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Risk Management in Construction Projects in Afghanistann

Inayatullah Mohib

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Abstract
The topic of this research is Risk Management in Construction Projects in Afghanistan. The main purpose of this paper is to identify risk factors and how to mitigate, minimize, and response to those identified risk factors. The main scope of this study is done by doing questionary survey by filling the designed format in which all aspects related to risk management and its mitigation are placed by different question methods.

The result of the questionary survey has diverse outcome including risk management, risk assessment, main causes of delays, types of risk in construction industries, risk management process steps, mitigation of identified risk in construction projects, and impact of identified risk factors on main component of the project (cost, quality, and schedule).

In addition, these findings provide additional information about financial risk and delay in implementation of the project are also critically important, because most of the mega projects in Afghanistan are funding by numerous international organizations/donors. Some of the financial risks in constructions industry are currency exchange rates, income taxes, inappropriate estimation of the projects, working items, unexpected increment in price of materials, procurement, and delay in payment process. These are some of the main financial risk factors which have direct impact on the construction projects. On the other hand, the main causes of being behind the schedule are security issues, poor management, delay in supply of construction materials and social destructions as well.

As a result, all construction projects have different risk from the initial to inauguration phase therefore, proper technical team of the management especially the sector of risk management is indispensable to be involved in every construction industry, however, in Afghanistan the stance of risk management is not common to be considered according to this research investigation. It's recommended that a proper team of risk management with experts in management, especially in risk management should be considered in every planning project. This will assist the project manager to reduce risks and execute stable project within time and budget.

Table of Contents

Table of Figures

Abbreviation

ADB (Asian Development Bank)
BQ (Bill of Quantity)
GCC (General Condition of Contract)
HSMP (Health and safety Mitigation Plan)
PCC (Personal Condition of Contract)
PID (Project Initiation Document)
QA (Quality Assurance)
QC (Quality Control)
QCM (Quality control Management)
QCP (Quality Control Plan)
RBS (Risk Breakdown Structures)
RFP (Request for the Proposal)
SP (Security Plan)
SSEMP (Site Specific Environmental Management Plan)
WBS (Work Breakdown Structure)

1.Introduction

Risk is an undefined occasion or condition which happened in projects, it has positive or negative impact on the projects (Miladi Rad and Yamini, 2016). Through this study we can identify major risks that Afghan construction projects are confronting, and the risk management and innovation techniques used to achieve these risks in construction projects in Afghanistan as well as how to identify risk factors, developing the effective responses & managerial techniques to resolve and minimize the risks in construction projects in Afghanistan. The main objective of this research is to understand construction risks and its impact on the construction projects in Afghanistan, and how to mitigate these construction

risks in projects there. There are different types of risks in construction projects but most common risks in construction projects in Afghanistan are: environmental risks (earthquake, flood, snow etc.), cost risk, schedule risk and performance risk. The initial risk of the projects has already been mentioned in PID (Project Initiation Document).

This research has been performed on both primary and secondary data. Both primary and secondary data are used in this research but the core data for this research has been done through questionnaire survey and an interview with project managers, clients, experts, local and international consultant about the risk management in construction projects in Afghanistan.

Furthermore, questionnaire survey has been performed in construction companies in Afghanistan to recognize their awareness regarding the risk in construction projects and how they are mitigating in their ongoing or completed projects. Most of the governmental and NGO projects are not completing the projects on time in Afghanistan due to poor management techniques and it has extreme impact on projects completion. Most projects haven't been completed as per original plan due to security reasons, quality problems, cost problems and poor scheduling of the projects as well. Most of the local companies don't have any stance about risks in projects. They are just thinking to achieve the project objectives by any cost, and it has extreme effect on the quality of the projects. The mega projects in Afghanistan have been scheduled for execution but it's not happening due to social conflicts, security reasons, some of these projects are in unsecure area which caused problems.

For this study, it is interestred to investigate about risks and risk management factors of construction projects in Afghanistan. For this purpose, the researcher had some practical investigation in Afghanistan with national and international construction organizations to know the exact issues while a construction project is executing.

This leads to myriad problems in construction projects in Afghanistan including lack of management and capacity, local conflicts, security issues, incomplete feasibility study, delaying in delivery of materials, machinery, environmental and geological risk, statutory compliance, survey, variation order and unstable government. There are many alternative methods are available for solving these problems, however, implementing sector or government is responsible to have quite technical team to do feasibility studies such as geographical investigation, geotechnical investigation, social investigation, environmental investigation along with engineering investigation to prepare a general report before planning the planned project. Furthermore, having sufficient data from the feasibility studies will assist the team to work on planning and designing the project precisely.

Moreover, myriad factors disrupt normal project implementation however, in construction projects risk and risk management are the main tools to be considered from the initial phase to inauguration phase to assure quality execution and stakeholders satisfaction as well. Besides that, through risk management techniques we could identify risk factors and how to response to the identified risk factors in construction industries.

There is no previous research using this approach to explain in detail how to identify risk factors, how to mitigate and response to the identified risk factors and risk management techniques. For this purpose, the researcher has interviewed myriad technical including project managers, quality control managers, environmental experts, consultants, safety

officers and social society to identify major risk factors that national construction companies mostly face during project implementation in Afghanistan.

This thesis has made several significant contributions to the field of construction management and risk management in construction industries in Afghanistan. This paper has practical way, questionary survey has done with diverse technical individuals in different construction industries which give significant role to the research. Risk management is mostly not considered in Afghanistan while executing construction projects, but the negative affection mostly disrupts smooth project implementation. Our research aims to collect important data from the site through stakeholders to explain all available and experienced factors which prohibits normal execution of the project and disrupts project budget as well.

2. Literature Review

2.1 Definition of risk management

The theory of risk management is contemporary become quite well-known in today's business world. Myriad organizations mostly create a risk management in their projects for enhancing the performance and developing the benefits. Construction projects mostly have high budget and are complex with the execution phase, however, reducing giving priority to the risk management will play a vital role for the management team in every construction projects consequently (GAJEWSKA and ROPEL, 2011).

Risk management includes the identification of risks, analysing it, and to ascertain the actions to change the hazards on every project. To deal with risk we should include every step for the risks management in order to execute the process of the project smoothly (B. Landage, Mhetre and Konnur, 2016).

There are two main categories of risk management techniques have been considered, firstly, preventive techniques through this technique we can prophesy the risk in construction projects during the execution stages. Secondly, Remedial Techniques, this is a technique when risk has been occurred during the implementation stage (Iqbal et al., 2015).

There are different ways to prophesy and recognize the risks. "Risk has two primary components for a given event" (Kerzner, 2017).

- "A probability of occurrence of that event"
- "Impact (or consequence) of the event occurring (amount at stake)"

2.2 Types of project risk

Moreover, two types of risks are defined, which are external risk and internal risk: External risk is environmental impacts on the projects and internal risk is uncertain in projects but still it has been mentioned in PID (project initiation documents) (RolandWanner, 2019).
Internal Risks: (RolandWanner, 2019)

- Cost Risk: This risk occurs when project has not been estimated correctly.
- Schedule Risk: project has not been scheduled properly, and each activity is taking more time than anticipated.

- Performance or Quality Risks: Outcome of the project does not match with project specification.

External Risks: (RolandWanner, 2019)

- Operational Risks: This risk occurs from poor execution and operation problems.
- Market Risks: It includes, currency risks, merchandise, competition risk and so on.
- Strategic Risks: Are those risks that failing to accomplish project goals, e.g., introducing and using new technology.
- Legal Risk: These are connected with contract related clauses, general condition of contract, particular condition of contract, codes, and regulations, preparing and acceptance of drawings by contractual groups of procurement team.
- Environmental Risks: Risk related to environment such as storm, flood, earthquake and so on.
- Governance Risks: The idea of risk government includes risk management or risk analysis, it also focuses on how risk related decision making can be affected to meet the big challenges facing society contemporary, especially which related to natural disasters, food safety or danger infrastructures. Risk management also includes historical and legal backgrounds, guiding laws, value system and observations as well as organizational necessities (B. Misra, 2017).

2.3 Project Stakeholder Management

Project Stakeholder Management comprises the process needed to introduce the people, group, or organization that could impact on the project, to determine the expectation of stakeholder and their impact on the project and to strengthen apt management strategies for effectively engaging stakeholders in project decision and implementation. It needs the work of the project team to determine the stakeholders demands, assesses the degree in which they impacted by the project and develop the strategies to effectively include stakeholders in support of the project decision and the planning and implementation of the project as well (PMBOK Guide, 6th Ed.).

The Project Stakeholder Management Process are:

1. Identify Stakeholders: The process of analyzing project stakeholders in its regular bases, documentation of regular data to know their interests, involvement, interdependencies, influence, and possible impact on the project success.
2. Plan Stakeholder Engagement: The processes of strengthening approaches to include project stakeholders based on their needs, interest, prospects, and possible impact on the project.
3. Manage Stakeholders Engagement: The process in which it required to meet with stakeholders to know their most recent needs, and prospects, identify drawbacks, and foster apt stakeholders' inclusion in the project.
4. Monitor Stakeholders Engagement: The way of monitoring project stakeholder relationships and developing strategies for inclusion of stakeholders through the alteration of engagement strategies and plans.

Risk management in construction projects is indispensable for the purpose of quality implementation and satisfaction of stakeholders as well. Before planning the project, executing department is responsible to prepare satisfaction report from the society which reflect the actual and most recent need of the project. For example, due to the unavailability of satisfaction survey from stakeholders before the planning of the projects in Afghanistan mostly do not satisfy stakeholders especially (society) although project is implemented with quality and on time.

Stakeholders are organization, group or individual that have an interest in the success and development of a company. There are two types of stakeholders, internal stake holders and external stakeholders: Internal stakeholders most of the time have a financial interest in the company and external stakeholders are those, who haven't invested in the company or organization, but their roles frequently reflect the society, government, and ecological worries. The project team must speak with all stakeholders to obtain stance and creating project plan (PMBOK Guide, 6th Ed.).

Starting any kind of projects, environmental analysis is the starting point and as well as a strategic tool for all projects, it is a way to organize all the external and internal elements of the project, which can affect the industry performance. There are numerous strategic tools for analyzing the environment but most common are PESTLE and SWOT tools, we use PESTLE tools for external analysis and SWOT for internal analysis. These factors have direct or indirect effects on any in organization (B. Landage, Mhetre and Konnur, 2016).

PESTLE:

P)- Political factors
E)- Economic factors
S)- Social factors
T)- Technological factors
L)- Legal factors
E)- Environmental factors

SWOT:
S)- Strength
W)- Weaknesses
O)- Opportunities
T)- Threats

Risk management is used to minimize and control the risks, there are various kinds of risk management techniques, such as risk avoidance (presentation), risk retention, risk reduction (mitigation) and risk transfer. Awareness and perception about the importance of risk in construction project should be clarified in project management decision making (Iqbal et al., 2015).

Risk playing a key part in the success or failure of the various industries and especially in construction industry. As an outcome of influencing cost, efficiency, and period of project in implementation, risk appears as an opportunity and threat. Accepting the risk means that some risks are inherent, and it gives business benefit. Avoiding the risk means that organization are not interested to do that activity. Risk control means that risk can be mitigated or reduced it to be happened. Risk transfer means that risk responsibility can be

transferred to another third party for example organization insured the purchased of the products (B. Landage, Mhetre and Konnur, 2016).

There are many risks in a project, but some of the risks need to be solved to mitigate the risks. it's an important to understand the risks, after that finding the required resources and funding, and senior management will likely have to approve the plan and all staff needs to be informed, if necessary, some essential trainings will be conducted (B. Landage, Mhetre and Konnur, 2016).

