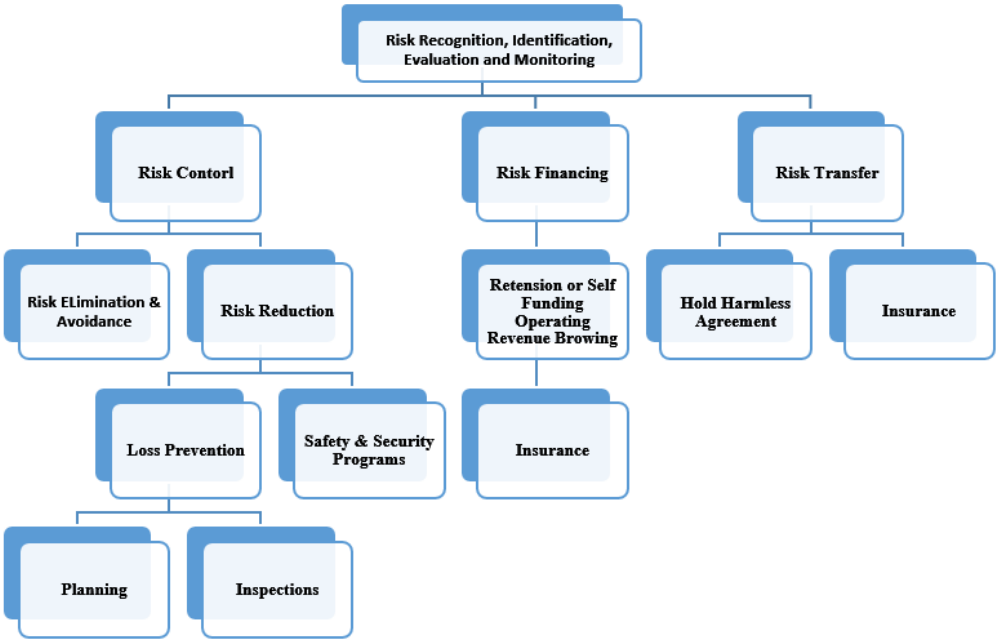

Figure 2-2 Position of Insurance Risk Management Framework

Contractors now a days purchase portfolio of insurance policies that include the following:

- Contractor All Risk Insurance.
- Workers Compensation Insurance.
- Contractor Plant & Machinery Insurance.
- Erection All Risk Insurance
- Third party liability insurance.
- Civil Engineering Completed Risk Insurance.
- Property insurance covering the contractor's real and personal property (El-Adaway et al., 2009).

2.3.1 How to make Insurance Effective:

After providing the insurance cover the insurer must change their methodology as usually they wait till the claim arrives. This can be done by providing financial incentives such that insurer will get a reward like rebate on the premium if he managed to prevent the loss from happening as well as he will be get any form of penalty if loss occurred by his negligence (Srivastava et al., 2001).

Insurance companies must investigate the construction project sites to evaluate risks before calculating the premiums which will in return increase the efficiency of the insurance policies. (Musundire et al., 2015). For this purpose they need the services of civil engineering professionals who can provide them better insight of the risks and their subsequent impact in case of maturity and this will help charging the correct premiums. (Atmanand, 2003). On the other hand contractors all risk insurance is more beneficial to contractors in terms of risk coverage and cost. In addition, it provide higher coverage areas due to it diversified nature.(El-Adaway et al., 2009).

2.3.2 New Dimensions of Construction Insurance:

a) Insurance in Alternate Dispute Resolution (ADR):

Nowadays, the comlexity and scale of consturction projects is increasing which arise complex disputes. Mostly projects have tight budget and schedule so alternative dispute-resolution (ADR) techniques such as arbitration etc. are widely used on construction projects to handle disagreements in more effective and timely. There is a risk that ADR suggest an alternative which have cost associated with it so ADR insurance is an useful alternative for transferring the financial risk to insurance company.The risk of incurring unexpectedly high ADR-implementation costs to the insurance company. (Song et al., 2011).

b) Insurance in Renewable Energy Sector:

Renewable energy is expected to constribute one-third to the world energy by 2050. As this is a growing field and risk related to this are also evolving so isnurance industry has to evolve with the development in this sector as insurance industry has the ability to adapt. Insurance can also help them in more effective risk assessment and help in risk management as other things are little less effective in this new developning sector. (Leblanc, 2008).

c) Insurance in Earthquake Prone Areas:

Earthquake insurance in seismic prone areas is a tool to avoid the financial effects of the risk as well as it is a measure of risk management. (Hoshiya et al., 2004).

2.4 CONSTRUCTION INSURANCE WORLDWIDE:

The developed countries have established an efficient insurance system and made it effective and mandatory which has reduced the losses related to lives and property (Atmanand, 2003). Construction industry experts have come up with the ways to transfer risks and reduce their negative effects throught the development of strategies at the organization level (El-Adaway et al., 2009).

In a study conducted by (Odeyinka, 2000) it was found that one of the key methods for the management of construction related risks in the Nigerian construction industry is through transfer to insurance companies.

Using the FIDIC standard forms of contract construction all risk (CAR) policy has become a mandatory insurance requirement in the construction industry. Construction all risk (CAR) policy covers most of the risks on a construction projects due to its diversified nature (Perera et al., 2010). Whereas talking about China, due to lack of knowledge about risk management, its benefits and unsupportive culture in the

construction industry the use of insurance is less and is not up to its full potential (Liu et al., 2007).

2.5 CONSTRUCTION INSURANCE IN PAKISTAN

The construction industry is playing an important role in economic growth of Pakistan. Construction industry grew 9.1% in year 2017 and contributed 2.7% to the country's GDP. The CPEC initiative and the improved security condition in the country has given boost to construction industry. Construction sector has also been an important beneficiary of foreign direct investment (FDI). State Bank of Pakistan report show that the construction sector received a net inflow of foreign direct investment of $35.7 million in August 2017. (ESOP, 2017).

The gross premium of insurance industry in Pakistan has increased 16% from 1972 to 2006. In the recent years this average is about 20% and still growing. This indicates the awareness in the construction engineering sector regarding insurance as tool to transfer construction risks (Arif et al., 2008) practictioners.

The changing business trends and the advancements in the technology needs the construction industry to improve its aptitude to manage risks related to construction. There is strong presence of insurance industry in Pakistan but insurance practices do not seem to be deep rooted in the construction sector due to its unsupportive culture. Formal risk management is rarely used on the construction project due to lasck of knowledgeandexpertise about risk management. In most situations, practitioners wait until issues arise. They apply informal techniques based upon their knowledge and past experience to handle the risk. The biggest hurdle to developing risk management process is an uncooperative culture in the construction industry. (Arif et al., 2008).

To overcome this problem, this research will focus on the collection of data from risk management department of insurance companies and to get feedback from construction industry about the effectiveness of construction risk insurance on their projects. The data collected will be analyzed to investigate insurance policies and their effectiveness on projects.

2.6. LIST OF RESEARCH WRITING RESOURCES:

Table 2-3 shows the list of research writing resources used in the identification of the factors affecting the risk assessment criteria of construction companies.

Table 2-3 List of Research Writing Resource

Sr. #	Source	Research Focus	Number Cited
1	Journal of Construction Engineering and Management	Contractor Claims Insurance ; ADR Insurance	5
2	International Journal of Project Management	Risk Analysis And Management On Construction Projects	4
3	Journal of Management and Economics	Use Of Insurance In Managing Construction Risks; WCI Premiums	3
4	Journal of Engineering Design and Technology	Major Construction Risk Factors	2

5	Journal of Construction in Developing Countries	Assessment Of Risk On Large Projects	2
6	Journal of Management Engineering	Post Disaster Insurance ; Single Vs Portfolio Insurance	2
7	The Geneva Papers on Risk and Insurance	Insurance In Renewable Energy Industry	2
8	International Journal of Disaster Prevention and Management	Insurance In Disaster Management	1
9	Journal of Industrial Management and Data Systems	Issues Of Risk Management And Insurance In Construction	1
10	Australian Journal of Construction Economics and Building	Risk Affecting Time Overrun In Road Construction	1
11	Journal of Risk Finance	Earthquake Insurance	1
12	Journal of Manufacturing Technology Management	Risk Factors For Project Success	1
13	Journal of Engineering, Construction and Architectural Management	Enterprise Risk Management	1

14	Journal of Construction Innovation	Framework For Project Risk Management	1
15	Others	Contractors All Risk Policy ; Transfer Of Seismic Risk To Insurance	3

4.7. FACTOR AFFECTING RISK ASSESSMENT OF CONSTRUCTION AND INSURANCE INDUSTRY

Table 2-4 shows probable factors affecting the risk assessment criteria of the construction industry. These are collected from previous studies and literature review.

Table 2-4 Factors Affecting Risk Assessment of Construction Industry

Sr. No.	**Factors Affecting the Risk Assessment Criteria (Construction Industry)**	**Frequency**
1	Financial Fluctuations	13
2	Force Majeure	13
3	Safety	10
4	Equipment Condition	8
5	Political Instability	6

6	Design Risks	10
7	Adequacy of Insurance	5
8	Tight Project Schedule	3
9	Quality	3
10	Financial Condition	3
11	Foreign Exchange & Convertibility	3
12	Claims & Disputes	3
13	Lack of Knowledge	5
14	Improper Project Management	4
15	Probability of Cost Overrun	2
16	Logistics (Materials in Transit) / Delay in Materials	3
17	Market Reputation of Owner	1
18	Site Security	1
19	Termination of JV	1
20	Government Policies	1
21	Past Experience with Company	1

Table 2-5 shows probable factors affecting the risk assessment of the insurance companies collected from pilot survey of the industry.

Table 2-5 Factors Affecting Risk Assessment of Construction Industry

Sr. No.	Factors Affecting Risk Assessment (Insurance Industry)	Frequency
1	Owner Reputation	2
2	Nature of Contract	4
3	Project / Risk Location	4
4	Equipment Condition	3
5	Past Experience	4
6	Project Duration	3
7	Scope of Project / Sum Insured	5
8	Risk Maturity Trends	2
9	Political Stability	2
10	Force Majeure	3
11	Third Party Liabilities	4
12	Safety	2
13	Quality	2

14	Surrounding Structures	2
15	Security	1

Chapter 3

3. METHODOLOGY

3.1 INTRODUCTION

This chapter will provide methodology to achieve the objectives of this research as provided in Chapter 1. Firstly a comprehensive literature review was done in order to identify the main factors to assess the construction risk insurance. Questionnaire survey was done form both the construction industry and the insurance sector for the assessment of construction risk insurance. In this chapter complete methodology is discussed about data collection and its analysis.

3.2 RESEARCH DESIGN

Research design refers to a logical way to carry out any research by the integration of multiple techniques. The study was divided into four phases. In first phase comprehensive literature review was carried out to identify the factors related to the construction risk insurance.

In second phase, questionnaire was developed and then it was floated to professionals in the construction industry and insurance company's professionals. In third phase statistical test were performed on the data collected from construction industry and insurance industry. In fourth phase, analysis was carried out on the data and results were discussed.

