



A STUDY ON RISK MANAGEMENT OF CONSTRUCTION PROJECTS IN AFGHANISTAN

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Abstract: Construction risk is a common phenomenon over the world. As consequence of those risks; globally most of the construction projects fail to meet their predefined quality standards, timely completion, safety and cost regulation. The construction industry in Afghanistan has no exception; in almost all the cases the risk factors are amongst the factors which contribute to time and cost overruns of the construction projects in the country. Unfortunately, only few numbers of previous researches have been carried out on the risk management process in the construction environment of Afghanistan; the focus was on risk assessment processes and evaluation of risks. The main aim of this study is to evaluate the frequency and impact of risks in one hand, and on the other hand to evaluate the influences of the risks contributed by owner, contractor, consultant and external. A review of the pertinent past literature was carried out in order to further discover the trends and governance of risks in different countries and in different project atmospheres. Furthermore, a questionnaire survey was designed and distributed to 110 individuals involved in the construction industry of Afghanistan. Risk Value equation was used to rank the risk factors on the basis of their frequency and impact. In addition, the risk assessment matrix was used to further evaluate the frequency and impact of the risks. The ten most significant risks result in time and cost overrun of construction projects in Afghanistan were obtained by employing of the above methods.

Keywords: Afghanistan, Construction Risk, Management, Risk Matrix

INTRODUCTION

Risk management is the process of risk recognition, categorization, mitigation and monitoring. It is essential in order to manage the quality of the project products and deliverables, avoid the time and cost overrun of the projects and to minimize the environmental and site safety risks. Risk management is an economical and systematic approach to manage construction risks. Construction is the riskiest industry across all the industries. Hence, it requires proper risk management processes in order to ensure the success of project in terms of time, cost, quality, safety and environmental sustainability. [1]. Risk management is considered one of the most important tools and received international popularity in construction industry due to vast interest of researchers. Although, this approximate new tool requires more new work in order to bring new and working features to eliminate the negative impacts of risks on the progress of construction projects. [2].

The management of multidimensional risks directed to construction projects have significance importance in international construction business, particularly in developing countries. Hence, to ensure work in one hand and to make economic advantages at the other hand. [3]. Most of the construction projects in Afghanistan failed to meet the contract requirements. Many of them facing time and cost overruns and poor quality. In this juncture to prevent the delay and cost overrun of the construction projects in Afghanistan and to bring improvement proper risk management is essential. Risk assessment process as a part of risk management resulted in eliminating of most of the threats associated to construction industry in Afghanistan. [4]. In majority of the cases in developing countries the phenomenon of risk did not achieve the required popularity. The risk management process is systematically divided into three main stages in construction projects. Which is identification of risk, analysis and evaluation of risk and risk response. Risk with higher extent will harm all the parties involved in construction industry [5].

Risk can be seen all over the world in all types of construction works. In present era of globalization, the possibility to face risks is very high in all aspects of live in particular in construction industry. The effective risk management does not include only the resignation of risks. However, the aim is to protect adverse effects of risk on the one hand and to gain the maximum benefits of the decision at the other hand. [6]. One of the main responsibilities a construction manager must possess at managing construction sites is the management of risk. However, the process has to be started and followed right from the initiation of the project prior to the execution of any construction activity in order to overcome the complex and tricky process of risk management. Aside with knowledge and experience the methodology should be systematic and appropriate [7]. Construction industry is the most tricky, dynamic and risky industry. Unfortunately, it is strongly believed that the industry do not have better reputation in risk management. Hence, number of construction projects failed to meet their time, cost and quality requirements and limitations. [8]. Prior to the commencement of any practical activity of projects the owner of the project has to choose along with the procurement process the proper risk management practices. Because, the three major components of construction procurement have their effects on project risk management. Project delivery method, payment form and utilization of partnering arrangements imparts prominent influences on the progress of construction projects. [9]. Risk management is almost a new practice in the field of construction industry in developing countries. Therefore, there is the need of an unite and join risk management practice. In Pakistan construction is considered as the most risky and tricky industry. However, the industry did not follow best risk management practices to achieve better reputation in handling of construction risks. [10].