Most of the time uncertainty resource of any projects have been identified due to not managing them in the early stage of the project and it has strong effect on the project. Therefore, a detailed structure of the project needs to be explained at the beginning of the project or a detailed structure of project life cycle can be applied to organize the risk management. Risk management can effectively employ relying on different and separate bases in each stage of project life cycle, without executing risk management in previous or next step (Miladi Rad and Yamini, 2016).

2.4 Phases of project risk management

According to the sixth edition of PMBOK guideline, there are seven processes of project risk management:

1. Plan Risk Management
2. Identify Risks
3. Perform Qualitative Risk Analysis
4. Perform Quantitative Risk Analysis
5. Plan Risk Responses
6. Implement Risk Responses
7. Monitor Risks

2.4.1 Plan Risk Management

It is the way of defining how to comport risk management activities for a project. The main advantage of this process is that to make sure the degree, type and availability of risk management are balanced to both risk and importance of the project to the organization and stakeholders. This process is done once or predefined points in the project. The plan risk management should be started when a project is considered should be completed primary in the project. It may also be required to revisit this process later in the project life cycle, for instances, a major phase changes, or if the scope of the project changes meaningfully or if a succeeding review of risk management needs alteration (PMBOK Guide, 6th Ed.).

This step of process has some inputs, tools & techniques, and outputs. Inputs are project charter, project management plan, project documents, organizational process assets, enterprise environmental factors. Tools & techniques are judgement of experts, analysis of data and meetings. Outputs are Risk management plan. Everything has been explained in detail in project charter, such as duration of the project, budget, project team, risks, constraints, scope, milestone and so on. Risk management plan entails of strategy for risk, methodology, responsibilities & roles, funding, timing and so on (PMBOK Guide, 6th Ed.).

Risk management is a process not a project that can be finished and then forgotten about. The organization, it's environment and its risks are constantly changing so the process should be consistently revisited. The kind of process which consists of identification, assessment, response, and review (B. Landage, Mhetre and Konnur, 2016).

2.4.2 Identify Risks

Identifying potential risks: Identifying potential risk includes project management plan, project documentation, agreement, procurement documentation, enterprise environmental factors, organizational process assets. Identifying the risk types are important, what kind of risk hazards we have? There are four main types of risks: operational risk, hazard risks, financial risks, and strategic risks. Operational risks are like failure in supply, hazard risks are like injuries, fire, financial risks are like economic recession. These kinds of risks can be identified by some following methods (B. Landage, Mhetre and Konnur, 2016).

a) Brainstorming
b) Delphi Techniques
c) Interview/Opinion of experts
d) Experience
e) Checklist

Brainstorming is one of the most widespread and famous techniques which is generally used for idea creation as well as useful in identifying risk. All relevant staff associated within projects are gathering and one person is facilitator, then each employee/staff is expressing their idea and at the end facilitator summarizing all the points and eliminating unnecessary ones.

Delphi technique: In this technique participants don't know each other as well as not sitting together at one place. Each participant is identifying the factors without consulting with each other and at the end summarizing all the points.

Interview/opinion of experts: Experts in relevant fields in a project is extremely helpful in order to solve and avoiding same problems. All the staff in the project could be interviewed to identify factors which is affecting the risk.

Experience: Past experience in relevant field is extremely helpful in identifying risks in projects and will be helpful to mitigate the risks.

Checklist: This is another tool, checklist for the identified risks is helpful in the projects whether these risks are in the past or present and how it responds to those risks (B. Landage, Mhetre and Konnur, 2016).

2.4.2.1 Risk Assessment

Risk assessment, it has a set of process, identify the risks, identifying who or what can be affected, evaluate the risk, risk mitigation, record the risk, contingency plan, review, and revision. Risk assessment is one of the most important aspect in construction projects, not all

the organizations have an idea about risk in construction projects in Afghanistan, we must understand and consider that point that every project has its risks that needs to be addressed to ensure project completed successfully (B. Landage, Mhetre and Konnur, 2016). Most construction projects in Afghanistan have three significant constraints, which are Time, Scope and Cost. It is quite challenging that project has been delivered on time.

2.4.3 Perform qualitative risk analysis

Qualitative method for risk assessment is: This risk assessment is based on descriptive scales and uses for defining the probability and impact of a risk. This assessment can be done in small & medium size projects or when the numerical data is unavailable and when we are limited of time and money (B. Landage, Mhetre and Konnur, 2016).

a) Risk Probability and impact assessment: The possibility of a certain risk which is going to be occurred can be evaluated.
b) Probability/impact risk rating matrix: The probability of high risk required immediate actions and the probability of low risk can be monitored and may take necessary actions if needed.
c) Risk categorization & risk urgency assessment: In this assessment we can used some tools like (WBS) work breakdown structure and (RBS) risk breakdown structures, work breakdown structures are breaking large activities into small activities which is easy to assess activities. Risk breakdown structure are categorizing the risks. Risk urgency assessment is prioritizing the risks and taking quick actions.

2.4.4 Perform quantitative risk analysis

Quantitative method for risk assessment is: This risk assessment is based on the priorities established in the previous qualitative risk analysis, which describes the impact on the project's budget and duration. This assessment can be done in mega projects and requires software (B. Landage, Mhetre and Konnur, 2016).

a) Sensitivity Analysis: This analysis will identify the undefined project elements which may have impact on the outcome of the project.
b) Scenario Analysis: This analysis will give us diverse scenario for the project, and we could opt it better options which has less hazards.
c) Probabilistic Analysis (Monte Carlo Simulation): This analysis identified the uncertainties and hazards on the project budget and schedule. Monte Carlo Simulation is mainly used for the analysis, and it simulates the whole system several times. It estimates the three points like, most likely, worst case and best-case length for all the task in time management.
d) Decision Trees: It's a tree diagram which has some graphical models, and this analysis can clearly affect each decision of the project.

2.4.5 Plan risk response

This step indicates what kind of necessary steps should be taken towards identifying risks and threats as well as creating an action plan, not only for responses to the identified risks but for monitoring as well (B. Landage, Mhetre and Konnur, 2016)

a) Risk avoidance: Executing the project in a different way and still achieving the project aims and objectives. Modifying the project management plan to eradicate the threats.
b) Risk Transfer: Finding other parties who are willing to accept the responsibility for the risk management, transferring the risk does not mean risk is eliminated, it still exists but risk has been owned by another party.
c) Risk mitigation/Reduction: Taking proper actions to diminish the risks.
d) Risk Exploit: A kind of risk where organization wants risk to be occurred in order to be perceived profits from the condition. For example, a workshop for employees in order to enhance their skills.
e) Risk Share: For example, paying insurance for sharing risk, accepting small portion of risk while sharing large part of risk to the insurer.
f) Risk Enhance: creating an opportunity to enhance the risk in order to maximizing the profits.
g) Risk Acceptance: Eventually, it's impossible to eliminate all the hazards or take advantage of all chances. This strategy is acceptable when there is no chance for escaping the risks and project manager and teams are agreeing and addressing the risk when it happens.
h) Contingency plan: It's a backup plan if a risk happens.

2.4.6 Implement Risk Responses

This step indicates what kind of necessary actions should be taken for the identified risks; this process is happening during the implementation stage of the project. Inputs for this process are risk management plan, risk register, risk report, etc… Techniques & tools are judgement of experts, project management information system, etc… Outputs for this process are request change, update in project documentation, risk register, risk report and so on (PMBOK Guide, 6th Ed.).

2.4.7 Monitor Risks

During the project implementation, the register risk will be monitored to ensure the analysis stay current. Risk priorities could be change as something happen in the project which will change the whole profile for each risk, risk can be expired or maybe didn't occur (B. Landage, Mhetre and Konnur, 2016).

(B. Landage, Mhetre and Konnur, 2016) argued that the last step of the risk management process is risk review. Organization mostly has the options to avoid, accept, control, or transfer a risk. Risk reviews brings non-stop improvement, controlling and monitoring the risks. There are some tools and techniques available for risk review such as, risk audit and measurement of the technical performance (B. Landage, Mhetre and Konnur, 2016).

2.5 Risk Management process in construction projects

Risk management is a systematic process of analysing, identifying, and responding to project risk. Risk management could be thought as a decision-making process, and it requires the full understanding and awareness of an identified risk or to take a crucial action to minimize or diminish the effect of risks. This process has three stages risk identification, risk analysis and

evaluation, and risk responses. The term identification denotes to keep record of the allied risks, then do the analysis & evaluation and the last stage is risk response, this step indicates what kind of necessary steps should be taken towards identifying risks and threats (Bahamid and Doh, 2017).

Risk management in construction industry are designed to monitor, plan and control to prevent the risk. Most of the construction projects are not finishing successfully in today's world due to several reasons and some of these reasons are evaluation and monitoring. Both evaluation and monitoring are using to judge the performance of projects. They are both related to each other, and they are sperate roles. Monitoring is viewing and the purpose of monitoring is to observe the projects against scope and plan.

2.6 Risk Management Process at the Stage of Designing Construction Projects

Designing any kinds of projects especially construction projects, designers should consider what kind of risks are there in projects, most of the time design projects are not implementing the same way as its designed. Moreover, assessing the risk management process at the stage of designing is the best time (Miladi Rad and Yamini, 2016).

Designing the construction projects, as well as its duration and budget. It is quite challenging to implement the projects as it was designed, proper attention is required to design the construction project which cover every aspect of the project. After completing the design stage, risk management process will commence and will control the obtained outcomes of the project as well as risk management process will consider some steps, reviewing documentation and doing necessary analysis if needed. It's quite essential to understand & know in which step risk management should be commenced as well as what damages could be occurred if we start this process late. Therefore, it's essential to know the best time of commencing risk management process in construction project (Miladi Rad and Yamini, 2016).

As we understood the importance of risk management process at the stage of designing construction projects, but this process is applying very less in construction projects in Afghanistan due to lack of capacity and poor management, this process is applicable only in international and mega projects in Afghanistan.

2.7 Risk types in construction

Respectively, construction projects are not empty of risks. Risk is existed in all kinds of construction projects regardless of their size or sector, if risks are not identified and analyzed properly the project is likely to be failed. Risk management is a process which identify and analyze the risks in projects and make a proper plan to mitigate or avoid the threats in any kind of construction projects. Due to the nature of the construction projects, risk management is a vital process to complete the project. Risk in construction industry could be generally classified into following aspects (B. Landage, Mhetre and Konnur, 2016).

1. Technical Risks: survey, incomplete design, insufficient specification, etc. are named as technical risks. Topographical survey is done to get points from the site and know about the height of the surface, it also gives sufficient information about the quantity

of cutting and filling as well, however, if this process is not done with concise so it can directly affect the design process which will bring significant technical errors from the beginning to the end of the project. To avoid technical risk, it is required to prepare completed package of QA specification in which all necessary data including survey, design, QA, QC, SSEMPs, Health and Safety, security, cold and hot weather, and other essential plans should be submitted and approved. Technical risk in construction projects can be avoided with coherent management and technical experts and it should be considered from the initial phase to the planning phase and inauguration phase with best plans and ongoing monitoring and supervision as well.