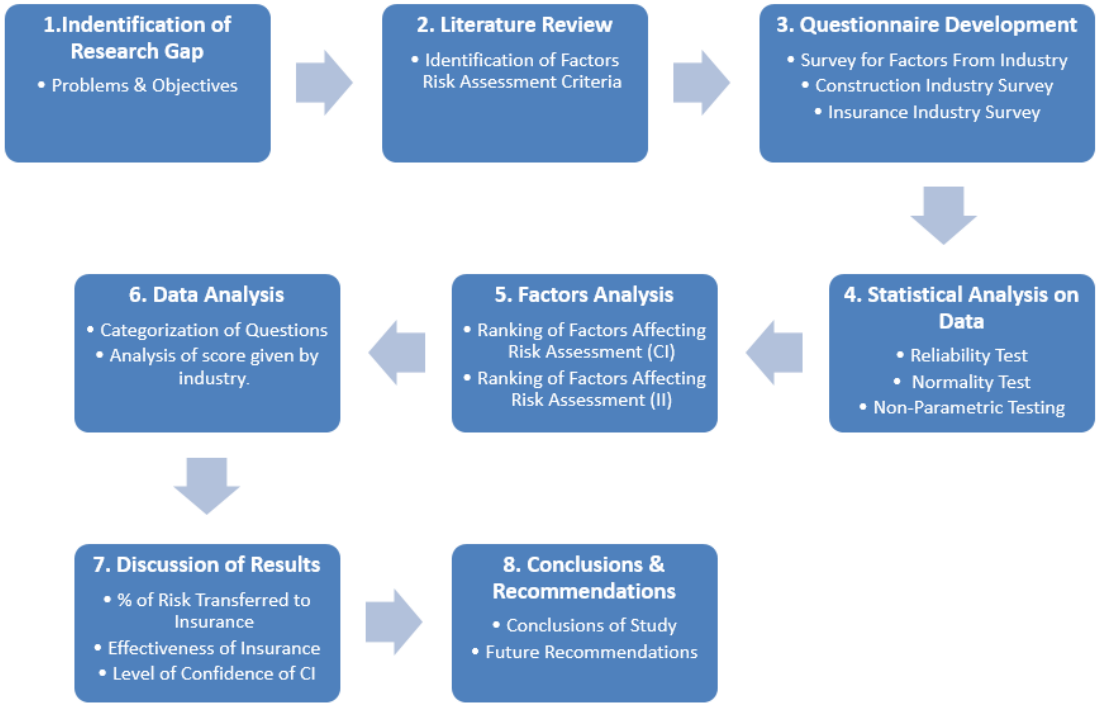

Figure 3-1 Research Flowchart

Figure 3-1 shows the schematic representation of working methodology for this research. It includes input from both literature and industry experts to produce reliable results.

Different data sources, method of collection and techniques used for achieving research objectives are stated below for clarification.

Objective 1 (O-1): To investigate the practices of insurance and to analyze the risk assessment criteria of the insurance companies.

Extensive literature review will be performed to investigate the practices of insurance. Survey will be conducted from insurance industry will also address the policies which are being issued to construction industry in Pakistan. To assess and analyze their risk assessment criteria of insurance companies list of factors will be requested form the insurance companies based upon which they and assessing the risk

and calculating the premiums. Figure 3-2 shows the methodology adopted to achieve respective objective.

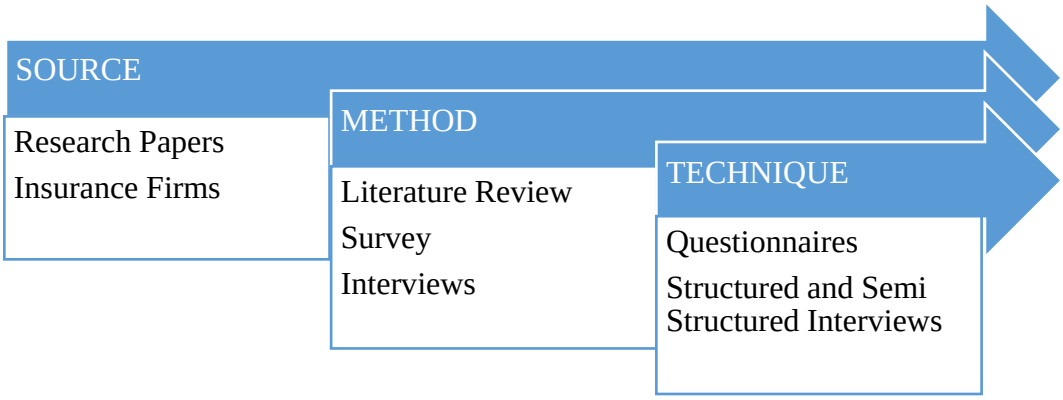

Figure 3-2 Source, Method and Technique for O-1

Objective 2 (O-2): To assess the level of confidence of construction managers on transferring the risk to insurance.

To achieve second objective, survey will be conducted to gather data from construction industry experts about their level of confidence on transferring the risk to insurance. Data will be analyzed to investigate their level of confidence on transferring risk to insurance. Figure 3-3 shows different sources, methods and techniques used for this objective.

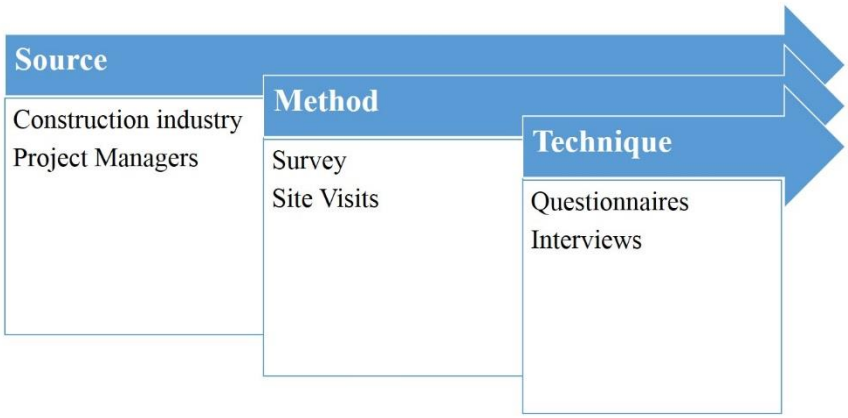

Figure 3-3 Source, Method and Technique for O-2

Objective 3 (O-3): To investigate the effectiveness of insurance on construction projects.

The data collected from insurance companies and construction industry, is analyzed in order to assess the effectiveness of transferring the risks to insurance in construction industry.

Objective 4 (O-4): To formulate guidelines for enhancing the use of construction insurance.

On the basis of knowledge gained from literature review, data collected from experts and analysis result, general guidelines will be established for enhancing the use of insurance and enhancing its effectiveness.

Chapter 4

4. DATA ANALYSIS AND RESULTS

4.1. INTRODUCTION

In this chapter will discuss the analysis performed on the collected data. Results were drawn from the data and detailed discussion on finding in the relevant sections of the chapter.

4.2. QUESTIONAIRE SURVEY

Firstly, the questionnaire survey was floated to construction industry to get their response on the reliability of transferring the construction risks to insurance and to rank the factors that must be considered while calculating the insurance premiums.

Secondly, the questionnaire survey was floated to insurance industry to get insight of the factors they are considering while calculating the premiums and their risk assessment criteria was studied based upon their response to the questionnaire.

4.2.1. Characteristics of Respondents form Construction Industry:

Questionnaire survey was floated to 356 respondents out of whom 98 responses were collected giving a response rate of 27.52%. The analysis was then carried out on 98 responses. The respondents were further characterized into four groups related to their principal organization i.e.; clients were 21.42%, consultants 25.51%, academia 14.28% and contractors 38.77%. Table 4-1 shows the respondents groups and their frequencies respectively.

Table 4-1 Respondent Characteristics

Group	No. of Respondents	Percentage	Cumulative Percentage
Client	21	21.42%	21.42
Consultant	25	25.51%	46.93
Contractor	38	38.77%	85.70
Academia	14	14.28%	100
Total	**98**	**100%**	

The experience of the respondents is shown in the Table 4-2. In total, 14.28% respondents had experience more than 10 years, 21.42% respondents had experience 6 to 10 years and 64.28% respondents had experience 5 years and less.

Table 4-2 Experience of Respondents in Constructions

Experience in Years	No. of Respondents	Percentage	Cumulative Percentage
0-5	63	64.28%	64.28
6-10	21	21.42%	85.70
More than 10	14	14.28%	100
Total	98	100%	

4.2.2. Characteristics of Insurance Companies:

Data was collected from five insurance companies based upon their credit ratings for the. Table 4-3 shows the credit ratings of the insurance companies given by Pakistan Credit Rating Agency (PACRA).

Table 4-3 Credit Ratings of Insurance Companies

Sr. No.	Company Name	PACRA Rating
1	EFU General Insurance Company Limited	AA+
2	Jubilee General Insurance Company Limited	AA+
3	IGI Insurance Company Limited	AA
4	Askari General Insurance Company Limited	AA
5	Adamjee Insurance Company Limited	AA+

4.3. STATISTICAL ANALYSIS:

To validate the collected data statistically various tests were conducted details for which is discussed below:

4.3.1. Reliability of the Collected Data

Cronbach's Coefficient Alpha Method (Construction Industry)

Cronbach's Alpha method is used to check the reliability of data which was based on Likert scale (Cronbach, 1951). If the value of Cronbach's Alpha is equal to or greater than 0.7, then the data is reliable. (Cortina, 1993).The value of Cronbach's Alpha for the first part of the questionnaire is 0.701 as shown in Table 4-4 so the data is reliable and we can proceed to further analysis.

Table 4-4 Cronbach's Coefficient Alpha

Case Processing Summary				Cronbach's Alpha	0.701
		N	%		
Cases	Valid	98	100.0		
	Excluded [a]	0	0.0	No. of Items	14
	Total	98	100.0		
a. List wise deletion on all variables in the procedure.					

If value of Cronbach's Alpha is greater than 0.9, then data is highly consistent. (Cortina, 1993).The value of Cronbach's Alpha for the second part of the questionnaire is 0.928 as shown in Table 4-5 so the data is highly consistent for further analysis.

Table 4-5 Cronbach's Coefficient Alpha

Case Processing Summary				Cronbach's Alpha	0.928
		N	%		
Cases	Valid	98	100.0		
	Excluded [a]	0	0.0	No. of Items	21
	Total	98	100.0		
a. List wise deletion on all variables in the procedure.					

Cronbach's Coefficient Alpha Method (Insurance Industry)

Cronbach's Alpha method is used to check the reliability of data which was based on Likert scale (Cronbach, 1951). If the value of Cronbach's Alpha is equal to or greater than 0.7, then the data is reliable. (Cortina, 1993).The value of Cronbach's Alpha for the first part of the questionnaire is 0.701 as shown in Table 4-6 so the data is reliable and we can proceed to further analysis.

Table 4-6 Cronbach's Coefficient Alpha

<table>
<tr><td colspan="4">Case Processing Summary</td><td rowspan="2">Cronbach's Alpha</td><td rowspan="2">0.707</td></tr>
<tr><td colspan="2"></td><td>N</td><td>%</td></tr>
<tr><td rowspan="3">Cases</td><td>Valid</td><td>11</td><td>100.0</td><td rowspan="4">No. of Items</td><td rowspan="4">15</td></tr>
<tr><td>Excluded [a]</td><td>0</td><td>0.0</td></tr>
<tr><td>Total</td><td>11</td><td>100.0</td></tr>
<tr><td colspan="4">a. List wise deletion on all variables in the procedure.</td></tr>
</table>

If the value of Cronbach's Alpha is equal to or greater than 0.7, then the data is reliable. (Cortina, 1993).The value of Cronbach's Alpha for the second part of the questionnaire is 0.701 as shown in Table 4-7 so the data is reliable and we can proceed to further analysis.

Table 4-7 Cronbach's Coefficient Alpha

<table>
<tr><td colspan="4">Case Processing Summary</td><td rowspan="2">Cronbach's Alpha</td><td rowspan="2">0.722</td></tr>
<tr><td colspan="2"></td><td>N</td><td>%</td></tr>
<tr><td rowspan="3">Cases</td><td>Valid</td><td>11</td><td>100.0</td><td rowspan="4">No. of Items</td><td rowspan="4">15</td></tr>
<tr><td>Excluded [a]</td><td>0</td><td>0.0</td></tr>
<tr><td>Total</td><td>11</td><td>100.0</td></tr>
<tr><td colspan="4">a. List wise deletion on all variables in the procedure.</td></tr>
</table>

4.3.2. Measurement of Normality of Data

Shapiro-Wilk Test Method (Construction Industry)

To check the normality of data, Shapiro-Wilk test was performed as the sample size was less than 2000. Shapiro-Wilk test was conducted to check whether the collected data was parametric or nonparametric i.e. normally distributed or not normally distributed. As per the results of this test, the data is non-parametric i.e. not normally distributed. So non-parametric tests are needed to further analysis. Table 4-8 and Table 4-9 shows the results of Shapiro-Wilk test performed on the data collected form construction industry.