LITERATURE REVIEW

A number of past studies relevant to the study has been studied and the findings are listed below:

The main aim was to study the risk management practices deployed in Afghanistan Building Construction Projects. The objectives were to evaluate the level of risk management techniques used in Afghanistan building projects, to examine the levels of understanding of the involved parties and to analyze the impacts of risks relevant to each category and party. In order to discover the understanding and response of different categories of firms and companies involved in Afghanistan building construction projects a questionnaire survey was conducted. Based on the higher probability of occurrence and impact poor construction management considered as the major risk in Afghanistan building construction projects. The respondents of the survey were: global and national construction companies, local and governmental agencies, sponsors and consultants. SPSS was used with object to analyze data and SWOT analysis model was used to evaluate the data. Based on the sources risk were classified into 6 major categories: design, technical, community and political, construction, financial, environmental and administrative categories of risk. The financial category of risk was found to be the extremely occurring aspect of risk categories. In majority of the cases the fund for many of the construction projects in Afghanistan is provided by external financiers; whereas, even in most of the cases due to delay in submitting of the invoices some of the construction projects have been terminated before the attainment of their planned objectives. [1]

The base for this research was a questionnaire survey on risk management in Pakistan construction industry. The aim of questionnaire was to report the significance of various categories of risk, responsibility recognition for their efficient management and the effectiveness of major risk management techniques used in the construction sector. The two categories of risk management techniques preventive and remedial techniques were considered. Found that financial complications, site accidents and Time overrun were the most common risks. Moreover, the contractor was mainly responsible of managing the site related risks and the client was responsible for the financial, design, change orders and scope related issues. Further, the proper schedule management and instructions and experience from the similar past projects were the most suitable preventive risk management strategies. The objective of the research was to identify common risks in construction industry and their preventive managing techniques practiced currently in Pakistan construction industry. A supplementary risk assessment tool was used in order to develop the risk assessment model for various types of construction projects in Pakistan. After the discussion the most common 10 risks were categorized as follows; delay in progress payments, difficulties in project funding, accidents

in sites, Time overrun, improper schedule management, weak performance by sub-contractors, inflation and fluctuations in money exchange rates, faulty scope identification, poor material and equipment quality and delay in the supply of material. Based on the results of the data preventive risk assessment technique was found to be the most suitable technique in order to manage the construction risks in an efficient style. [2]

The goal of research was to reveal and asses the existing risks in construction industries of developing countries and their prevention strategies to develop a well-organized risk management framework prior to the conducting of contract relationship with international financiers, developers and contractors. The 28 major risks were included in questionnaire survey. The evaluation and ranking of risk in a hierarchical level was done based on the three country, market and project categories. Working solutions were suggested and assessed for all the major risks. To achieve the objectives of the research four major research activities have been carried out through review of past literature, international survey, interviews and discussion. Out of 11 major risks, 7 risks were associated to country level which validate that country level is the most causing group. Besides, except the quantitative analysis a well-organized qualitative analysis by considering 6 steps was also put into practice. The steps for qualitative analysis are: definition of the nature of risk, determination of risk criticality, identification of the mutual influences, relationship amongst risks, mitigation measures based on the higher priority. 11 critical risks were: approval and permit, law changes, reinforcement of justice, local partner's wealth, political issues, cost overrun, corruption, interest rates and inflation, government policies and the influence of government on termination of JV and disputes were concluded and their mitigation strategies were developed. [3]

21 major risks were analyzed evaluated. 5x5 probability matrix was used to evaluate the major risks. In this study the process of risk assessment was carried out in three stages: risk identification, risk analysis and risk evaluation. Also found that during evaluation stage risk was categorized into acceptable, unwanted and unacceptable categories. At the conclusion of this study found that out of 21 risks considered for analysis, 20 of them fell in the categories of unacceptable and unwanted. [4]

The main aim of the paper was reviewing of the existing literature on construction project risk management process in developing countries. The most popular techniques used to identify risks in developing countries are: checklists, past experience, interviews and brainstorming. Moreover, the most risk mitigation strategies used in developing countries are: risk retaining, risk reduction, risk distribution, risk control, risk avoidance and risk transfer. [5]

In this study based on the utility theory a method for the analysis of risk was presented. The risk analysis procedure of the suggested method included the following: data

regarding the construction conditions and economic situation and the relationship amongst supply and demand. [11]

Reference [6] Classified the most common risks based on their frequency of occurrence and impact. The most common risks based on frequency are: systematic and specific risks; and based on impact are: fixed risk and variable risks. Besides, risks were classified into following more types: financial risks time related risks, technical risks, market risks, nature risks, external risks and risks related to workplace safety and human.