2. Construction Risks: changing in design, labor efficiency, dispute of labor, condition of site, failure of equipment, new technology, and high-quality standard delivery. With having proper plan, due to the requirement of the project and donors need it is sometimes required to bring changes in design that may bring significant change in implementation plan, scheduling respectively. Equipment are essential parts of execution plan, the failure in equipment can cause the schedule to go behind so it can affect the contractors budgeting and invoices plans as well.
3. Physical Risk: Injuries of labor, fire, and robbery. To avoid physical risk, government or donor is recommended to give indispensable role to the health and safety mitigation plan along with site specific environmental management plan. Safety plan will be followed by safety officers on the site and the SSEMPs will be guided of SSEMPs officers as well. Personnel Protective Equipment (PPE) including gloves, eyeglasses, shoes, helmet, safety jackets are those essential parts of safety to be considered by site labors and should be monitored by site safety officer on the site on its regular bases.
4. Organizational Risks: experience of contractors, inexperience work force and communication. Contractors play vital role in quality execution of the project, the main sector responsible for on time and well implementation of the signed project is contractor. However, having plethora of related work experience is the essential part of RFP that should be added in biding document from the government or donor side.
5. Financial Risks: upsurged material price, exchange rate of currency, delay in payment, procurement, improper estimation, and taxes. In Afghanistan change in material price is very common because most of material are imported from foreign countries with USD dollars but in local shops and common markets, they sell these materials in Afghan currency which is not flexible and can be changed rapidly. On the other hand, delay in invoices can also pull the project toward the risk because contractors mostly have other sub-contractors and supplier, and they are obligated to pay them constantly. Delay in invoices will delay the flow of work that can affect the designed schedule as well.
6. Environmental Risk: Natural disasters, hazards, domestic risks, safety risks, earthquake and so on. To avoid this, donor or implementor sector is responsible to do proper investigation and feasibility studies to know the nature of the site well where project is desired, however, feasibility assessment in this regard will assist the donor to prepare a collection of information regarding environmental resources, records for hazards, natural disasters, and floods as well. Therefore, the available data from the assessment will assist the planning sector to do proper planning accordingly and it will decrease the amount risk from the prospective environmental risk.
7. Socio-Political Risks: Pollution, safety rules, corruption, bribery, language barrier, war, permit, and approval. Social risk is also important to be considered when planning to execute construction projects in Afghanistan because social issues mostly disrupt smooth project implementation, however, to avoid this risk social and

domestic investigation should be placed in feasibility studies and assessment. This will assist the implementor sector to know the community well and get the social agreement for the implementation of the project.

2.8 Review of Risk in construction industry

Over-all all construction projects & construction industry activities are risky. Risk can be elaborated as an occasion which has influence on objectives, might have positive or negative result. Risk management is a system which aims to measure and categorize all risks, to which an industry or project bared. Therefore, before the implementation of a project, each project should undergo risk analysis performed along with the identification of possible risks. Identification of risks in construction projects is based primarily on determining what types of risks may affect the project, identifying their characteristic parameters and estimating the probability of their occurrence in the project. The need for risk identification stems from the decision- making conditions under which an investor's availability (Szymanski, 2017).

There are five main groups of risk in construction projects (Szymanski, 2017).

1. Preliminary design
2. Tender
3. Detailed design
4. Construction works
5. Financing the investment

In preliminary design, the rejection of the construction project may cause loss of expenditures and will occurred some risks like "risk of overestimating the costs of the project" and many more. In tender stage we may face some risks such as "risk of corruption", "risk of tender cancellation" and so on. In detailed design stage, this is the backbone of the final project, and we might have faced these risks such as: incorrect design, overestimating the budget of the project, and etc… In construction works, it's the implementation stage of the project and have some risk such as: scheduling, geographical conditions & access to projects, equipment or machinery failure, lack of specialized individuals/employees, poor management, lack of resources, delaying in supplying materials, quality, scope of the project and many more. Financing the investment, the last group of risk which is covered by the extreme risks in projects and these risks are instability of government, security, improper cost plan, price escalation, types of contractors and variation order (Szymanski, 2017).

2.9 Causes of Project Delay in the construction Industry in Afghanistan

It's quite common when project is finished on time it means that project is successful but unluckily due to several reasons many construction projects in Afghanistan are failed to complete on their original contract time. There are some core factors that delaying the construction projects in Afghanistan are: slow decision making, corruption, security threats, poor qualification of the contractor's, technical staff, delays in payment by clients, poor supervision, incomplete feasibility study, lack of resources, variation order, equipment's (machinery, labour. etc.), design, delaying in the delivery of materials, achieving the plan, environmental & geological risk (flood, earthquake, snow. etc.), accommodation building housing types not applicable, political risk, the plan and management by contractor's (Niazai and Gidado, 2012).

2.10 Role of risk management in construction project in Afghanistan

Risk management has become an essential part of the management process for any kind of projects, managing risks in the construction industry has been identified as a vital management process to achieve project goals in terms of cost, time, quality, environmental sustainability, and safety. Through risk management techniques and innovation many risk projects can be completed successfully. Most of the construction companies in Afghanistan are not able to deliver the project on time successfully, there are several reasons but one of its main reasons is poor construction management (Faqiri & Rasool, 2018).

Hence, construction industry has more job opportunities comparing to other economic-industrial sectors therefore it is essential to assess the appropriate use of risk management in various stages of construction project life cycle. The accomplishment and success of the construction projects are evaluated based on the outcome of project aims in the form of determined cost, quality, and time. Many construction project managers commence to work only with an unclear view of project purposes, risk is playing a significant role in failure or success of the numerous industries, mainly construction industries. Mega construction projects have involved with numerous risk factors that affect project consequences. Through project life cycle we can adopt best method to elaborate overall structure of construction projects in each passage of time, generally it's defined based on the project type or on the nature of project (Miladi Rad and Yamini, 2016).

2.11 Limitation of previous research

As far as we know, no previous research has investigated that how much risk management is essential in construction industries. Most studies have relied on what are the main causes of delay and what are the main risks in construction projects in Afghanistan. Additionally, previous studies emphasis on why most of the projects are not completing on time and within budget, and they have not considered the importance of risk management. If we consider risk management and its tools in construction industry, as a result project will be implemented on time and within the budget. This research will assist all technical individuals to know the practical tools about risk management and its factors in construction projects in Afghanistan.

This research paper has been chosen by having several practical investigations with national and international construction companies, NGOs, and individual consultants to know the exact demand of construction management and its requirements by considering risk management and the factors affecting all phases of projects including initial, preparatory, and implementation phases.

During my practical research in Afghanistan, I found out some drawbacks in construction management, especially in risk management in construction industries. Construction projects are chosen without having close consideration to the stakeholders and most projects are implemented without consideration of geotechnical investigation and feasibility studies, weak procurement processes and non-technical estimation sheets as well.

Moreover, to implement construction project in standard manner, it is required to have some essential plans for example, Quality Control Plan (QCP), Site Specific Environmental Management Plan (SSEMPs), Quality Assurance Plan (QA), Health and safety Mitigation

Plan (HSMP), Security Plan (SP) but in Afghanistan these plans are not prepared in most construction projects because the management team mostly do not have awareness about it. Consequently, the unavailability of above-mentioned plans could bring myriad risks to the execution of every construction project.

2.12 Research question

a) What are the risks in construction projects and its impact on the projects?
b) What kind of risk management techniques should be used to mitigate these risks in construction projects?
c) How to response to the identified risks in construction projects in Afghanistan?

3. Research Methodology

Both primary and secondary data are used in this research. The main source of data for this research has been collected through a questionnaire survey from the key staff, managers, clients, local and international consultant as well as reviewed some books, journals, articles, magazine articles, that how to identify risk & the risk factors in construction projects, what kind of risk management techniques should be used to respond, mitigate, and minimize these risks in construction projects in Afghanistan.

These questionnaires are mostly related to the risk management, risk management techniques and risks in the construction projects in Afghanistan. As well as the core data for this research has been collected from the companies through questionnaires, survey, and interview. This case is studied, deeply investigated, and made inside some of local projects, international projects, and governmental projects. The data for this research has been collected directly from some companies.

Initially, an experimental or pilot study was conducted to identify and verify the research questionaries whether its relevant to the objective of this study or not. The pilot study was approved by the research supervisor. Furthermore, questionnaire survey has been performed in construction companies in Afghanistan to recognize their awareness regarding the risks in construction projects, risk management techniques and how they are responding to the identified risks in construction projects in Afghanistan. Alongside, how they are mitigating & minimizing risks in construction projects.

There are several reasons that governmental, NGO and private projects are not completing on time in Afghanistan, these reasons are poor management techniques, instability of government, design, security, incomplete feasibility study, quality problem, cost problem, poor secluding, and many more factors which has extreme impact on the construction projects completion date. Many local companies even do not have any stance about risks in projects there only aim is how to complete the projects and it has strong impact on the quality of a project.

Through this study we can identify major risk factors that Afghan's construction projects are confronting, and the risk management and innovation techniques are used to mitigate & minimize these risks in construction projects. The questionnaire survey has been done with in almost five to ten construction practitioners, with some local and international clients, donors, contractors, local and international consultants and interviewed some project managers.

The questionnaire survey has been divided into two main parts; part one questionaries survey has several parts and consist of some demographic questions, causes of delay in construction projects, risk management, risk assessment, types of risk in construction industry, risk management process steps, who has the responsibility of doing risk assessment, why construction projects are not completing on the time, why most of the construction projects are delayed in Afghanistan, what are the causes of delaying? Besides that, the last part in this questionnaire survey is mainly about how to respond and mitigate to those identified major risk factors in construction industry in Afghanistan.

In part two questionnaire survey, it has only one questions but has sixteen sub questions and it is the main question in all questionaries; in this question the researcher asked sixteen major risks that has direct effect on main component of project including cost, quality & schedule.

Each construction project has different style for assessing the risks in construction projects (Iqbal et al., 2015). This study highlighted and showed what are the main risk factors that Afghan construction projects are facing, and the risk management techniques are used to minimize & mitigate those identified risk factors.

It would not be possible without the help of methods that are quite common in the management process, selection of the right method is the key factor in risk management. The most common methods are included (Szymanski, 2017).

- Delphi method
- SWOT analysis
- Brain storming
- Sensitivity method
- Risk matrix
- Computer simulations and modelling
- Ishikawa or fishbone method

Furthermore, there are some mathematical methods as well which are used for estimating the scale of risk probability. Some of these methods are (Szymanski, 2017).

- Pert diagram/method
- Decision trees
- Fuzzy sets
- Probability theory & probabilistic method
- Artificial neural networks

The main objective of this research is to understand construction risks and its impact on construction projects in Afghanistan and how to mitigate & minimize these risks in construction projects. There are various risks in construction projects but most common risk in construction projects in Afghanistan are cost risk, schedule risk and performance risk (outcomes of the project does not match with project specification). Execution of the construction projects in Afghanistan is one of the most vital tasks for clients and contractors

to execute the construction projects, there are lots of barriers such as security concerns, lack of management and capacity, local conflict, price escalation and unstable government.

What is questionnaire: A kind of research instrument which has a chain of questions "for the purpose of gathering information from respondents" (Mcleod, 2019). Often, in questionnaire there are two kinds of questions, open questions, and closed questions. we can use both open and closed questions in order to collect the data.

Closed questions: Are those question which could assist us in collecting data and all the questions should be ranked and has continuous rating scale, such as measuring the strength of attitudes or emotions. For example, agree, strongly agree, neutral, disagree, strongly disagree and unable to answer. This kind of questions could be economical.

Open questions: Easy, simple and the language of questions should be to the point and understandable in order to achieve objective of the questions. For example, could you please tell me how you are feeling right now.

Question order: Questions should be asked like from the less complex to the most complex, from the realistic and behavior to the intellectual and from the more general to the more specific.

Terminology: Questions would be simple to the specific point and easy to understand.

Ethical Issues: The researcher should do commitment and ensure that all the essential information is provided by the defendant should be confidential, e.g. name, address, etc.

Interview could be carried out by phone call, online, computer, post, or face to face.