Table 4-8 Shapiro Wilk Test

Sr. No.	Description	Statistic	df	Sig.
1	Insurance is very important for the construction industry	.716	98	.000
2	Insurance is a contractual obligation in most of the Construction Contracts	.842	98	.000
3	The insurance, now a days is playing effective role in current construction environment	.884	98	.000
4	There is a need to upgrade the insurance services in construction industry	.692	98	.000
5	There is a need to enforce the use of insurance in construction industry	.694	98	.000
6	The insurance is a rather neglected issue in the construction industry	.851	98	.000
7	The currently offered insurance policies do not cover the whole spectrum of construction risks	.818	98	.000
8	The local insurance practices in Pakistan are consistent with the international practices	.892	98	.000
9	The risk premiums charged by the Insurance Companies are Unrealistic	.872	98	.000
10	The construction insurance has reduced the possible claims between clients and contractors	.873	98	.000
11	The contractors are more willing to utilize the construction insurance as the most favorable risk transfer mechanism	.887	98	.000
12	There is a dire need of training sessions for insurance practitioners to get along with the changing construction risks	.730	98	.000
13	There is need to offer educational programs on Insurance and Risks that relate Specifically to the Needs of the Construction Industry	.649	98	.000
14	Insurance increases the Overall Project Cost	.901	98	.000

Table 4-9 Shapiro Wilk Test

Sr. No.	Description	Statistic	df	Sig.
1	Financial Fluctuations	.879	98	.000
2	Force Majeure	.870	98	.000
3	Safety	.847	98	.000
4	Equipment Condition	.865	98	.000
5	Political Instability	.873	98	.000
6	Design Risks	.877	98	.000
7	Adequacy of Insurance	.898	98	.000
8	Tight Project Schedule	.893	98	.000
9	Quality	.892	98	.000
10	Financial Condition	.877	98	.000
11	Foreign Exchange & Convertibility	.895	98	.000
12	Claims & Disputes	.876	98	.000
13	Lack of Knowledge	.880	98	.000
14	Improper Project Management	.889	98	.000
15	Probability of Cost Overrun	.888	98	.000
16	Logistics (Materials in Transit) / Delay in Materials	.900	98	.000
17	Market Reputation of Owner	.888	98	.000
18	Site Security	.888	98	.000
19	Termination of JV	.899	98	.000
20	Government Policies	.855	98	.000
21	Past Experience with Company	.879	98	.000

Shapiro-Wilk Test Method (Insurance Industry)

To check the normality of data, Shapiro-Wilk test was performed as the sample size was less than 2000. Shapiro-Wilk test was conducted to check whether the collected data was parametric or nonparametric i.e. normally distributed or not normally

distributed. As per the results of this test, the data is non-parametric i.e. not normally distributed. So non-parametric tests are needed to further analysis. Table 4-10 and Table 4-11 shows the results of Shapiro-Wilk test performed on the data collected form insurance industry.

Table 4-10 Shapiro Wilk Test

Sr. No.	Description	Statistic	df	Sig.
1	Insurance is very important for the construction industry	.572	11	.000
2	Insurance is a contractual obligation in most of the Construction Contracts	.572	11	.000
3	The insurance, now a days is playing effective role in current construction environment	.774	11	.004
4	There is a need to upgrade the insurance services in construction industry	.799	11	.009
5	There is need to enforce the use of insurance in construction industry	.833	11	.025
6	There has been an increasing trend towards acquirement of construction insurance	.689	11	.000
7	The construction insurance is an ignored issue in the insurance business	.756	11	.002
8	The insurance is a rather neglected issue in the construction industry	.799	11	.009
9	There is poor quantification of risk on behalf of Insurance Companies	.625	11	.000
10	The Premium Calculation Mechanism is inconsistent with no set rules/methods/policies	.649	11	.000
11	The insurers have the capability to incorporate the overall risk spectrum in their Risk Quantification and subsequent Premium	.793	11	.008
12	The local insurance practices in Pakistan are consistent with the international practices	.833	11	.025

13	The contractors are more willing to utilize the construction insurance as the most favorable risk transfer mechanism	.649	11	.000
14	There is a dire need of training sessions for insurance practitioners to get along with the changing construction risks	.822	11	.018
15	Insurance increases the project cost	.625	11	.000

Table 4-11 Shapiro Wilk Test

Sr. No.	**Description**	**Statistic**	**df**	**Sig.**
1	Owner Reputation	.649	11	.000
2	Nature of Contract	.625	11	.000
3	Project / Risk Location	.819	11	.017
4	Equipment Condition	.625	11	.000
5	Past Experience	.795	11	.008
6	Project Duration	.795	11	.008
7	Scope of Project / Sum Insured	.819	11	.017
8	Risk Maturity Trends	.649	11	.000
9	Political Stability	.625	11	.000
10	Force Majeure	.625	11	.000
11	Third Party Liabilities	.649	11	.000
12	Safety	.795	11	.008
13	Quality	.785	11	.006
14	Surrounding Structures	.649	11	.000
15	Security	.649	11	.000

4.3.3. Kruskal Wallis Test for Non-Parametric Data (Construction Industry):

As from the above test the data collected for this research was non-parametric so Kruskal-Wallis Test as shown in Table 4-12 and Table 4-13 was used to check whether all respondents i.e. clients, consultants, contractors and academia had similar perception regarding the questions asked and the factors that should be used in calculating the premium for risk insurance.

Table 4-12 Kruskal Wallis test on Questions Response from Clients, Consultants, Contractors and Academia.

Sr. No.	Description	Sig.
1	Insurance is very important for the construction industry	.491
2	Insurance is a contractual obligation in most of the Construction Contracts	.085
3	The insurance, now a days is playing effective role in current construction environment	.825
4	There is a need to upgrade the insurance services in construction industry	.829
5	There is a need to enforce the use of insurance in construction industry	.910
6	The insurance is a rather neglected issue in the construction industry	.611
7	The currently offered insurance policies do not cover the whole spectrum of construction risks	.073
8	The local insurance practices in Pakistan are consistent with the international practices	.251
9	The risk premiums charged by the Insurance Companies are Unrealistic	.906
10	The construction insurance has reduced the possible claims between clients and contractors	.876
11	The contractors are more willing to utilize the construction insurance as the most favorable risk transfer mechanism	.919
12	There is a dire need of training sessions for insurance practitioners to get along with the changing construction risks	.851

13	There is need to offer educational programs on Insurance and Risks that relate Specifically to the Needs of the Construction Industry	.473
14	Insurance increases the Overall Project Cost	.349

For all of the questions asked, the perception of every group of respondents was same.

Table 4-13 Kruskal Wallis test on factors from Clients, Consultants, Contractors and Academia.

Sr. No.	**Description**	**Sig.**
1	Financial Fluctuations	.980
2	Force Majeure	.251
3	Safety	.763
4	Equipment Condition	.129
5	Political Instability	.316
6	Design Risks	.089
7	Adequacy of Insurance	.314
8	Tight Project Schedule	.228
9	Quality	.426
10	Financial Condition	.095
11	Foreign Exchange & Convertibility	.857
12	Claims & Disputes	.863
13	Lack of Knowledge	.981
14	Improper Project Management	.305
15	Probability of Cost Overrun	.368
16	Logistics (Materials in Transit) / Delay in Materials	.353
17	Market Reputation of Owner	.629
18	Site Security	.404
19	Termination of JV	.800
20	Government Policies	.262
21	Past Experience with Company	.691

For all of the factors, the perception of every group of respondents was same.

4.3.4. Kruskal Wallis Test for Non-Parametric Data (Insurance Industry):

As from the above Shapiro Wilk test the data collected for this research was non-parametric so Kruskal-Wallis Test as shown in Table 4-14 and Table 4-15 was used to check whether all respondents from different insurance companies had similar perception regarding the questions asked and the factors that they are using in calculating the premium for risk insurance.

Table 4-14 Kruskal Wallis test on Questions Response from Insurance Companies.

Sr. No.	Description	Sig.
1	Insurance is very important for the construction industry	.040
2	Insurance is a contractual obligation in most of the Construction Contracts	.371
3	The insurance, now a days is playing effective role in current construction environment	.105
4	There is a need to upgrade the insurance services in construction industry	.177
5	There is need to enforce the use of insurance in construction industry	.147
6	There has been an increasing trend towards acquirement of construction insurance	.096
7	The construction insurance is an ignored issue in the insurance business	.603
8	The insurance is a rather neglected issue in the construction industry	.818
9	There is poor quantification of risk on behalf of Insurance Companies	.392
10	The Premium Calculation Mechanism is inconsistent with no set rules/methods/policies	.562
11	The insurers have the capability to incorporate the overall risk spectrum in their Risk Quantification and subsequent Premium	.433
12	The local insurance practices in Pakistan are consistent with the international practices	.549
13	The contractors are more willing to utilize the construction insurance as the most favorable risk transfer mechanism	.421
14	There is a dire need of training sessions for insurance practitioners to get along with the changing construction risks	.084
15	Insurance increases the project cost	.133

For all of the factors, the perception of every company was same but for the following one factor difference in perception was observed:

a) Insurance is very important for the construction industry.

Table 4-15 Kruskal Wallis test on Factors from Insurance Companies.

Sr. No.	Description	Sig.
1	Owner Reputation	.562
2	Nature of Contract	.485
3	Project / Risk Location	.381
4	Equipment Condition	.650
5	Past Experience	.247
6	Project Duration	.247
7	Scope of Project / Sum Insured	.144
8	Risk Maturity Trends	.726
9	Political Stability	.485
10	Force Majeure	.485
11	Third Party Liabilities	.726
12	Safety	.247
13	Quality	.068
14	Surrounding Structures	.726
15	Security	.562

For all of the factors, the perception of every company was same.

4.4. TYPES OF INSURANCE POLICIES UTILIZED IN PAKISTAN:

We have investigated about the insurance policies issued by the insurance companies to the construction industry in the questionnaire. Below mentioned are the

insurance policies utilized by the construction industry in Pakistan. Summary of rate of premium for insurance policies is also shown in Table 4-16 below.

4.4.1. Construction All Risk Insurance (CAR):

Contractors all risks (CAR) insurance policy covers for risks related to material damage and third-party injury or damage to the property claims on construction projects. The average rate of premium for CAR policies charged by the insurance companies in Pakistan varies between 0.1% to 0.45% as per project nature.

4.4.2. Erection All Risk Insurance (EAR):

Erection All Risks (EAR) Insurance provide cover against the risks involved in erection and installation of plants, machinery, steel structures and heavy equipment on projects and against their exposure to loss, damage or liability. The average rate of premium for EAR policies charged by the insurance companies in Pakistan is 0.45% and varies as per project nature.

4.4.3. Worker Compensation Insurance (WCI):

Workmen's Compensation insurance provide cover against the death of the employee and bodily injury arising while carrying out work at project. The average rate of premium for WCI policies charged by the insurance companies in Pakistan varies between 1% to 1.5% as per job nature.

4.4.4. Contractor Plant & Machinery Insurance:

The Plants, Equipment and Machinery at construction projects are exposed to a lot of uncertainties inherent in their operations as well as they are exposed to other calamities at site. Contractor plant & machinery insurance covers loss associated with

any accidental breakdown. The average rate of premium for this policy charged by the insurance companies in Pakistan varies between 0.7% to 0.8% as per nature of equipment.

4.4.5. Civil Engineering Completed Risk Insurance (CECR):

Civil engineering completed risk insurance is relatively new form of insurance that covers operational phase risks of construction projects. The rate of premium for this particular type of insurance varies on every project based on the requirement of the client and risks which are to be addressed by this insurance.

Table 4-16 Summary of Rate of Premium for Insurance Policies

Sr. No.	Insurance Policies	Rate of Premium
1	Construction All Risk Insurance	0.1% to 0.45%
2	Erection All Risk Insurance	0.45%
3	Worker Compensation Insurance	1% to 1.5%
4	Contractor Plant & Machinery Insurance	0.7% to 0.8%
5	Civil Engineering Completed Risk Insurance	Varies for every project

4.5. PERCENTAGE OF TOTAL RISK TRANSFERRED TO THE INSURANCE COMPANIES BY THE CONSTRUCTION INDUSTRY IN PAST YEARS:

We have obtained the financial statistics from the insurance industry which shows how much premium was written in terms of policies issued to the construction industry. The Table 4-17 below shows the premium written to the construction industry in the past years where as Figure 4-1shows the graphical representation.