The aim of paper was to discover the problems in the process of risk management by using knowledge-based approach. Moreover, to suggest a methodology based on the modeling of risk management, evaluation and best practice model. It is predicted that by using of the above three-fold procedure the clients and contractors will be able to promote the risk management performances. Motivation for the conduction or research was as a result of very little number of research done on the subject in Chilean construction industry. At the conclusion 5 levels of organizations were developed based on the major characteristics of each level of risk management [7]

The study reviewed systematic risk management approaches. The main emphasis was to manage the risk right from the very earliest stages of the project such as procurement and so on. Further, a small project as analyzed as a case study. The risk was allocated based on the various sources such as: owner, contractor, external and undecided. Also, the importance levels of most important and least important were specified to each source. The case study reports and analysis indicates that risks of different types affected the project. The risk identified in case study were classified into following 4 types: planning risks, design and construction risks, site-related risks and market risks, and the risks from the design and construction category were on the top of the list. [8]

The three variables in construction projects' procurement have been studied and their effects have been investigated. Eleven projects from the Swedish construction projects have been selected for the collection of data, interviews have been carried out with clients, contractors and consultants. The objective of the paper was to indicate the importance of proper selection of the procurement option over the risk management. Client is the main player of the project and has the immense responsibility in the process of risk management. In order to promote the construction efficiency and to safeguard the project objectives client is responsible to allocate the risk management processes formally from the very early stages of the construction projects. The limitations of the study were three procurement options: lump sum general contracts, design-bid-build with lump sum and partnering with cost-reimbursing type of payment. [9]

The aim of the study was to explore the risk management practices used in Pakistan. Thereby, a survey was developed and distributed. The survey forms were distributed to 22 contractor companies worked on 100 different projects. As resulted, there has been always a strong co-relation between project success and proper risk management. Unfortunately, in the local construction projects the lack of required importance to risk management is always feasible in the construction industry of Pakistan. The study was analyzed as the base for evaluation of the effects of risk management in Pakistan construction industry. Definitely the research is useful for the construction companies in order to recognize their weakness and improve it by application of the efficient risk management processes. The most used risk management technique for the analysis of risks in Pakistan were found as follows: expert judgement, work break down structure, risk index method and data collecting and representing techniques. Also, the most used risk management mitigation strategies in Pakistan were found as follows: risk management plan and decision making, sharing of risks and cost benefit analysis and risk transferring. [10]

RESEARCH METHODOLOGY

The review of relevant past literature has been conducted. Besides, a comprehensive questionnaire survey was developed in order to examine the current and future state of construction industry in Afghanistan in term of risk management. The following figure shows the flow chart of research methodology adopted in the study.

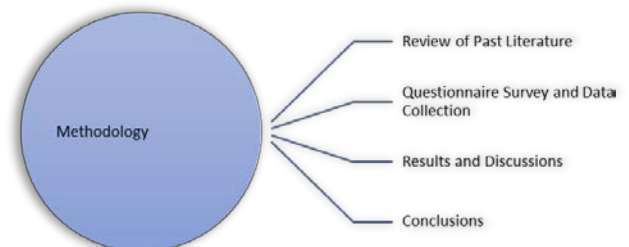


Figure 1. Flow chart of research methodology and research approaches.

— Questionnaire Survey

A comprehensive questionnaire was conducted in order to collect the necessary information for data analysis. 46 Risks were observed after the literature review and were considered for the evaluation by the utilization of 5 Point Scale Likert Survey. The questionnaire survey was designed to assess the responses of the respondents in two major qualities: Impact of risk and frequency of occurrence.

— Risk mapping

Based on the frequency and impact of risks a 5x5 risk analysis matrix was deployed in order to evaluate the level of risks. [04] and others used the risk value equation (1) for the determination of potential risk levels.

$$R = P \times S \quad (1)$$

where, P= Frequency of occurrence, S= Risk impact.

— Frequency classifications of risks

The 5 categories of frequency illustrated in risk analysis matrix are as follows:

- ≡ Don't Know: Risks with zero probability of occurrence.
- ≡ Never: Rare risks which have very little chances of occurrence.
- ≡ Sometimes: Risks which poses 50 percent probability of occurrence.
- ≡ Often: Risks which have higher probability of occurrence.
- ≡ Always: Risks which are expected to occur always, they are the first priority risks.