3.1 Data Analysis

However, there are trends in our data to suggest that the main source of information for this research has been collected through questionnaire survey from the key staff members, managers, clients, local & international consultant. Besides that, the researcher arranged and conducted several meetings with project managers, engineers and many more people and asked them a series of questions, that how to identify risk factors in construction projects in Afghanistan, what kind of risk management techniques should be used to respond, mitigate & minimize these risks in construction projects there. After these meetings the researcher finalized the survey questionnaires, most of these meetings were online due to covid-19 pandemic situation all over the world.

Each construction project has various style for assessing the risks in construction projects, this research or study highlighted and showed that what are the main risk factors that Afghan construction projects are confronting, and the risk management techniques are used to minimize & mitigate those identified risk factors. Raw data is available for the future if someone is interested in this research for example questionaries and outcome of the survey.

The data of this research has been shown in tables and charts to explain effectively in order to make the analysis easier for the people when they study the findings of this research. To present data accurately and give clear message to the readers, we always use the table or chart.

3.1.1 Mixed method

Both qualitative & quantitative methods have been used in this research or dissertation, both these methods have their own strengths & weaknesses in order to minimize these weaknesses of this research or dissertation both methods have been considered. In simple words, qualitative research produces non-numerical data while quantitative research is producing numerical data. In quantitative method a large volume of data could be easily collected, and it is easy to be analyzed rapidly and economically. As this research contains both quantitative and qualitative data in order to answer to those complex questions that needs further explanation, if you are looking for the best result so it's better to consider both.

3.1.2 Methods for gathering quantitative & qualitative data

There are mainly four used methods for gathering primary data:

- Interviews
- Questionaries
- Observations
- Focus groups

3.1.3 Descriptive and inferential statistics

Descriptive statistics: Are those techniques & methods which is used to elaborate or summarize data, frequently a group of people or things in terms of numbers, ranking, percentages, tables, or graphs.

Inferential Statistics: Are those methods & techniques which is used for inferring from a smaller sample, patterns or trends concerning the whole study population. These could be statement made about a population when it would not be feasible to perceive each member including simplification about patterns of food ingesting based on questionnaire or interview responses gained at a comparatively small number of supermarkets.

3.1.4 Analysis of Quantitative Data

There are various methods for analysing the quantitative data gathered in surveys, these methods are: (QuestionPro, 2018).

- Cross-tabulations:
- Trend analysis
- MaxDiff analysis
- Conjoint analysis
- TURF analysis
- Gap analysis
- SWOT analysis
- Text analysis

Cross-tabulation is most used method for analysing the quantitative data, also known by crosstab or contingency table. It is a statical tool which is used for categorical data, categorical data involve value, data is always have been collected in numbers and these

numbers has relationship with each other. Number doesn't have meaning for example 3,2,9, unless you quantified that 3 apple, 2 banana and 9 oranges.

Gap analysis uses a side-by-side matrix to demonstrate quantitative information and it assists to measure the difference among expected performance and actual performance.

SWOT analysis is another tool for analysing the quantitative methods that assigns numerical values to indicate strength, weakness, opportunities and threats of an organization or product or service which in turn provides a holistic picture about competition. This method assists to create effective business strategies.

Raw data or information must be presented in a meaningful way, and these are the steps to present the data in a good way and how to process further analysis. Besides that, for the data analysis we could use SPSS software as well.

- Relate measurement scales with variables (nominal, ordinal, interval, and ratio)
- Connect descriptive statistics with data (mean, median, mode, frequency, minimum & maximum values, percentage)
- Decide a measurement scale
- Select appropriate tables to represent data and analyse collected data

4. Analysis of Research Questionaries

The experiments are completely based on research questionaries and these questionaries were made in google docs or google form, these questionaries were designed in such a way that to identify the major factor that Afghan construction companies are confronting. The researcher has disseminated questionaries in Afghan construction companies in Afghanistan, with various organization and key staff members. Our data for this research has been analysed automatically in google docs.

It was total nineteen questions which are divided into two parts. In first part there are eighteen questions in this part there are some demographic questions and other questions which are related to risk management, risk assessment and risk types in construction industry, risk management techniques, and major factor of risks. In part two it is only one questions but it is the main question in all questionaries; in this question the researcher asked sixteen major risks that has direct effect on main components of project (cost, quality & schedule).

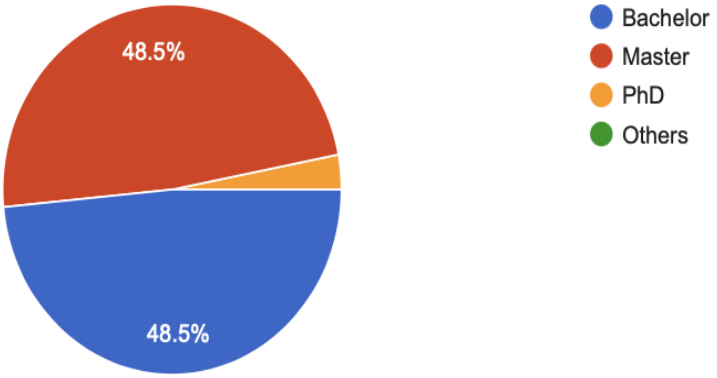

Figure 1 display the level of degree or education that participants have.

In this questionnaire survey about thirty-three people participated. Seeing the figure one about 48.5% bachelors, 48.5% masters and 3% PhD holders' participants have answered this research questionaries.

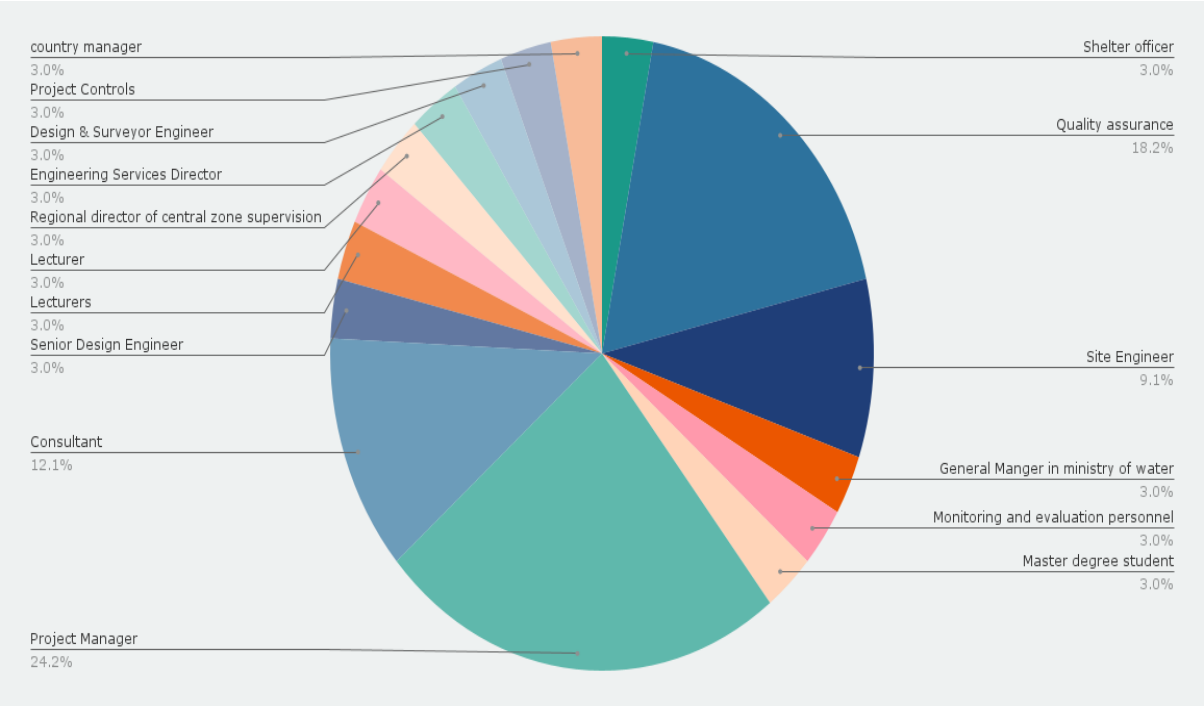

Figure 2 exhibit the employment status of the participants.

In this question, myriad various technical have participated including country manager 3%, project controls 3%, project manager 24.2%, consultant 12.1%, senior design engineer 3%, site engineers 9.1%, quality assurance 18.2%, shelter officer 3%, engineering service directors 3%, lecturers 6% respectively.

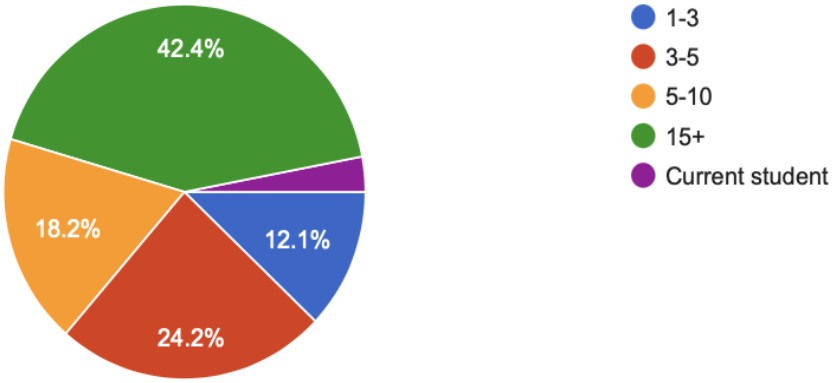

Figure 3 shows the professional experience of the participants in the related field.

This figure shows the years of experiences all participants have in which 42.4% is the percentage of those who have 15 and more than that, 24.2% is estimated for three to five years' experience, 18.2% is five to ten years of experience, and 12.1% is one-to-three-year experience from the above chart.

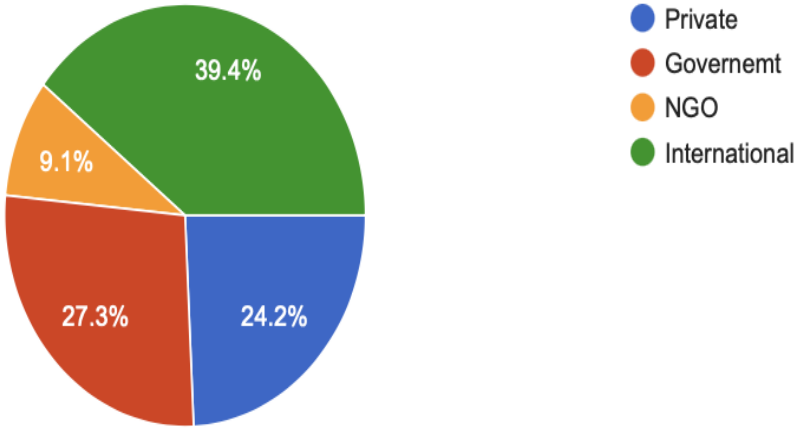

Figure 4 exhibits the types of organizations where participants have worked.

Seeing the chart, these participants have been working in various organizations, 39.4% international organizations, 27.3% governmental sectors, 24.2% private sectors, and 9.1% from NGOs.