Table 4-17 Premium Written in Past Years by Insurance Industry

Year	**2017**	**2016**	**2015**	**2014**
Company	**Premium Written in Million Rupees**			
Adamjee	1633	1571	1543	1547
Askari	101	187	90	78
EFU	3868	3003	2684	2769
Jubilee	629	733	902	756
IGI	203	-	-	-
Total	**6434**	**5495**	**5218**	**5149**

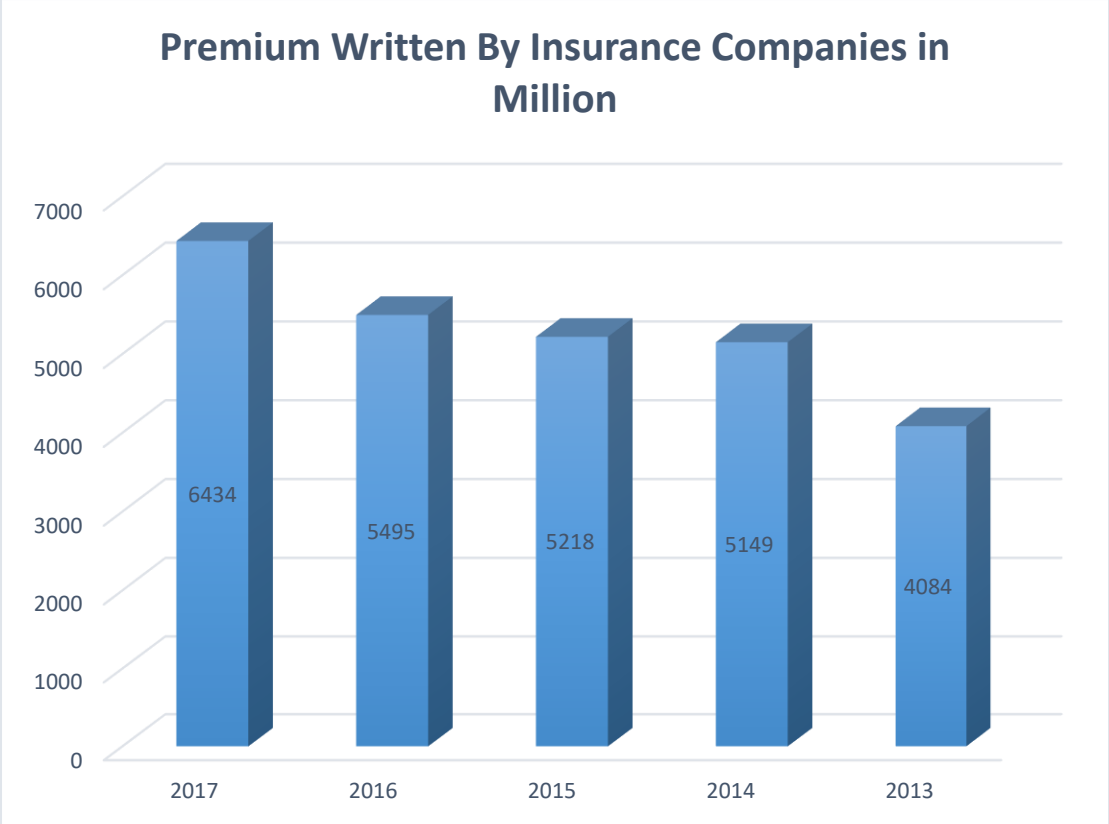

Figure 4-1 Premium Written by Insurance Industry

To get the numbers of the total business done by the construction industry in these years was obtained from the Pakistan Bureau of Statistics press released shown in Table 4-18 which showed the contribution of the construction industry in the GDP of Pakistan and Figure 4-2 shows its graphical representation which shows the growth in construction sector over the past years.

Table 4-18 Construction Industry Contribution to GDP

Year	**2017**	**2016**	**2015**	**2014**
Contribution in GDP Form Construction Industry in Million Rupees	343183	320769	294154	256685

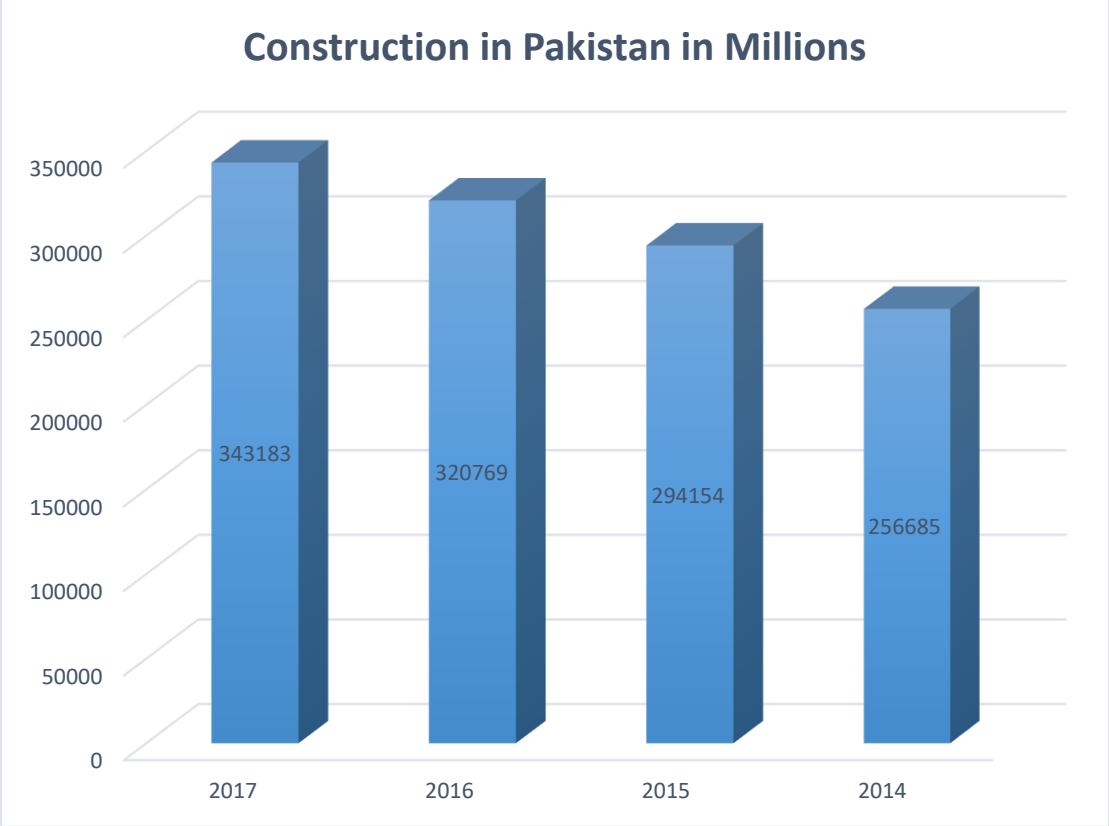

Figure 4-2 Construction in Pakistan in Millions

To get the percentage of amount given to insurance industry by construction industry we will divide the total construction carried out in the year by the total premium written by the insurance companies as shown in Table 4-19.

Table 4-19 Percentage Funds Given to Insurance Industry

Year	**2017**	**2016**	**2015**	**2014**
% Amount to II From CI	1.87	1.71	1.77	2.01

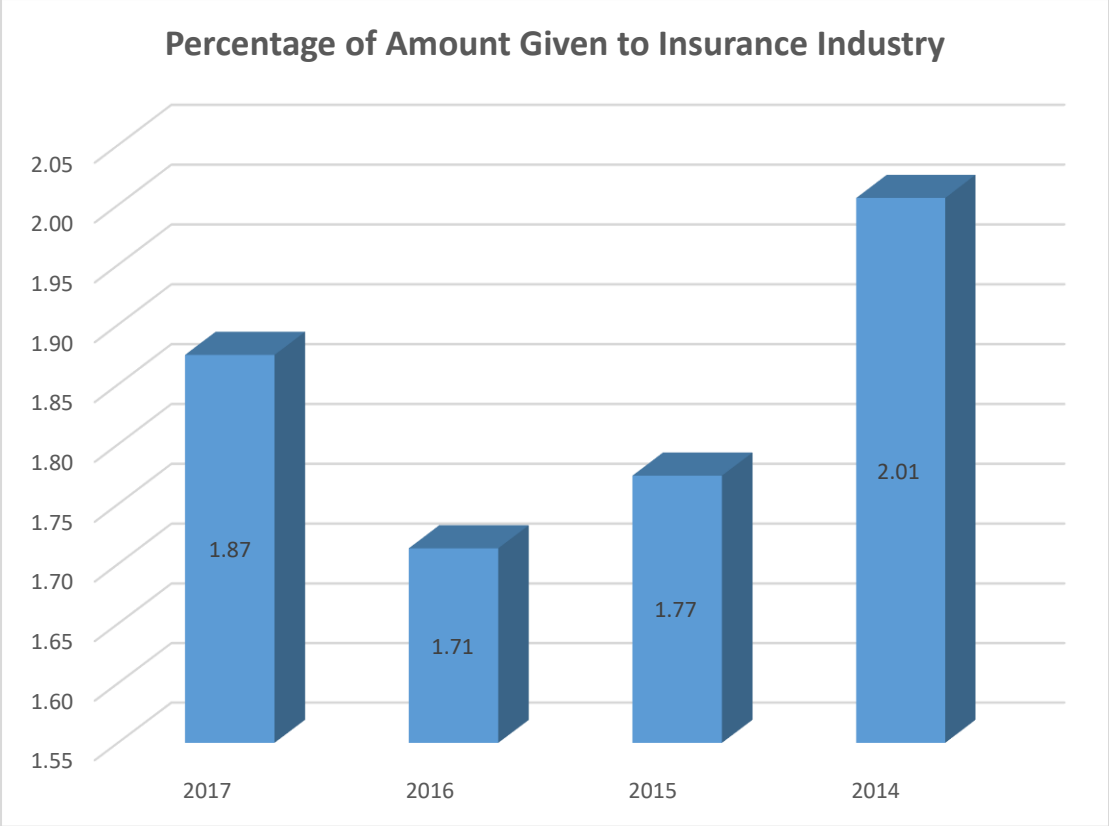

Figure 4-3 Percentage of Risk Transferred to Insurance Industry.

As shown in Figure 4-3 approximately construction industry has paid two percent of its total cost to the insurance industry in order to get insurance cover for their projects.

In order to check the effectiveness of the risk transferred to insurance industry we will be interested in the amount or percentage of claims paid by the insurance industry to construction industry of the total premium written. The Table 4-20 below shows the amount of claims paid by the insurance industry also Figure 4-4 shows total claims paid each year:

Table 4-20 Claim Paid in Past Years by Insurance Industry

Premium Written vs Claims Paid by the Insurance Companies in Millions (PKR)												
Year	2014			2015			2016			2017		
Company	PW	CP	%	PW	CP	%	PW	CP	%	PW	CP	%
Adamjee	1547	701	45%	1543	636	41%	1571	670	43%	1633	478	29%
Askari	78	20	26%	90	36	40%	187	57	30%	101	58	57%
EFU	2769	951	34%	2684	827	31%	3003	520	17%	3868	764	19%
Jubilee	756	140	18%	902	171	19%	733	174	24%	629	271	43%
IGI	-	-		-	-		-	-		203	72	
Total	5149	1811	35%	5218	1671	32%	5495	1421	26%	6434	1643	26%

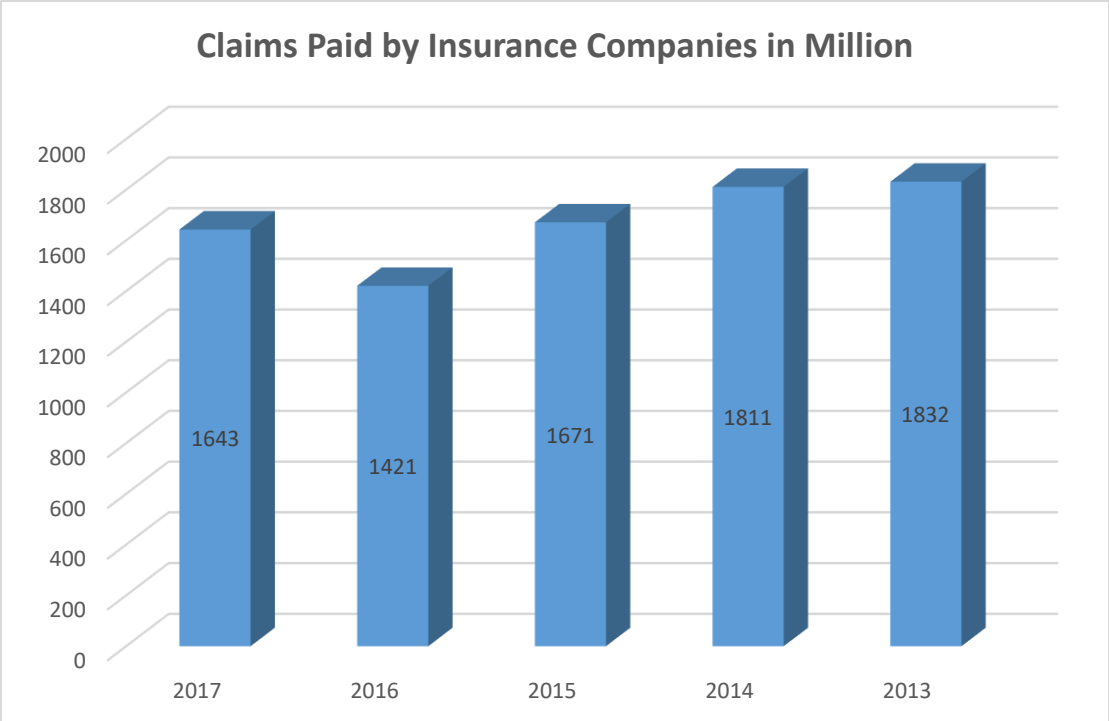

Figure 4-4 Claims Paid by Insurance Industry

The Table 4-21 below shows percentage of claims paid by insurance industry to construction industry.