— **Impact classification of risks**

The 5 categories of impact illustrated in risk analysis matrix are as follows:

- ≡ Don't Know: Risks with zero negative impact on the project or organization.
- ≡ No Effect: Risks that do not impart any notable effect on the success of the project/organization. But, still have some effects.
- ≡ Some What High: These risks are the threats which imparts negative effects on the project.
- ≡ High; This category of risks possesses strong chances of opposed effects which have the potential of adverse impacts on the completion of the project.
- ≡ Very High: This category can harm the project on a large scale and results on the failure of the overall success of the project or affecting the daily activities seriously.

Table 1. Risk categorization and evaluation of acceptance.

Category of risk (Levels)	Evaluation of acceptance
Very low (1 to 4)	Acceptable
Low (5 to 6)	Unwanted (Acceptable but should be reduced)
Medium (8 to 9)	
High (10 to 12)	
Very high (15 to 25)	Unacceptable

— **Risk evaluation matrix**

Risk evaluation matrix is used in order to determine the level of risk on the basis of the probability and impact rating by respondents from level 1 to level 25.

Table 2. Categories of risk based on the risk levels

Probability (P)	Impact (S)					
	Don't Know	No effect	Some What High	High	Very high	
	5	4	3	2	1	
Don't Know	5	Very high (25)	Very high (20)	Very high (15)	High (10)	Low (5)
Never	4	Very high (20)	Very high (16)	High (12)	Medium (8)	Very low (4)
Sometimes	3	Very high (15)	High (12)	Medium (9)	Low (6)	Very low (3)
Often	2	High (10)	Medium (8)	Low (6)	Very low (4)	High low (2)
Always	1	Low (5)	Very low (4)	Vey low (3)	Very low (2)	Low low (1)

RESULTS AND DISCUSSION

A compressive questionnaire survey was designed and survey forms were distributed to various categories of construction professionals and experts in Afghanistan. After the review of literature 46 risks were obtained and were preferred for the further critical analysis in this study. Risks were classified based on their frequency and impact

evaluation by respondents. Risk values for each risk was determined by the multiplication of frequency and impact of each risk. The acceptance evaluation of risks was performed based on the risk levels obtained from the risk values. The very low-level risks from level 1 to level 4 were considered as acceptable risks.

The low-level risks from level 5 to level 6, medium level from level 8 to level 9 and high-level form level 10 to level 12 were considered as unwanted risks. And very high-level risks form level 15 to level 25 were considered as unacceptable risks.

Table 3. Indicates the risk value and ranking of each risk based on the risk value.

Risk	Risk Code	Impact mean (S)	Frequency mean (P)	Risk value (R=PxS)	Ranking based on risk value
Risks Related to Owner					
Delay in Invoices	01	3.89	4.20	16.34	3
Improper scope definition or changes in scope	02	2.85	4.06	11.57	43
Delay in funding of the projects by donor	03	3.74	4.08	15.26	12
Excessive change orders during execution phase of the project	04	3.82	4.16	15.89	7
Mistakes in bidding and contract award	05	3.69	3.51	12.95	36
Changes in drawing during construction	06	3.41	3.74	12.75	39
Risks Related to Consultant					
Late approval and provision of work permits	CL3	3.83	4.09	15.66	9
Justice reinforcing	CL4	3.64	3.73	13.58	29
Faulty design	CL5	3.95	3.92	15.48	10
Late approval of design documents	CL6	3.51	3.66	12.85	37
Risk Related to Contractor					
Bureaucracy in project teams	C1	3.61	3.81	13.75	25
Lack of enthusiasm	C2	3.82	3.25	12.42	40
Lake of key skill labour	C3	3.77	3.51	13.23	32
Problems in financing of the projects	C4	3.92	3.89	15.25	13
Safety accidents in construction sites	C5	3.81	4.03	15.35	11
Scheduling and execution	C6	3.77	4.03	15.19	14
Poor performance by sub-contractors	C7	3.65	3.88	14.16	21
Delay in material supply	C8	3.68	3.73	13.73	26
Cost overrun	C9	3.97	4.30	17.07	1
Cost fluctuation of material	C10	3.81	3.69	14.06	22
Lasey sub-contract work	C11	3.89	3.59	13.97	23
Insufficient coordination by contractors' technical staff	C12	3.85	3.61	13.90	24
Excessive changes in sub-contracts due to their work failure	C13	3.75	3.82	14.33	19
Time overrun	C14	4.02	4.10	16.48	2
Inappropriate planning	C15	3.97	4.07	16.16	4
Risks related to External					
Insufficient coordination amongst parties	E1	3.75	3.98	14.93	15
Difficulties in law	E2	3.53	3.75	13.24	31
Lack of regular staff meetings	E3	3.69	3.31	12.21	41
Political changes	E4	3.65	3.73	13.61	28
Social changes	E5	3.75	3.81	14.29	20
Security	E6	3.82	4.15	15.85	8