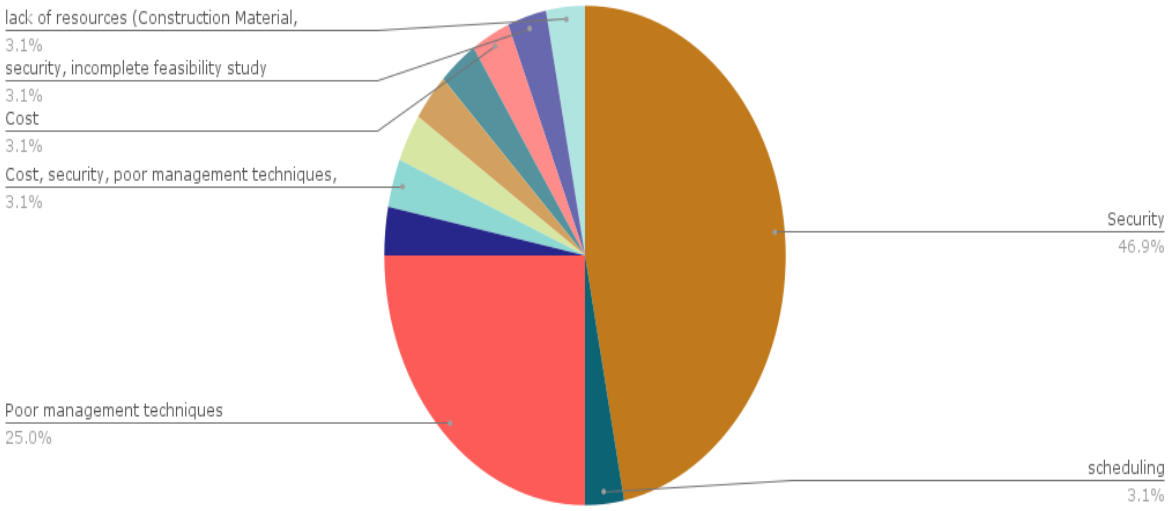

Figure 5 shwos the main causes of project delay in construction project in Afghanistan.

Seeing the figure, 46.9% security issues, 25% poor management techniques, 3.1% (lack of resources, incomplete feasibility study, scheduling). Data revealed a significant main factor that delaying construction projects in Afghanistan. Security is the biggest reason that most projects have been started or delayed in Afghanistan. Poor management techniques are another second biggest reason that projects have been delayed and other factors that are also delaying the project but these two are the main reasons.

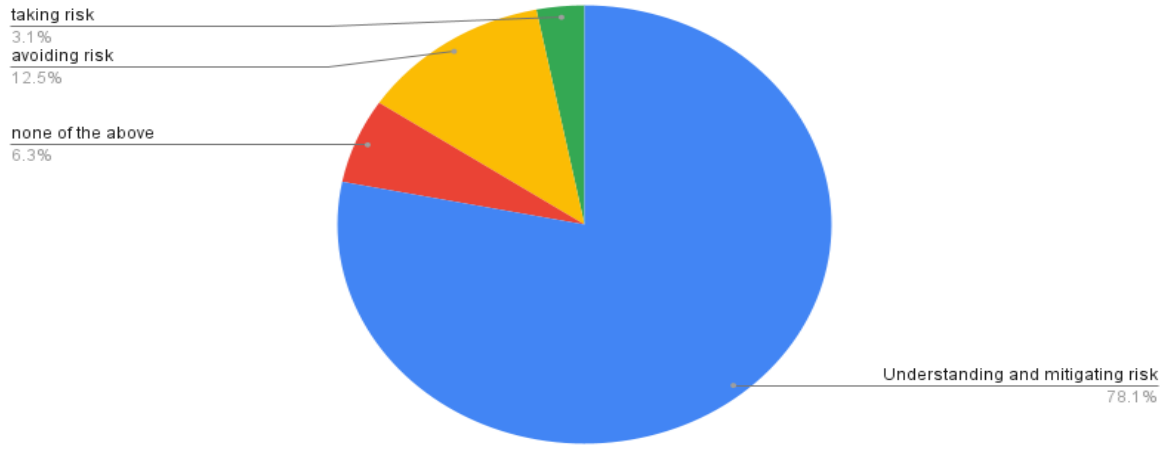

Figure 6 shows risk assessment is assissing or helping project in.

However, according to our data, 78.1% participants believes that risk assessment is assisting project in understanding & mitigating risk, 12.5% demonstrate that risk assessment is assisting projects to avoid risk in construction projects, 6.3% demonstrate that risk assessment is assisting projects in nothing while 3.1% demonstrate that risk assessment is assisting projects in avoiding risk.

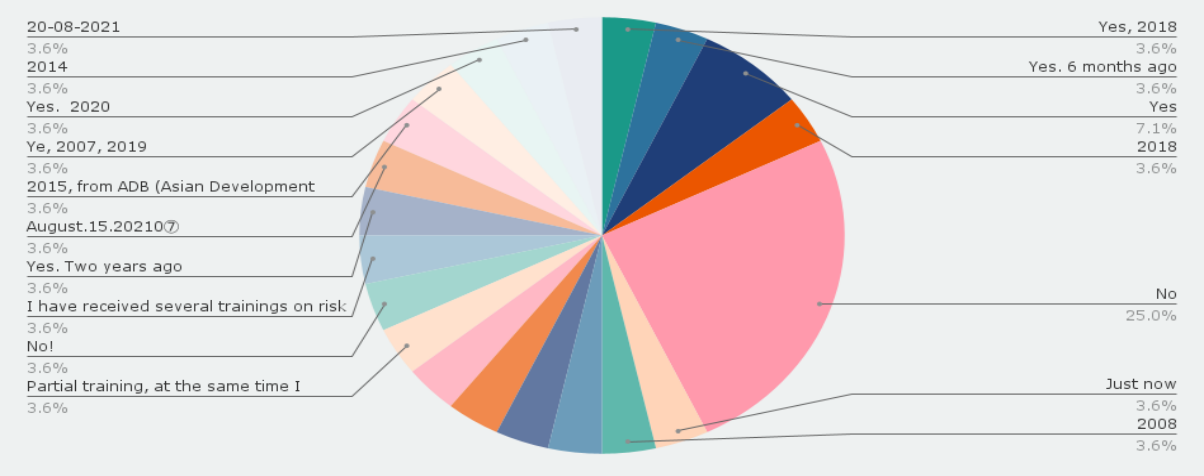

Figure 7 exhibits if participants received trainings regarding risk assessmnet with mentioning the time.

Figure 7 describe that did participants receive any training on risk management or not if yes when did they receive it. Besides that, many precipitants expressed their view that how much risk assessment is effective in the construction projects. Some of their views are:

- It assists construction projects to be completed on time and within budget
- In the preparation stage of a project, if project team do proper risk assessment & understanding the possible root causes of those risks, we can plan measures to mitigate, rectify and can avoid risk in advance
- Risk assessment is effective because if we minimize risks the project will be completed on time and without spending extra cost
- Risk assessment is essential for the project because mitigation measures can be taken after the assessment
- In the case of risk, risk mitigation measures could be considered
- Risk assessment is important because it helps identify, evaluate & mitigate associated risks in construction activities

Figure 8 shows that who will be the responsible person for doing risk assessment.

Our data also address that 53.1% project manager, 15.6% health, safety & environmental department and 9.4% engineering personnel are the responsible people for doing the risk assessment in construction projects.

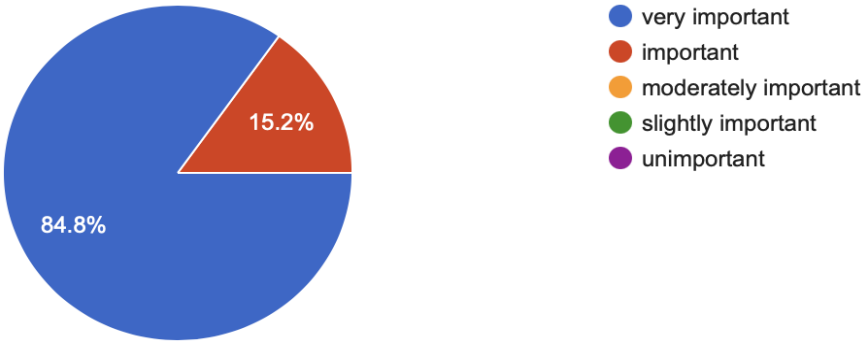

Figure 9 shows how much risk assessment is significant.

According to our data 84.8% participants demonstrate that risk assessment is very important in construction projects while 15.2% call it important.

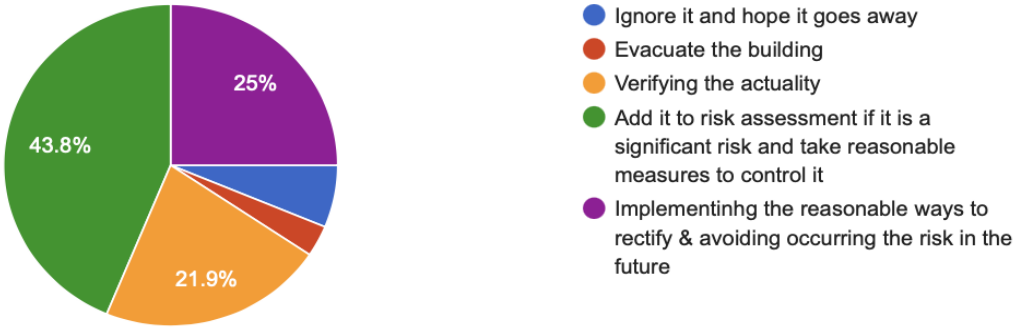

Figure 10 Shows if a member of the team report a risk to the team.

Our data shows that, 43.8% partipants states that if a staff member report a hazard or risks, it should be add it to the risk assessemnt if it is a significant risk, can be taken reasonable measures to conrol it, while 25% states that if a staff member report a risk, implementing the reasonable ways to rectify & avoidng occuring the risk in future, while the rest of percentage states that verifying the actuality of risk, ignore it and hope it goes away and evacuate the building.

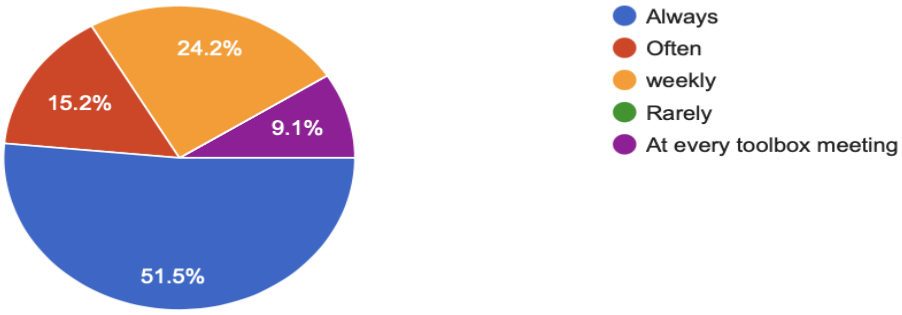

Figure 11 shows that how often project manager and health, safety and environmental officers discuss the risk with the project team.

Figure 11 exhibits that 51.5% participants believes that project manager, safety & environmental manager should always discuss risk with project team, 24.2% believes risk should be discussed with project team weekly, 15.2% states risk should be discussed with project team often while 9.1% participants states that risk should be discussed at every toolbox meeting.

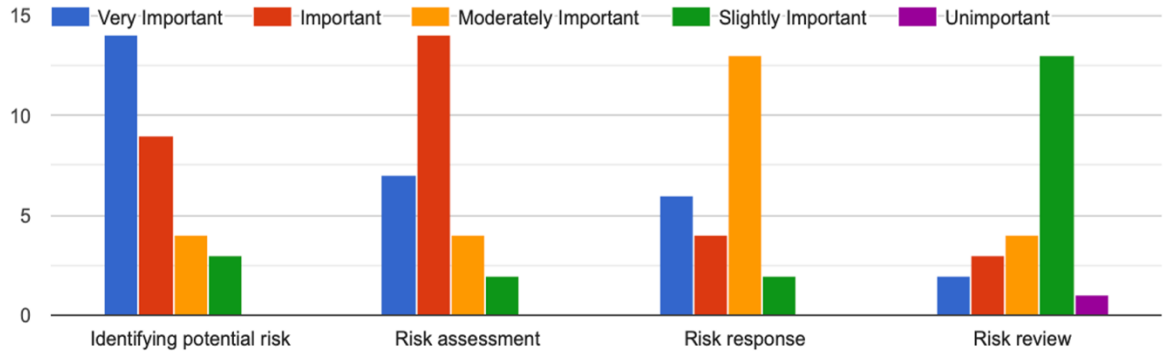

Figure 12 exhibt the risk management process steps.