Table 4-21 Percentage of Claims Paid by Insurance Industry

Year	2017	2016	2015	2014
% Claim Paid	25.54	25.85	32.03	35.18

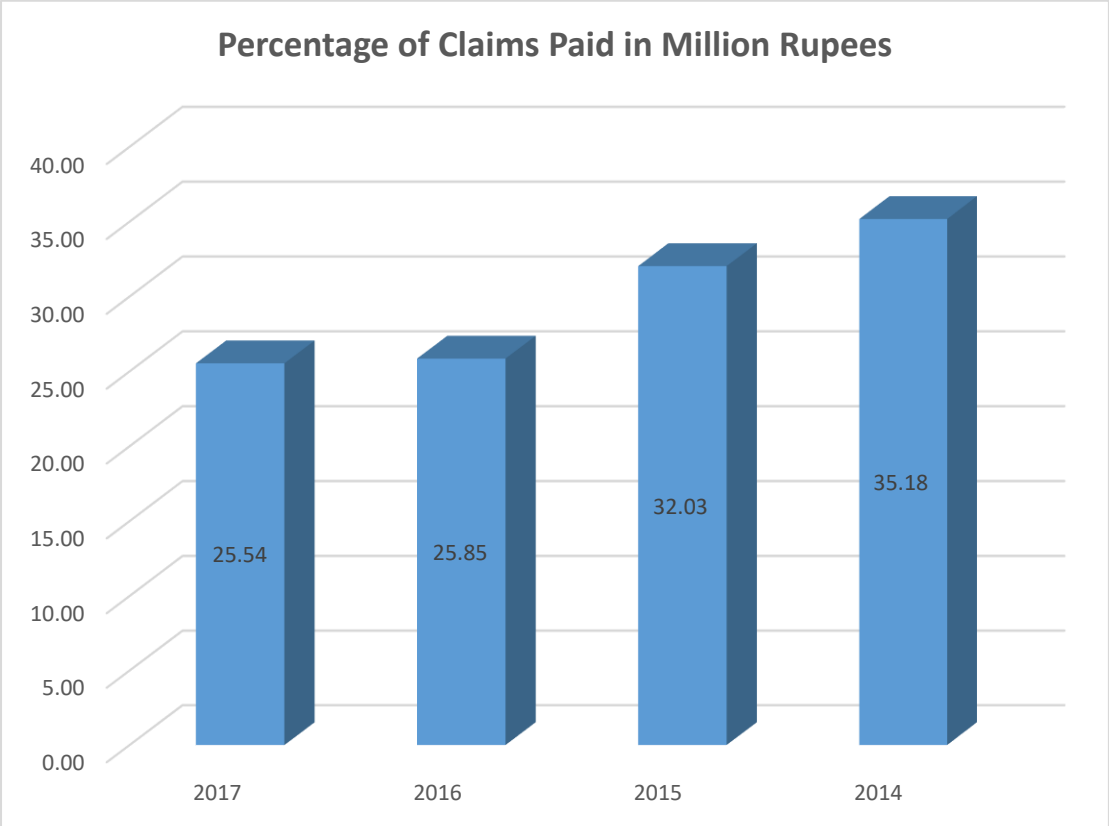

Figure 4-5 Percentage of Claims Paid by Insurance Industry

Figure 4-5 shows approximately insurance companies have paid 30% of total amount of premium written to construction industry in terms of claims raised by construction industry.

4.6. FACTORS AFFECTING THE RISK ASSESSMENT CRITERIA OF INSURANCE COMPANIES:

After the extensive literature review twenty one factors / risks were identified which should be considered while calculating the premium by the insurance companies. To assess the importance of these factors survey was carried out and each factor was rated by the construction industry professionals based on the Likert scale. Statistical Analysis was performed on the results of the survey results in the section 4.3. As mentioned above the data is reliable for further analysis and data is non parametric and the perception of every respondent group was same.

On the other hand second survey was conducted to get the factors based upon which the insurance companies in Pakistan are actually calculating the premiums for the insurance. Fifteen factors were reported by the insurance companies and they have also rate these factors on five point Likert scale of importance. Statistical Analysis was performed on the results of the survey results in the section 4.3. The data comes out to be reliable for further analysis and data is non parametric and the perception of every company was same on these factors. Now after checking the reliability and performing the normality and non-parametric test above we will calculate the relative importance index rank both list of factors.

4.6.1. Relative Importance Index (RII)

The data collected through the questionnaire survey regarding the factors obtained from the literature which should be used while calculating the risk premium form construction industry and the factors used by the insurance industry to calculate the risk premium was analyzed and ranked using the Relative Importance Index as per (Kometa

et al., 1994). Using equation 4.1 mentioned below, RII was calculated for each factor available in both the questionnaires. It was then used to define the rank of each factor.

$RII = \Sigma W / (A * N)$ …….. $(0 \leq RII \leq 1)$ (Equation 4.1)

Where:

W = Weight given to each factor by the respondents and ranges from 1 to 5

Where '1' is 'Not Applicable' and '5' is 'Directly affect it'

A = Highest weight (i.e. 5 in our case)

N = Total number of respondents (i.e. 98 in first case and 11 in second case)

On the basis of above analysis, the results are presented in the Tables 4-22 and Table 4-23 below:

Table 4-22 Relative Importance Index of factors (Construction Industry)

Sr. No.	**Factors**	**RII**
1	Safety	0.7857
2	Government Policies	0.7673
3	Equipment Condition	0.7551
4	Past Experience	0.7469
5	Political Stability	0.7429
6	Design Risks	0.7429
7	Financial Fluctuations	0.7408
8	Financial Conditions	0.7286
9	Market Reputation of Owner	0.7245
10	Claims & Disputes	0.7204
11	Force Majeure	0.7204
12	Site Security	0.7184

13	Improper Project Management	0.7143
14	Quality	0.7122
15	Lack of Knowledge	0.7122
16	Probability of Cost Overrun	0.7102
17	Foreign Exchange	0.7102
18	Tight Project Schedule	0.7061
19	Adequacy of Insurance	0.6959
20	Logistics	0.6898
21	Termination of JV	0.6571

Table 4-23Relative Importance Index of factors (Insurance Industry)

Sr. No.	**Factors**	**RII**
1	Risk Maturity Trends	0.8909
2	Quality	0.8364
3	Safety	0.8
4	Project Duration	0.8
5	Past Experience	0.8
6	Project / Risk Location	0.7818
7	Scope of Project / Sum Insured	0.7818
8	Nature of Contract	0.7273
9	Force Majeure	0.7273
10	Security	0.6909
11	Third Party Liabilities	0.4909
12	Owner Reputation	0.4909
13	Surrounding Structures	0.4909
14	Equipment Condition	0.4727
15	Political Stability	0.4727

Nine factors safety, equipment condition, past experience, political stability, owner reputation, force majeure, security, quality and project duration are common in both the industries risk assessment criteria. The insurance sector is more concern about the

financial aspects related to the risk whereas construction sector has its concern about the technical aspects of risks.

4.6. QUESTIONNAIRE ANALYSIS:

The questions were categorized into four groups as mentioned below:

a) Importance (Level of Confidence): Importance of insurance
b) Effectiveness: Effectiveness of insurance on construction projects
c) Regulating: Regulating the insurance business.
d) Enforcing: Enforcing the use of insurance on construction projects.

Questions were asked on the Likert scale and the score of each question was collected for all the respondents. The following steps then followed to get the final score:

i. The scores for each question are summed that give the total score of that question and then it is divided by the number of respondents to get an average score.
ii. Then the average score is divided by the maximum value i.e. 5 and multiplied by 100 to get average percentage score.
iii. Average percentage score is calculated for every question and for every group.

The score for each question and each group is shown in the Table 4-24 and Table 4-25 below and their subsequent graphical representation is shown in Figure 4-6 and Figure 4-7. The score is categorized as greater than 60% means in favor of the issue discussed, 60% to 40% means neutral opinion and less than 40% mean not in favor of the issue discussed.

Table 4-24 Questionnaire Scores Analysis

Groups	Contractors	Consultants	Clients	Academia	Insurance Industry	Total Average
Total Average	78.20	75.87	74.53	76.35	72.09	75.41
Importance / Level of Confidence	69.8	67.8	67.8	71.4	69.2	69.19
Q1C Q1I	88	86	83	76	95	85.60
Q6C Q8I	77	71	70	80	65	72.60
Q8C Q12I	44	45	52	54	80	55.00
Q11C Q13I	68	70	70	71	51	66.00
Q14C Q15I	72	67	64	76	53	66.40
Q7I					71	71.00
Effectiveness	75	72	71	76	65	71.84
Q3C Q3I	74	70	75	73	84	75.20
Q7C	87	78	73	86		64.80
Q10C	64	67	66	69		53.20
Q6I					71	71.00
Q9I					47	47.00
Q10I					49	49.00
Q11I					75	75.00
Enforce	84	81	80	73.5	77.5	79.20
Q2C Q2I	81	78	79	63	75	75.20
Q5C 5I	87	84	81	84	80	83.20
Regulate	84	83	79	84.5	76.5	81.40
Q4C	86	89	80	87	75	83.40
Q9C	69	72	68	70		55.80
Q12C Q14I	89	84	83	87	78	84.20
Q13C	92	87	85	94		71.60

Table 4-25 Questionnaire Final Score Summary

Groups	Total Average	Importance / Level of Confidence	Effectiveness	Enforce	Regulate
Insurance Industry	72.09	69.2	65	77.5	76.5
Academia	76.35	71.4	76	73.5	84.5
Clients	74.53	67.8	71	80	79
Consultants	75.87	67.8	72	81	83
Contractors	78.20	69.8	75	84	84
Total Average	75.41	69.19	71.84	79.20	81.40