Fluctuation in the material rates	E7	3.44	3.99	13.73	27
Lack of key resources	E8	3.38	3.89	13.15	34
Working under the condition of projects in insecure areas	E9	3.98	4.01	15.96	6
Fluctuation in money exchange rates	E10	3.82	3.55	13.56	30
Lack of high-quality materials and equipment	E11	3.47	3.70	12.84	38
Changes in law	E12	3.64	3.07	11.17	45
Local partners preferences	E13	3.28	3.44	11.28	44
Poor communication and coordination amongst involved parties	E14	3.72	3.86	14.36	18
Interest rates	E15	2.86	3.53	10.10	46
Governmental policies	E16	3.56	4.08	14.52	17
Government influences on disputes	E17	3.38	3.84	12.98	35
Corruption	E18	4.08	3.94	16.08	5
Inflation	E19	3.47	3.80	13.19	33
Bureaucracy in government entities	E20	3.38	3.61	12.20	42
Improper pre-contract coordination	E21	3.58	4.13	14.79	16

— Risk evaluation matrixes

The criticality of the risks related to all the categories owner, consultant, contractor and external have been evaluated by the deploying of risk evaluation matrix. The numbers from 1 to 5 in both vertical and horizontal axis indicates the level of risk based on the mean values of impact and frequency.

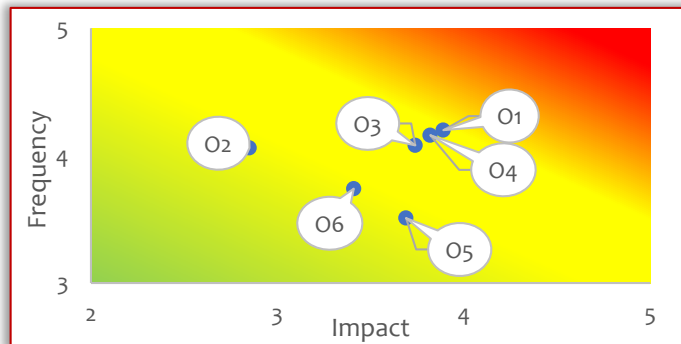


Figure 2. Risk matrix related to owner.

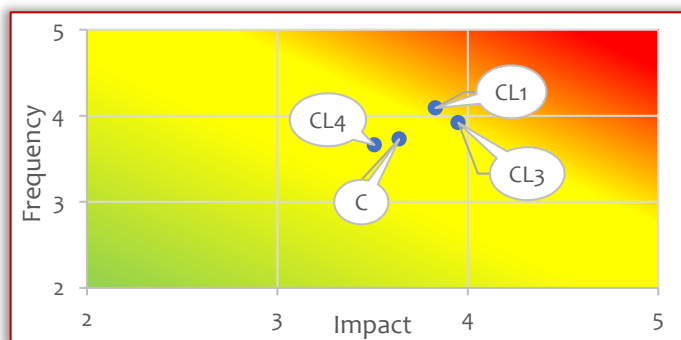


Figure 3. Risk matrix related to consultant.

Cost overrun with risk value of (17.07) found to be the most critical risk which disrupted the progress of most of the construction projects in Afghanistan. Due to many reasons most of the construction projects in Afghanistan have been not completed by their pre-budgeted cost. Furthermore, in some of the cases this particular risk prevented the

successful accomplishment of the construction projects across the country.

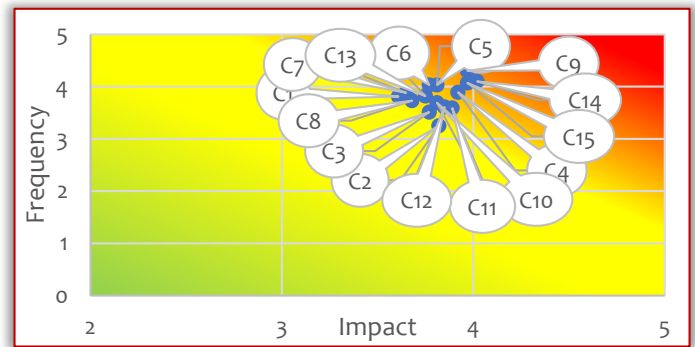


Figure 4. Risk related matrix related to contractor.