However according to the responses of the participants the data in figure 12 exhibit and describes that identifying potential risk is very important, risk assessment is important, risk responses is moderately important and risk review is slightly important. It's quite common and well known if you are working in any kind of construction organization therefore you might have faced risks in construction projects (e.g., cost risk, schedule risk, quality risk and many more), most of the participants says yes, we have faced risks and we have reported to the leadership and quality manager orally and through e-mail as well.

Figure 13 shows that who is responsible for doing risk assessment.

Our data also address that 54.5% participants indicates that the project manager is the only person who will be responsible for identifying risks in construction projects, 15.2% states that health, safety, and environmental department is the responsible for identifying risks in

construction projects while 9.1% participants indicates that engineering personnel is the responsible for identifying risks in construction projects.

Figure 14 shows the common ways of mitigating risks in construction industries in Afghanistan.

As explained in detail what is risk management, risk management process and how to response or mitigate risks in construction industry, our data also address the most common ways for mitigating the risks, data also discovered a significant way that has been using for mitigating the risks. However, according to our information as it shown in above figure 14 that what are the most common ways for mitigating the risks in construction projects in Afghanistan. 45.5% states the best way for mitigating the risk is change the suppliers, train the staff, or provide equipment to mitigate the risks, 36.4% states that the best way for mitigating the risk is to accept the risk and create a contingency plan for it, 9.1% states that avoid the risk (turn down the projects or change the scope and schedule) and 9.1% believes that transfer the risk (transfer the risk to insurance or issue performance bonds).

Our data also address the importance of risk management in construction projects, participants has expressed their thoughts therefore some of them are saying that risk management is extremely essential to mitigate or minimize the risks because risks can destroy the projects, other participants believes that risk management is vital during the project initiation, planning and execution stages; it saves time and money. If we ignore the risk, project might face financial crisis or might have human ruin in the future, risk management is important for the smooth implementation of the projects. Assessing the risks is a vital step in project management, it should be done in various stages of the projects, if assessing the risks have not been done in various stages the project might face failure or may have huge loss for both the clients and for the implementation of the project.

One of the survey participants says; that risk assessment provide an approach which through we can control & diminish the accidents in the construction site, it's fundamental safety steps to any kind of work circumstance to diminish and annihilate the risks in the site and take reasonable action to mitigate and minimize the risks as well as risk management assists the key staff of the projects like client, contractor or developer, consultant and suppliers to acquire the project needs, diminish the negative impacts on the project performance in relation to cost, time and quality objectives.

The participants believes that; Typically, in construction industry almost risks are the same from technical, social, and environmental point of view therefore learn lessoned is useful from the past projects to minimize and mitigate the risks. Risk analysis procedure categorization and mitigation techniques are very important parameter which could be used in construction industry. Safety hazards which lead to accident of workers, undefined scope of the project, unknown condition of the project, price escalation, shortage of labours, equipment, natural disaster, and suppliers. These are important points that we could use it in the next project how to avoid such risks.

Training the project staff is very helpful in project to avoid risk in the project in advance or find a solution how to diminish the risks. From day-to-day life we are learning something new as it's same in construction industry previous lessons matter, experience matter in construction projects, save cost and time. We could evaluate the degree of success for the relevant actions, adapt the finding to the current and for the future projects. Effective decision making can lead us to understand all risk and opportunities both internally and externally.

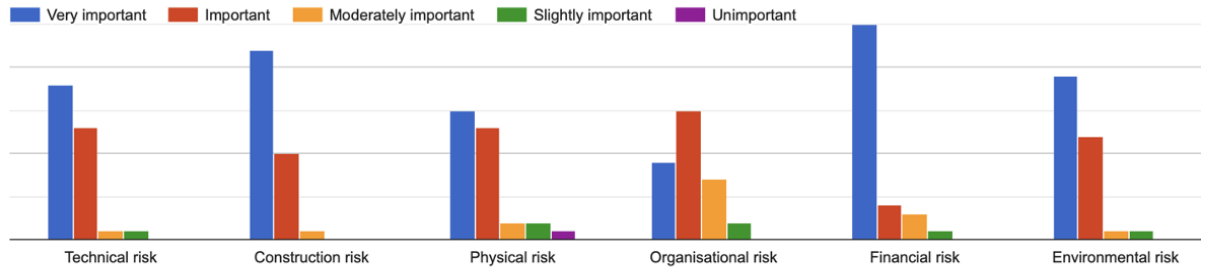

Figure 15 exhibt the risk types in construction industry

However, our data also address that there are various kinds of risks in construction industry and what are the importance of these risks in construction industry based on participants view each kind of risks is important but based on the priority in each stage of construction we must accurately analyse the risks in construction industry. Figure 15 describe the importance of each type of risk in construction industry.

4.1 Part two research questionaries

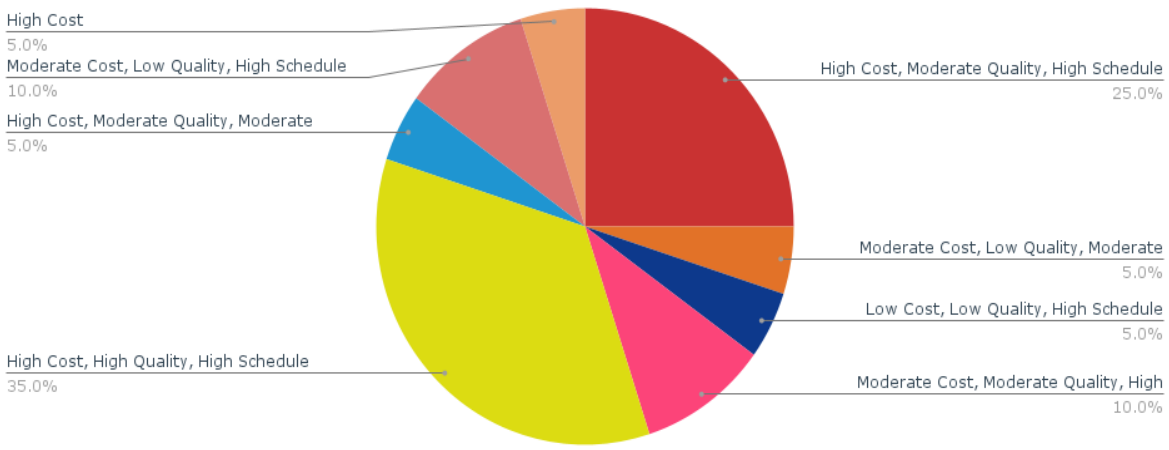

Figure 16 shows the degree of impact on main components of projects including cost, quality, and schedule applied from the type of security risks in construction projects in Afghanistan.

According to the chart above, 25% agree for high cost, moderate quality, and high schedule, 10% vote for moderate cost, moderate quality, and high schedule, 5% moderate cost, low quality, moderate schedule as well.

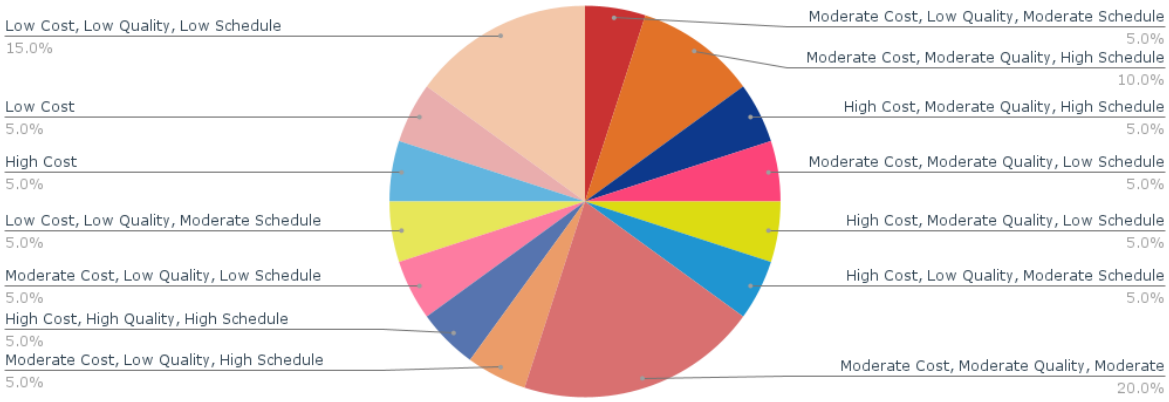

Figure 17 shows the degree of impact on main components of projects including cost, quality, and schedule applied from the type of feasibility study risks in construction projects in Afghanistan

According to the figure 17 about 20% vote for moderate cost, moderate quality, moderate schedule, 15% low cost, low quality, low schedule as well. Feasibility study is one of the important factors which is needed to be done before the planning of the project. This is done with diverse technical teams including Geotechnical Investigation Team, Environmental Team, Health and Safety officers, Social Workers, Government Agents and Donors. To do feasibility study and assessment the form should be designed according to the need of project, and it should be filled by mentioned team members to collect complete data for the planning and budgeting face.

Feasibility study and assessment assist the donors and the implementing sectors to know nature of the project and have an agreement that how project is necessary to be executed. Social and domestic agreement should be done with inhabitants before ending this face.

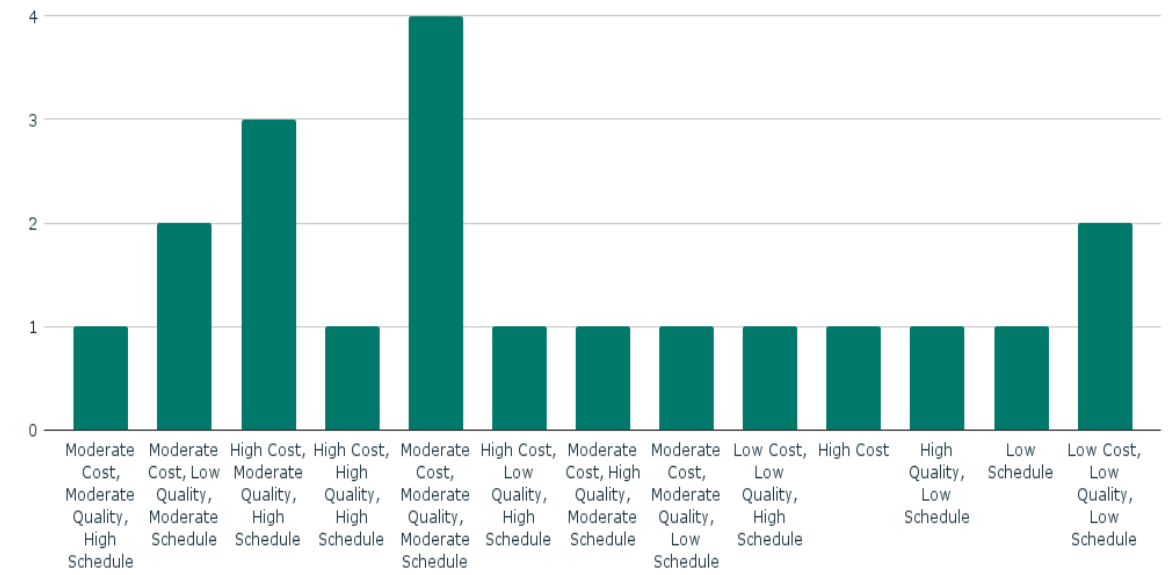

Figure 18 shows the degree of impact on main components of projects including cost, quality, and schedule applied from the type of survey risks in construction projects in Afghanistan.