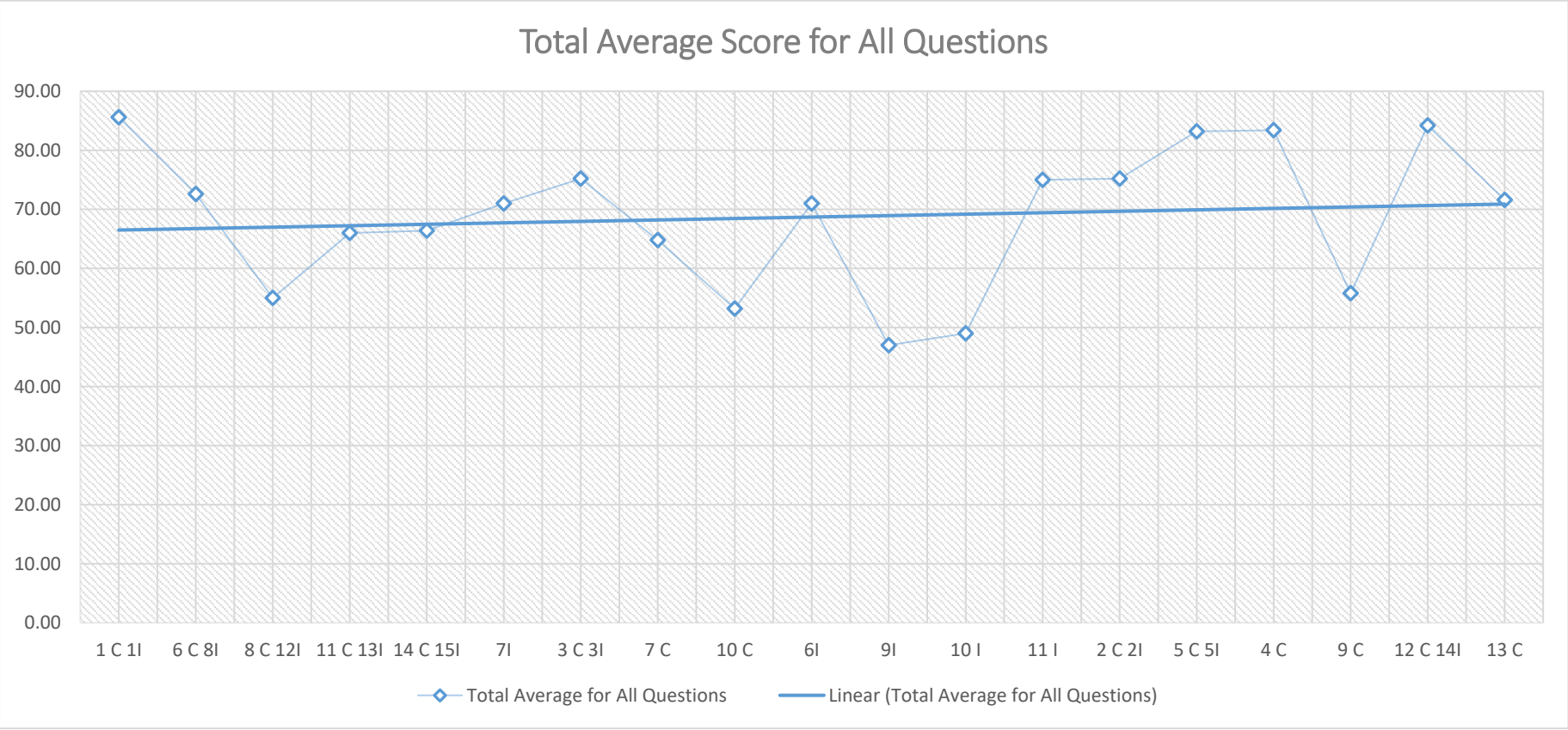

Figure 4-6 Total Average Score for All Questions

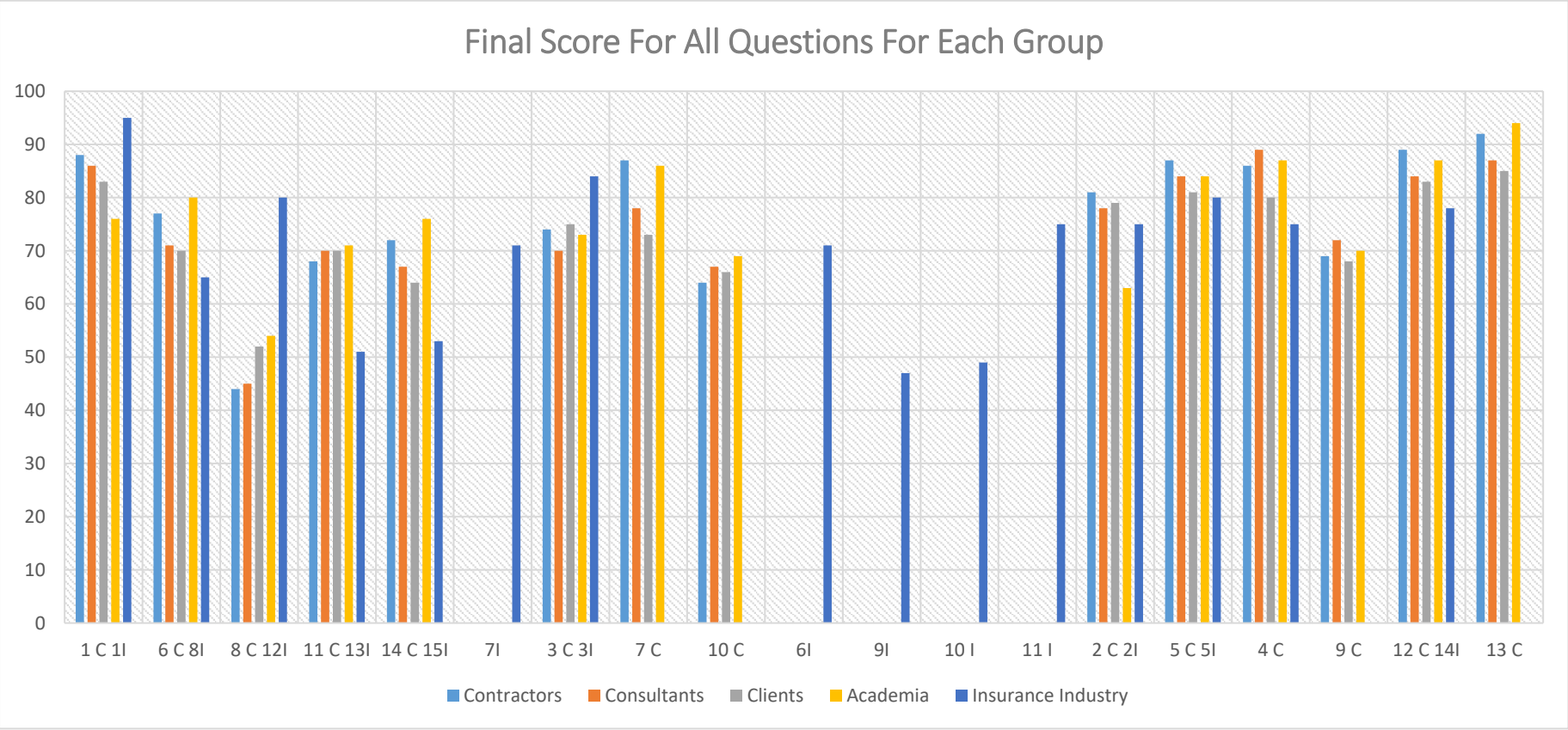

Figure 4-7 Final Score for All Questions for Each Group

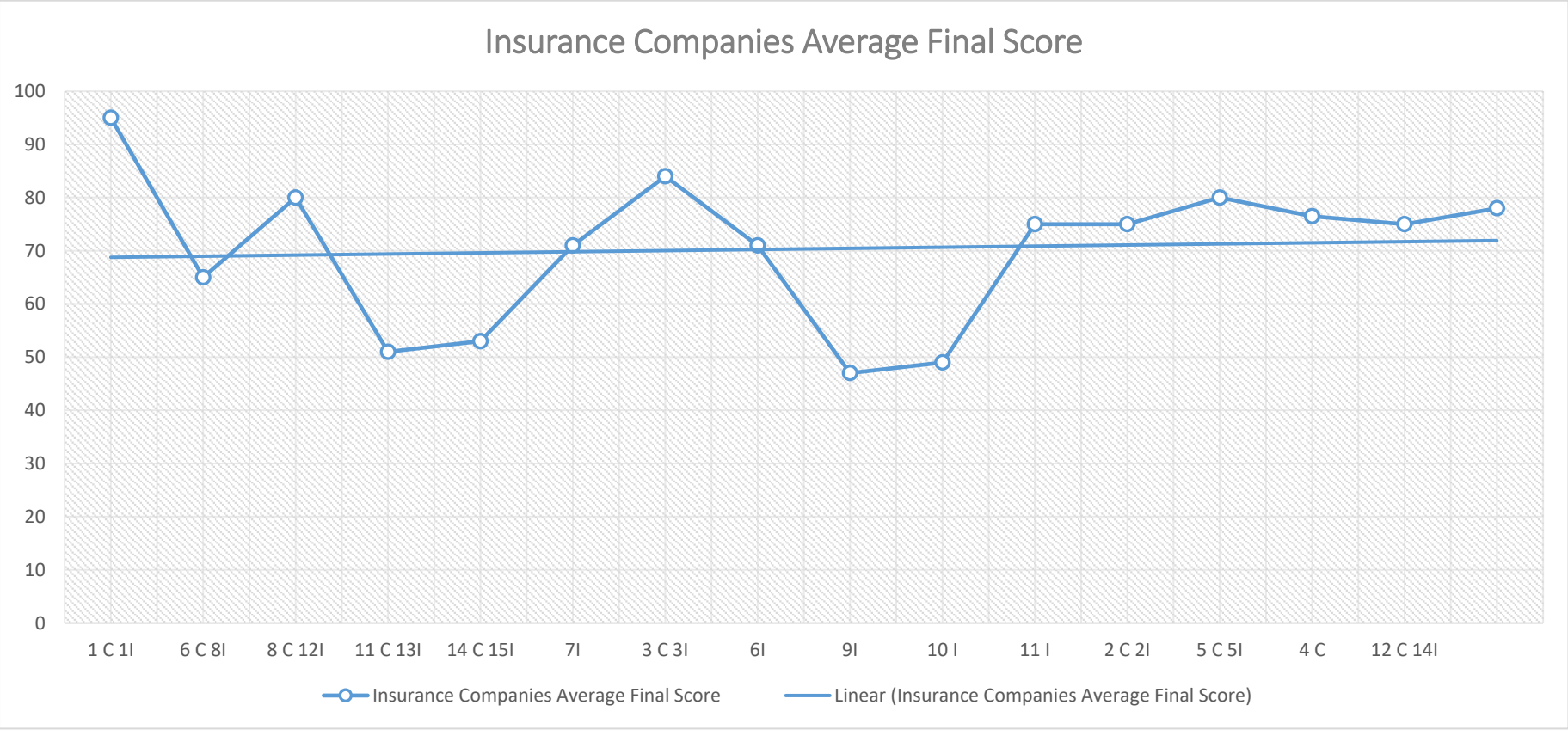

Figure 4-8 Insurance Companies Average Final Score

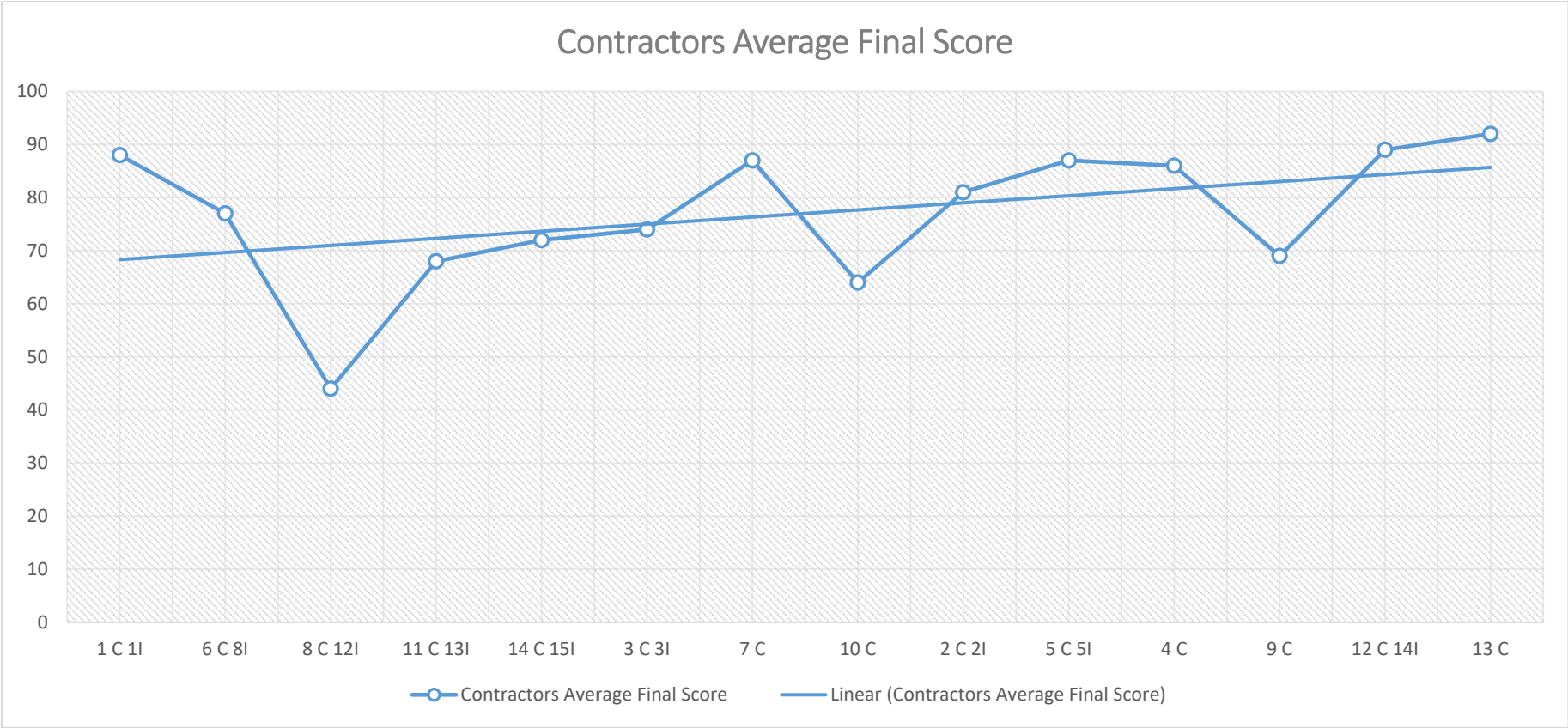

Figure 4-9 Contractors Average Final Score

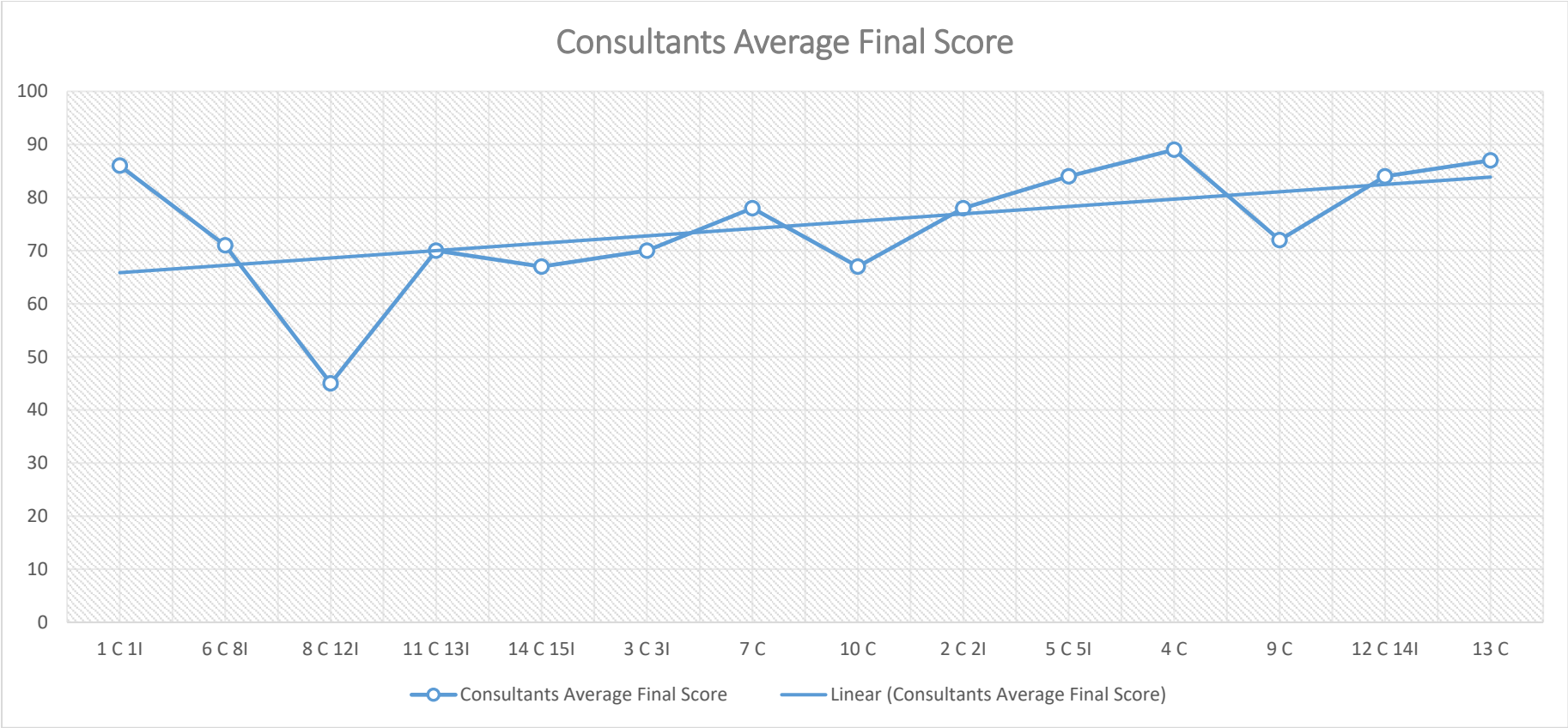

Figure 4-10 Consultants Average Final Score

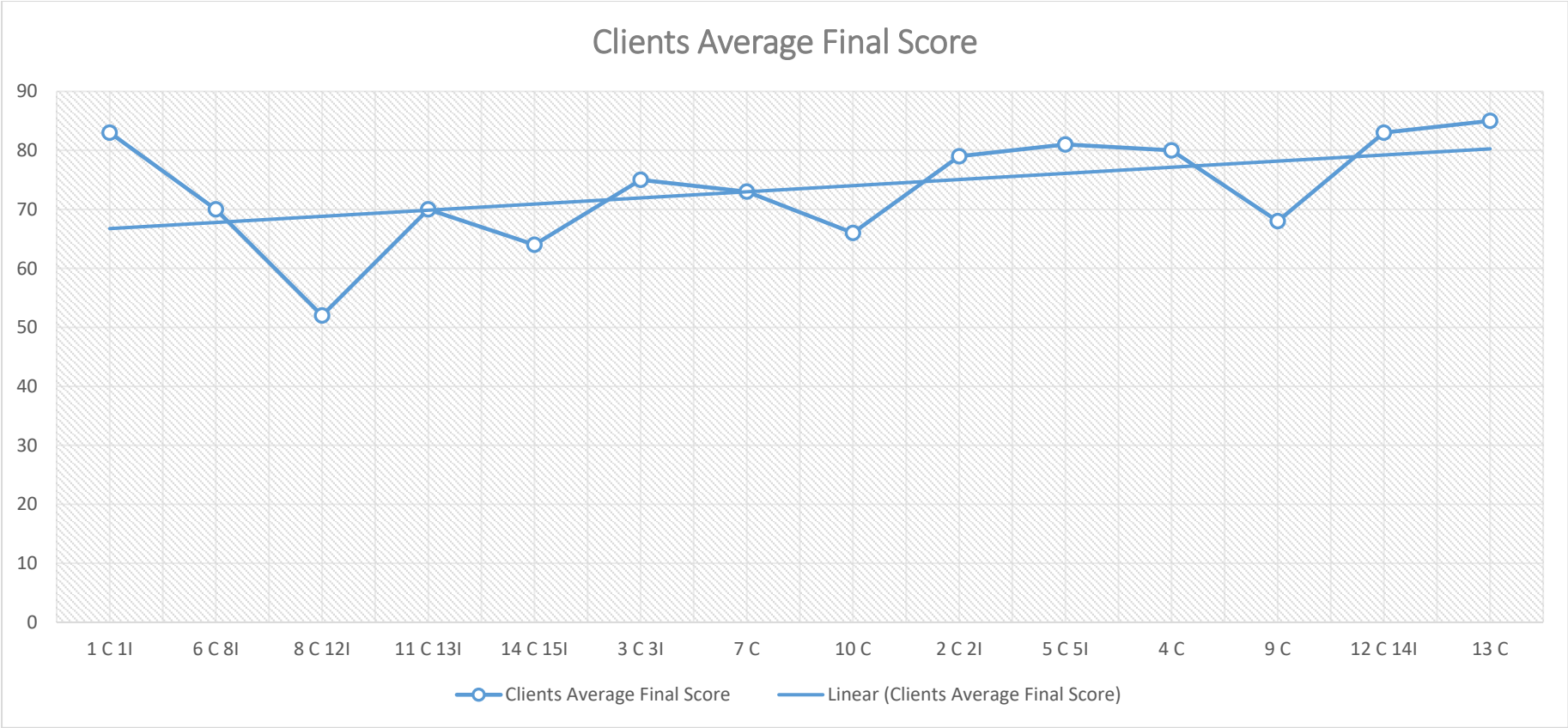

Figure 4-11 Clients Average Final Score

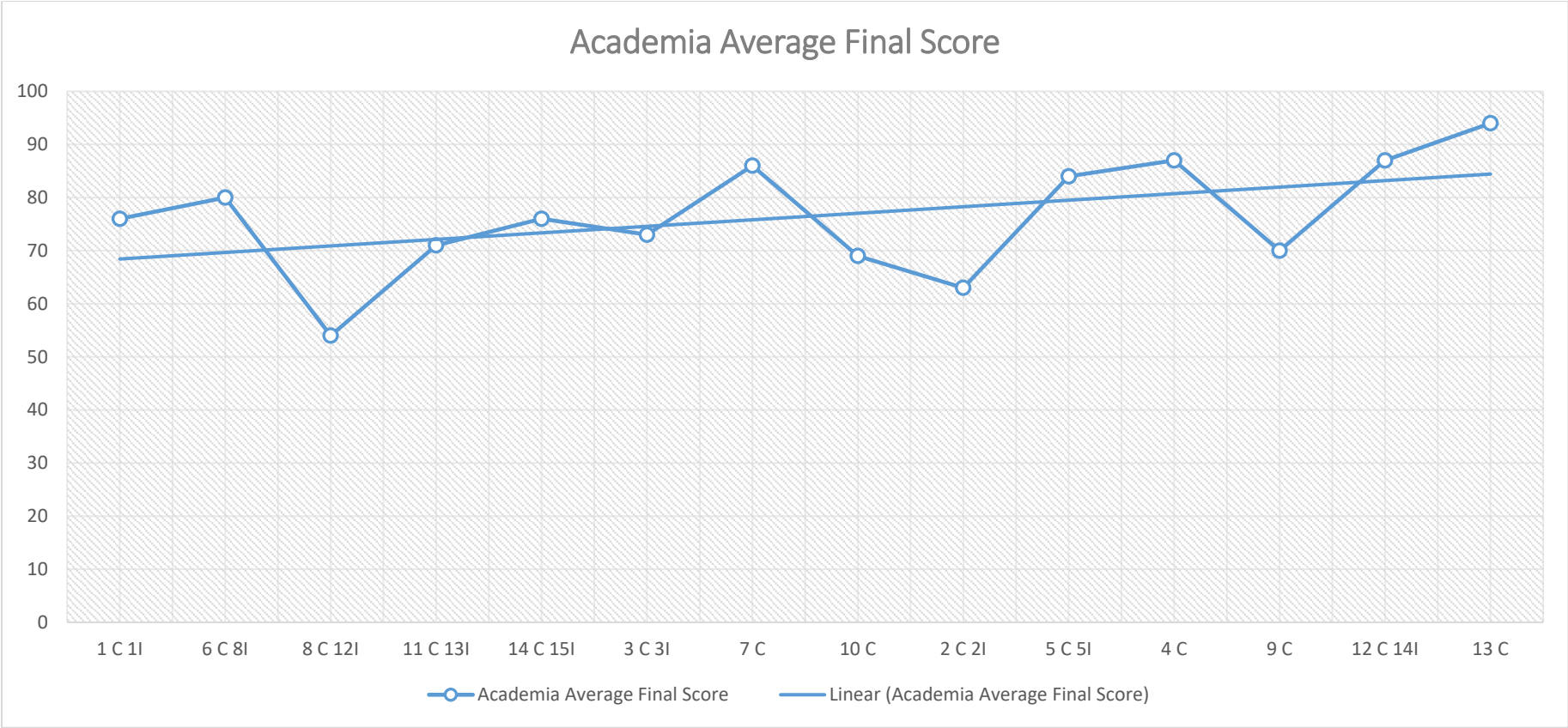

Figure 4-12 Academia Average Final Score

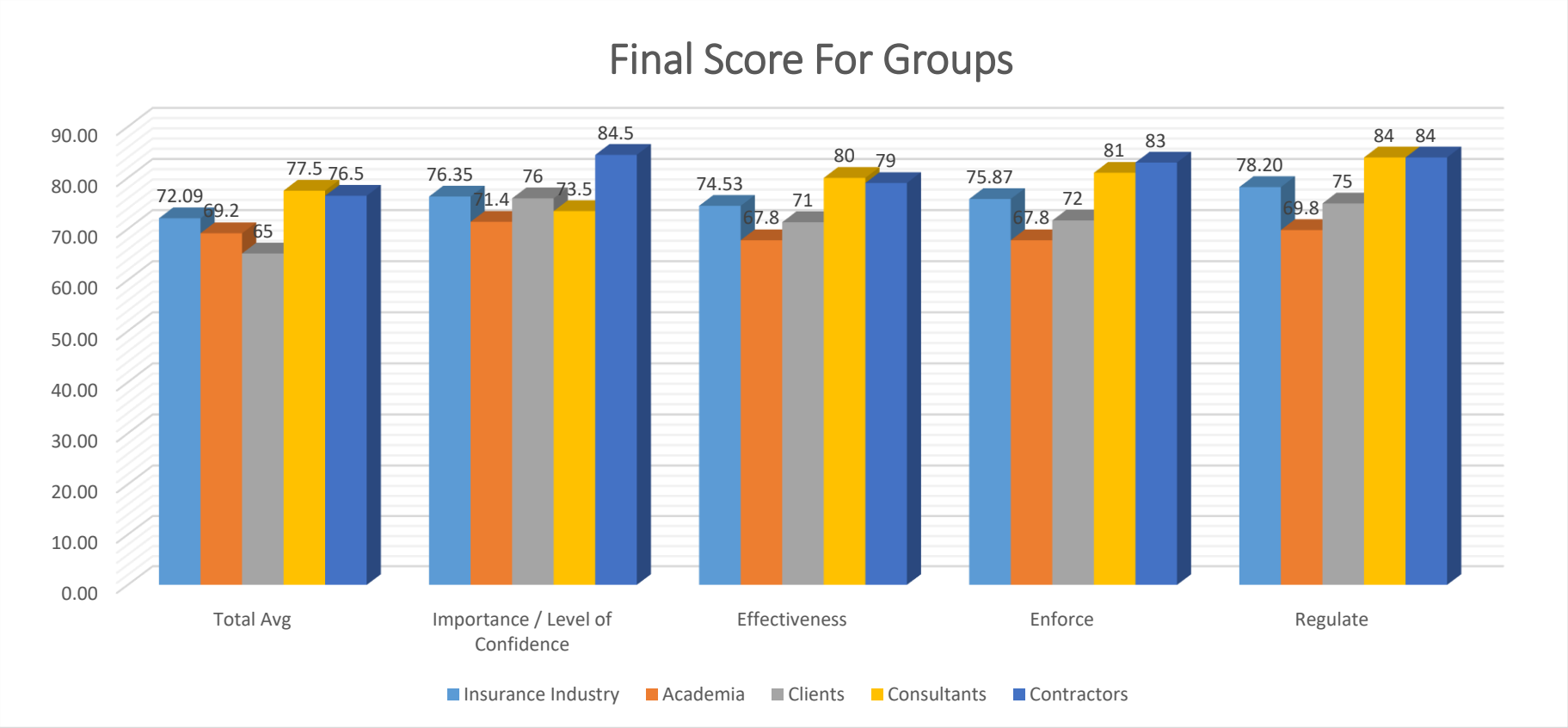

Figure 4-13 Academia Average Final Score

4.6.1. Explanation of Scores:

- The total average of all the groups is 75.41 which shows that the respondents form every industry support the objectives of this study.
- The final total average for every group as shown in Figure 4-13 is above neutral range i.e. 60 which means that they support all the four points on which the questionnaire was categorized.
- The final average score for each four categories for insurance industry is greater than 60. Their trend moves form enforce to regulate to importance to effectiveness as shown in Figure 4-8.
- The trend among contractors shows equal values for enforce and regulate then comes effectiveness and at last comes importance as shown in Figure 4-9. The total final average for every category is greater than 60.
- The final average score for each four categories for consultants is greater than 60. Their trend moves form regulate to enforce to effectiveness to importance as shown in Figure 4-10.
- The trend among clients organization shows largest value for enforce then comes regulate, effectiveness and at last comes importance as shown in Figure 4-11. The total final average for every category is greater than 60.
- The final average score for each four categories for Academia is greater than 60. Their trend moves form regulate to effectiveness to enforce to importance as shown in Figure 4-12.
- The final total average for the “regulate” section is the highest among other categories i.e. 81.40 which shows that all the groups believes that there is a need to regulate the insurance policies in the country. This is due to the following reasons:

- Clients, contractors and consultants have the concern about paying an extra cost. But their concern is neutralized by fact that if insurance is effectively applied the benefits obtained from it are not compared to the premium paid.

- The final total average for the "Enforce" section is second highest among other categories i.e. 79.20 which shows that all the groups believes that there is a need to enforce the use of insurance policies on construction industry for the transfer of risks. The reason is the construction industry now a days only getting insurance where there is mandatory by the contract.
- The final total average for the "Effectiveness" section is 71.84 which is also above the neutral score i.e. 60 this shows that all the users believe that the insurance is an effective mean to transfer the risk.
- Lastly the final total average for the "Importance / Level of Confidence" section is 69.19 which is least among the four categories but is well above the neutral score i.e. 60 this shows that all the contractors and clients are confident in transferring their risk to insurance.
- The question "insurance is very important for construction industry" got the highest score i.e. 88% which indicate that the every group is supporting the importance of insurance.