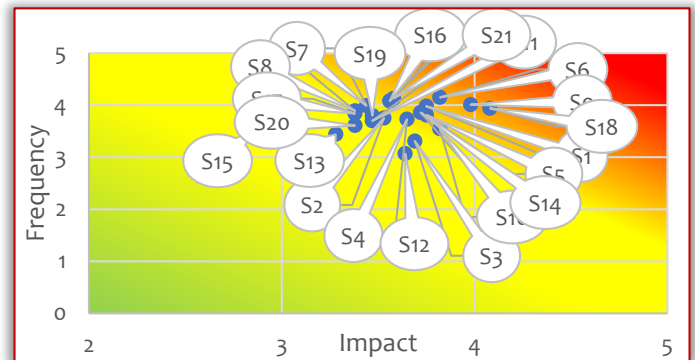


Figure 5. Risk matrix related to external.

Time overrun with risk value of (16.48) founded to be the second most critical risk. Progress delay or late completion of the construction projects is the global challenge in construction industry. Proper and well-organized risk management practices reduce the chances of construction delays. However, in most of the cases the contractors fail to provide resources and budget for proper utilization of risk management. Besides, some of the contractors even do not consider risk management in their priority lists of the construction techniques.

Delay in invoices by owner with risk value of (16.34) obtained to the third most critical risk in the study. Owners do not pay the invoices on time to contractors which resulted in time and cost overruns of most of the construction projects in Afghanistan.

Inappropriate planning with risk value of (16.16) found to be the fourth most critical risk. Improper or inappropriate planning is one of the main causes of projects' failure; replanning always requires some extra time and extra budget. As a result, inappropriate planning has been considered one of the major reasons of construction delays and cost overruns.

Corruption with risk value of (16.08) found to be the fifth most critical risk. Corruption is obtainable in almost all of the project phases from Pre-bid qualification to project closure. Hence, corruption is considered as one of the major obstacles for the foreign investors and NGOs to invest in the construction industry of Afghanistan.

CONCLUSION

Relevant past researches have been reviewed and the findings were analyzed. Unfortunately, only few researches have been carried out on risk management of construction projects in Afghanistan.

The core aim of this paper was to evaluate the frequency and impact of risks in one hand, and on the other hand to evaluate the influences of the risks related to various parties involved in construction such as: owner, contractor, consultant and external. Risk management is the process of risk identification, evaluation and mitigation. Therefore, 46 risks have been identified after literature review and were considered for further critical evaluation in this paper through questionnaire survey.

The most common risks existing in construction industry of Afghanistan were evaluated by the using of risk assessment matrix, and ranked by risk value. In addition, recommendations were given in order to minimize the impact of risks on the progress of construction projects so as to prevent construction delays and cost overrun.

The top 10 risks achieved in this study are: cost overrun (risk related to contractor), time overrun (risk related to contractor), delay in invoices (risk related to owner), inappropriate planning (risk related to contractor), corruption (risk related to external), working under the condition of projects in unsecure areas (risk related to external), excessive change orders during execution phase of the project (risk related to owner), security (risk related to external), late approval and work permissions (risk related to consultant) and faulty design (risk related to consultant).

From the overall results it can be concluded that the contractors' category is the most causing party of risks in construction industry of Afghanistan followed by external category.

RECOMMENDATIONS

Following recommendations are given in order to minimize the impact of risks on the accomplishment of construction projects in Afghanistan. In order to minimize the impact of risks and increase the possibility of successful completion of the construction projects in Afghanistan the contractors should deploy proper risk management practices. Moreover, efficient risk management will assure the timely and on budget completion of the construction projects. Thus, the two major reasons of project failure time and cost overrun will be prevented.

Delay in invoices is another risk which disrupts the progress of construction projects. If owner take his responsibility and pay the progress payment to contractor on-time this attribute can also be prevented. Besides, in order to minimize delays and cost overruns the consultant is also required to approve and report the construction works timely and concisely.

Inappropriate planning also prevented many of the construction projects to achieve their predefined objectives. Owner is suggested to conduct the feasibility study of the

construction projects properly and consider all the involved and influential aspects. Also, the contractor should improve the planning and scheduling abilities of their teams.

Corruption is considered as another external risk leads to arguments and disagreements in the construction industry of Afghanistan. The government has to be very strict in this regard and the legal processes and lawsuits should be firmly considered and followed. So as to absorb funds and sponsorships of international community and external investors the government has the extremist obligation of fighting against corruption.

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