Figure 18 exhibits the type of survey risks in construction projects in Afghanistan. Seeing the chart, we can explain that most participants vote for the moderate cost, moderate quality, and moderate schedule. The second big percentage according to the chart is high cost, moderate quality, and high schedule as well.

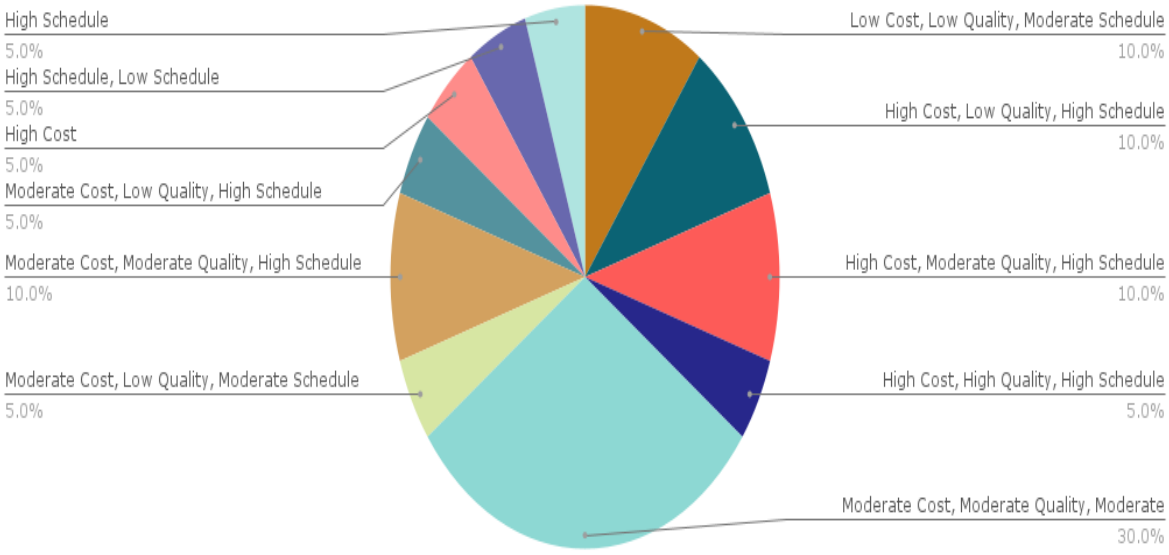

Figure 19 shows the degree of impact on main components of project including const, quality and schedule applied from the type of achieving the plan risk in construction projects in Afghanistan.

Seeing the figure 19 we can deduce that, the 30% of the participants are agree that the impact will be moderate cost, moderate quality, and moderate schedule. On the other hand, 10% of the participants consent with high cost, low quality, and high schedule. Other remained percentages are 10% moderate cost, low quality, and high schedule.

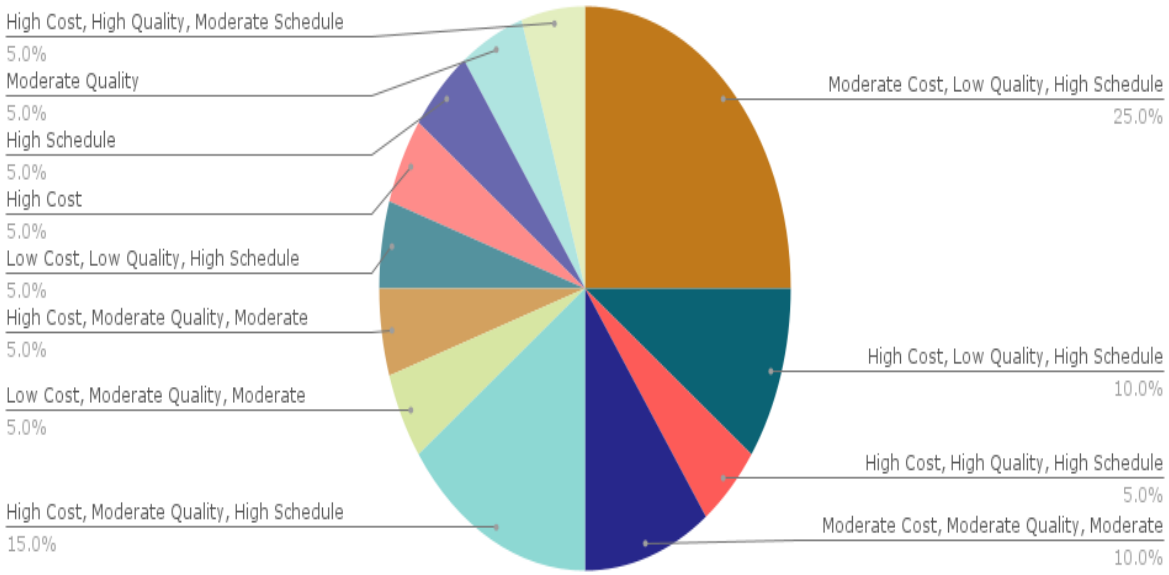

Figure 20 shows the degree of impact on main components of projects including cost, quality, and schedule applied from the type of delivery of materials risks in construction projects in Afghanistan.

One of the big factors that mostly affect project quality implementation and on time schedule execution in Afghanistan is to deliver construction materiel on time and due the requirement of the quality assurance and quality control. However, figure 20 shows that 25% participants agree with moderate cost, low quality, and high schedule. 15% consent with high cost, moderate quality, and high schedule.

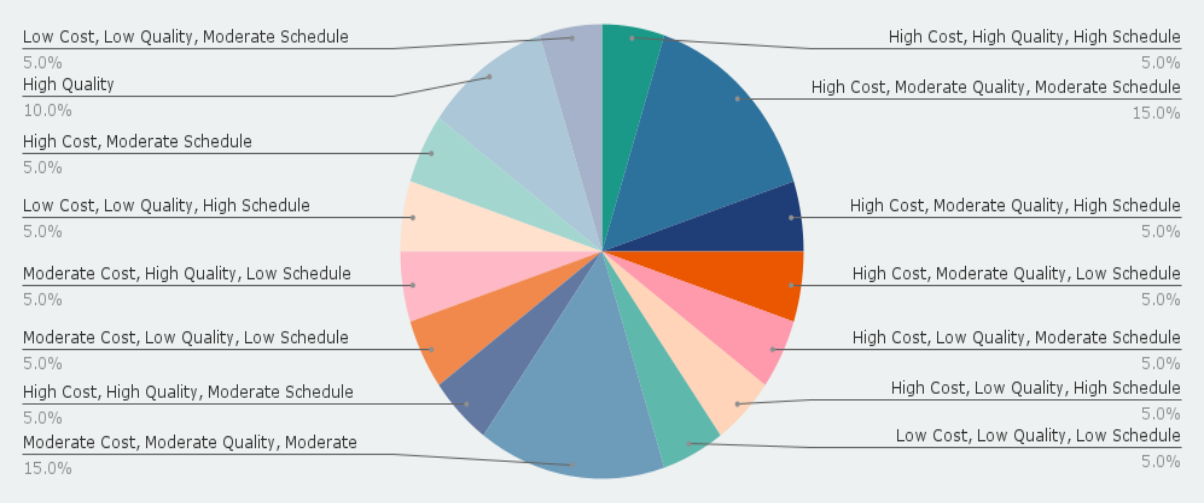

Figure 21 shows the degree of impact on main components of projects including cost, quality, and schedule applied from the type of design risks in construction projects in Afghanistan.

Design risk also have direct negative impact on project quality and on time implementation, as per above chart 15% agree with moderate cost, moderate quality, and moderate schedule. 15% consent with high cost, moderate quality, and moderate schedule as well. 5% high quality, 5% high cost, moderate schedule, 5% low cost, low quality, and high schedule, 5% moderate cost, high quality, and low schedule, 5% low cost, low quality, and low schedule, 5% high cost, low quality, moderate schedule.

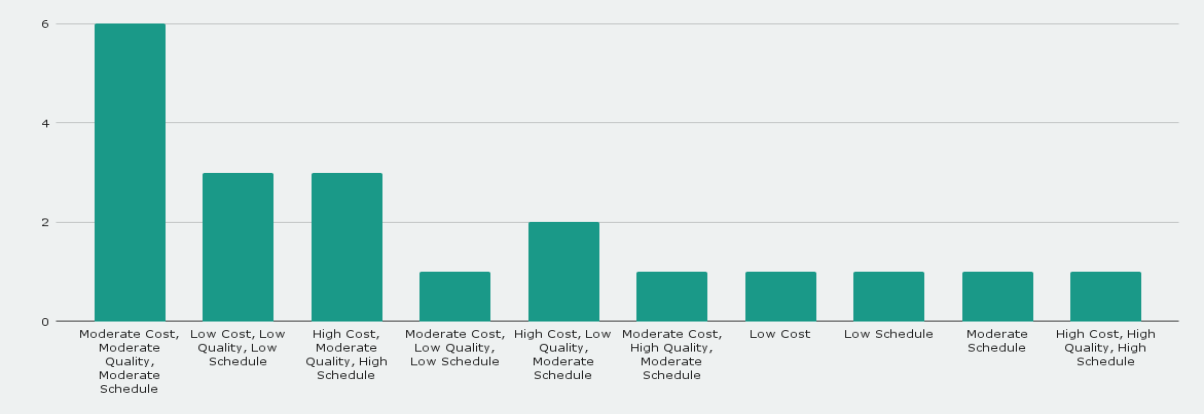

Figure 22 shows the degree of impact on main components of projects including cost, quality, and schedule applied from the type of variation order risks in construction projects in Afghanistan.

Contracts in construction projects mostly have two significant parts including General Condition of Contract (GCC) and Personal Condition of Contract (PCC) and variation in contact mostly requested due to several reasons but it may be the low quality of implementation or unavailability of budget from the donor side. However, in above chart most of the participants agree with moderate cost, moderate quality, and moderate schedule and some are consenting with low cost, low quality, and low schedule may be the reason.

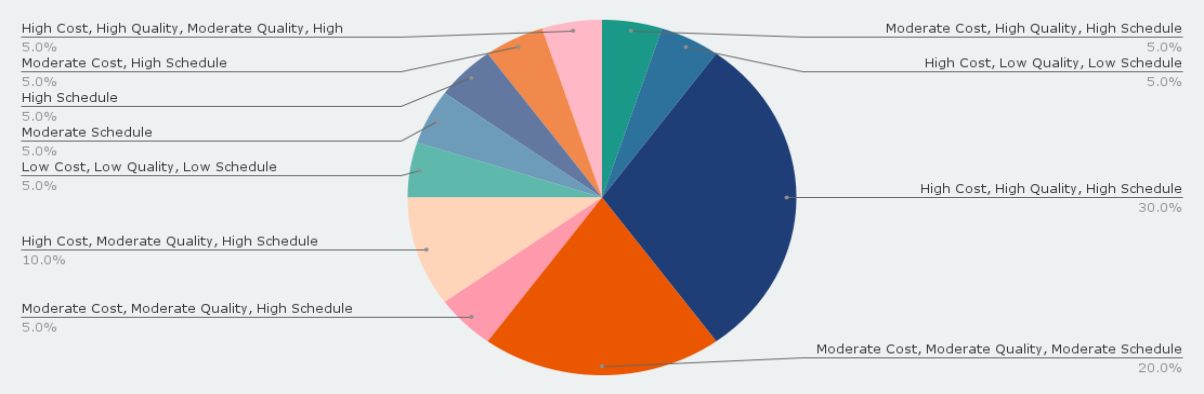

Figure 23 shows the degree of impact on main components of projects including cost, quality, and schedule applied from the type of equipment's risks in construction projects in Afghanistan.