Chapter 5

5. CONCLUSION AND RECOMMENDATIONS

5.1. CONCLUSIONS

Construction industry is transferring 2% of its total cost to insurance companies to get insurance cover for their projects. The use of insurance can be increased by regulating the insurance policies such that they can properly assess the construction risks and calculate their premiums more realistically to reduce the premium costs. The insurance is paying back 30% of the total premium written in terms of claims. Construction industry only gets insurance when declared contractually mandatory. After regulating the insurance policies, there is a need to enforce construction industry to transfer their risks to insurance companies. The industry experts believe in the effectiveness of insurance for risk transfer where as their level of confidence on transferring the construction risk to insurance companies is also significant.

5.2. RECOMMENDATIONS

Future studies can focus the following areas:

- Contractual modifications in insurance policies as well as construction contracts to effectively enforce and regulate better value insurance.

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ANNEXURE I

Questionnaire Construction Industry

1. Firm Name:

   ……

2. Incorporation Date:

   ……

3. Name:

   ……

4. Designation:

   ……

5. Contact Information:

   ……..

Indicate your opinion for the following statements using the scale below:

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	2	3	4	5

1. Insurance is very important for the construction industry

   1 2 3 4 5

2. Insurance is a contractual obligation in most of the Construction Contracts

   1 2 3 4 5

3. The insurance, now a days is playing effective role in current construction environment

   1 2 3 4 5

4. There is a need to upgrade the insurance services in construction industry

   1 2 3 4 5

5. There is a need to enforce the use of insurance in construction industry

   1 2 3 4 5

6. The insurance is a rather neglected issue in the construction industry

   1 2 3 4 5

7. The currently offered insurance policies do not cover the whole spectrum of construction risks

   1 2 3 4 5

8. The local insurance practices in Pakistan are consistent with the international practices

   1 2 3 4 5

9. The risk premiums charged by the Insurance Companies are Unrealistic

   1 2 3 4 5

10. The construction insurance has reduced the possible claims between clients and contractors

    1 2 3 4 5

11. The contractors are more willing to utilize the construction insurance as the most favorable risk transfer mechanism

    1 2 3 4 5

12. There is a dire need of training sessions for insurance practitioners to get along with the changing construction risks

    1 2 3 4 5

13. There is need to offer educational programs on Insurance and Risks that relate Specifically to the Needs of the Construction Industry

    1 2 3 4 5

14. Insurance increases the Overall Project Cost

    1 2 3 4 5

The following Construction Insurance related risk factors have been identified through thorough literature review, please score these factors on the basis of insurance cover requirement, on a scale of 1 to 5, with 1 being the lowest;

Sr. No.	**Identified Factors**	**Scale**				
		1	**2**	**3**	**4**	**5**
1	Financial Fluctuations					
2	Force Majeure					
3	Safety Conditions at Site					
4	Equipment Condition					
5	Political Instability					
6	Design Risks					
7	Adequacy of Insurance					
8	Tight Project Schedule					
9	Quality					
10	Financial Condition					
11	Foreign Exchange & Convertibility					

12	Claims & Disputes					
13	Lack of Knowledge					
14	Improper Project Management					
15	Probability of Cost Overrun					
16	Logistics (Materials in Transit) / Delay in Materials					
17	Market Reputation of Owner					
18	Site Security					
19	Termination of JV					
20	Government Policies					
21	Past Experience with Company					

Questionnaire Insurance Industry

1. Firm Name:

   ……

2. Incorporation Date:

   ……

3. Name:

   ……

4. Designation:

   ……

5. Contact Information:

   ……

Indicate your opinion for the following statements based on your experienced insights about construction projects at the following scale:

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	2	3	4	5

1. Insurance is very important for the construction industry

   1 2 3 4 5

2. Insurance is a contractual obligation in most of the Construction Contracts

   1 2 3 4 5

3. The insurance, now a days is playing effective role in current construction environment

   1 2 3 4 5

4. There is a need to upgrade the insurance services in construction industry

   1 2 3 4 5

5. There is need to enforce the use of insurance in construction industry

   1 2 3 4 5

6. There has been an increasing trend towards acquirement of construction insurance:

   a. During the 1990s
   b. During the 2000s
   c. More after 2010

7. The construction insurance is an ignored issue in the insurance business:

   1 2 3 4 5

8. The insurance is a rather neglected issue in the construction industry

   1 2 3 4 5

9. There is poor quantification of risk on behalf of Insurance Companies

   1 2 3 4 5

10. The Premium Calculation Mechanism is inconsistent with no set rules/methods/policies

    1 2 3 4 5

11. Do the insurers have the capability to incorporate the overall risk spectrum in their Risk Quantification and subsequent Premium Generation?

    1 2 3 4 5

12. The local insurance practices in Pakistan are consistent with the international practices

    1 2 3 4 5

13. The contractors are more willing to utilize the construction insurance as the most favorable risk transfer mechanism

    1 2 3 4 5

14. There is a dire need of training sessions for insurance practitioners to get along with the changing construction risks

    1 2 3 4 5

15. Insurance increases the project cost

    1 2 3 4 5

16. Please specify the types of construction insurance policies you are providing to construction industry and their coverage:

17. Please provide the average rate of premiums charged on the above mentioned insurance policies:

    (Percentage of project cost)

18. Please specify premium written during last years

Sr. No.	2013	2014	2015	2016	2017
1					

19. Please specify the amount of claims paid in last years:

Sr. No.	2013	2014	2015	2016	2017
1					

The following construction Insurance related risk factors have been identified through thorough interviews, please rate the factors in your opinion with respect to your risk assessment criteria on a scale of 1 to 5, with 1 being the lowest;

Sr. No.	**Identified Factors**	**Scale**				
		1	**2**	**3**	**4**	**5**
1	Safety					
2	Equipment Condition					
3	Past Experience					
4	Political Stability					
5	Owner Reputation					
6	Force Majeure					
7	Security					
8	Quality					
9	Project Duration					
10	Third Parties Liabilities					
11	Nature of Contract					
12	Risk Maturity Trends					
13	Project Location					

14	Surrounding Structures					
15	Scope of Project / Sum Insured					