As per project's requirement in construction field equipment and machinery are the main tools for the well execution of the project therefore it has some negative impacts if not available. Moreover, according to the above chart, most of the participants agree with high cost and high quality and the second big percentage consents with moderate Cost as well.

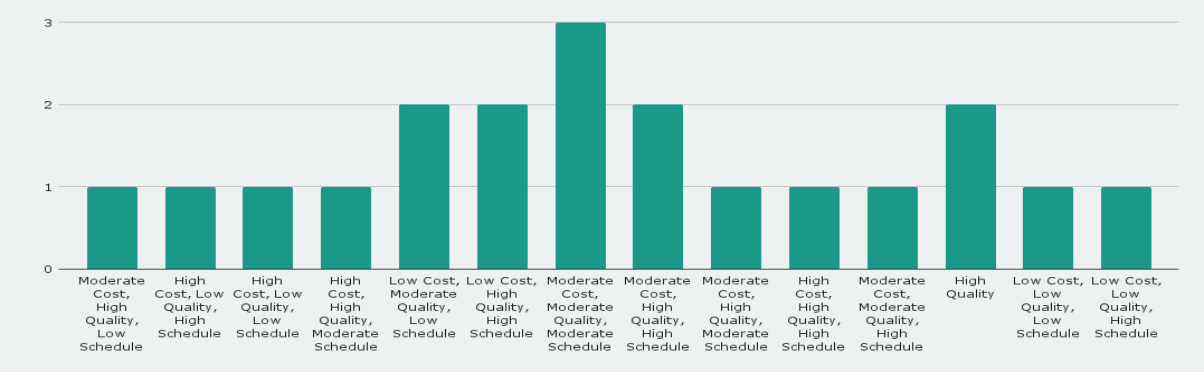

Figure 24 shows that the degree of impact on main components of projects including Cost, Quality, and Schudle applied from the type of contractors risks in construction projects in Afghansitan.

In Afghanistan implementing the construction project is intended through legal procurement processes in which some essential work experiences and bank statement is needed along with related experiences as well to win the project but it depends on the budget and duration of the project as well. According to the chart above most participants agree with moderate cost, moderate quality, and moderate schedule. Some consents with high quality as well.

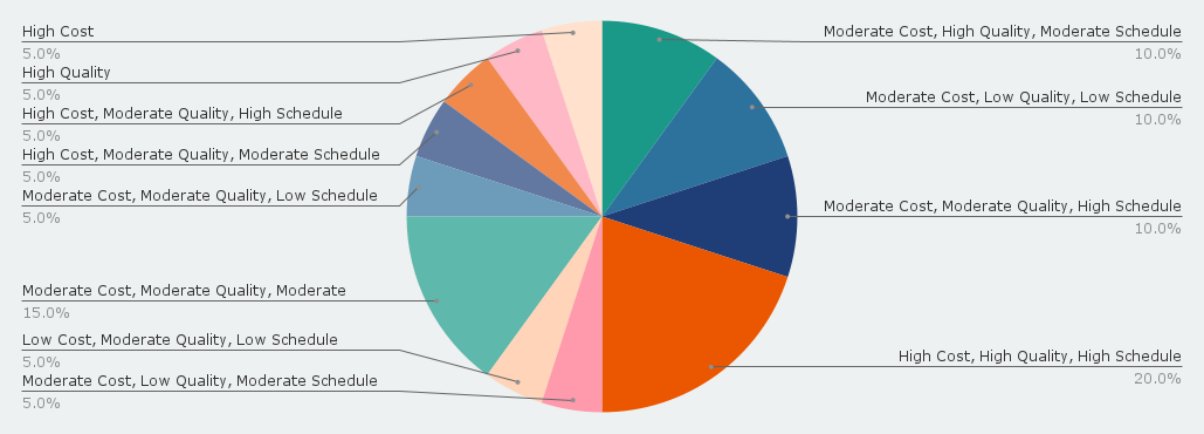

Figure 25 shows the degree of impact on main components of projects including cost, quality, and schedule applied from the type of safety risks in construction projects in Afghanistan.

Safety of the labours is mainly required in every project, and it is clearly written in Request for the Proposal (RFP) before signing the contract in Afghanistan. Some government related project does not have special policy for safety and health mitigation but in other international organization related projects a special Health and Safety plan is needed before starting the project. However, seeing the above chart we can deduce that most of the participants agree with high cost, high quality, and high schedule. 15% consent with moderate cost, moderate quality, and moderate schedule as well. 10% moderate cost, moderate quality, and high schedule, 10% moderate cost, high quality, and moderate schedule, 5% high cost, moderate quality, high schedule.

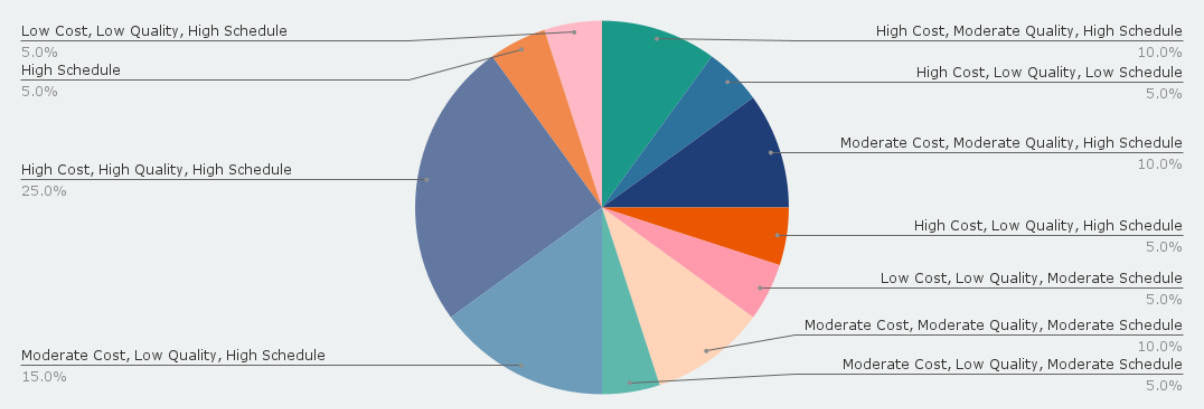

Figure 26 shows the degree of impact on main components of projects including cost, quality, and schedule applied from the type of Covid-19, lockdown & health issues risks in construction projects in Afghanistan.

Covid-19 affected construction projects in Afghanistan and most ongoing projects delayed and delay in project may have direct impact to the quality of the project as well. Health and Safety Officers along with Environmental Officers are responsible to prepare Covid-19 related trainings to the labours on the site and to the senior officer on the site to avoid

spreading this virus. However, according to the above chart 25% of the participants agree with high cost, high quality, and high schedule. 15% moderate cost, low quality, high schedule, 10% high cost, moderate quality, high schedule, 10% high cost, low quality, low schedule, and the remained percentages are high cost, low quality, and high schedule.

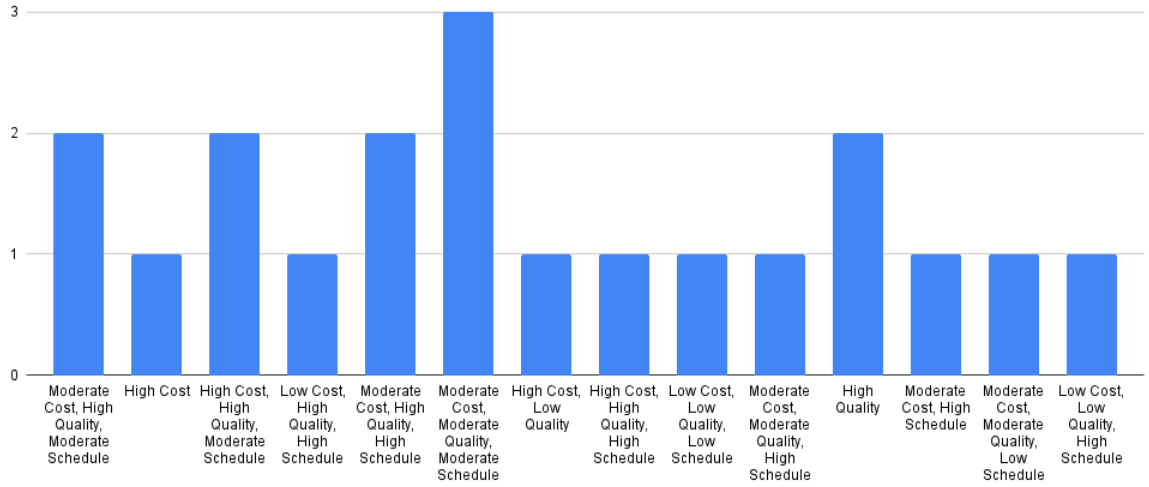

Figure 27 shows the degree of impact on main components of projects including cost, quality, and schedule applied from the type of lack of specialised individuals/employees risks in construction projects in Afghanistan.

Lack of technical employees will have direct affection to the design risk, quality of the project and on time scheduling as well. Seeing the figure 27 most of the participants agree with moderate cost, moderate quality, and moderate schedule. The other big percentage is high quality, high cost, and moderate scheduling.

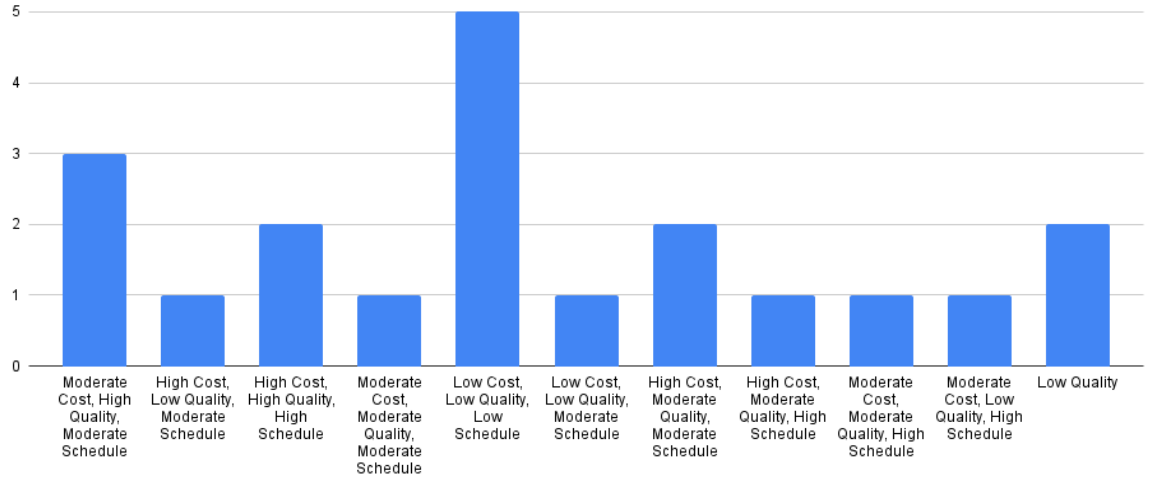

Figure 28 shows the degree of impact on main components of projects including cost, quality, and schedule applied from the type of natural disaster risks in construction projects in Afghanistan.

Natural disaster should be considered according to the nature of the project, and it should be assessed before the planning phase in feasibility study and assessment because Afghanistan most provinces are in zone 4 of the earthquake and this zone is somewhat risky while implementing any construction project. Seeing the above chart, most participants consent with low cost, low quality and low schedule and some are agreed with moderate cost, high quality and moderate schedule as well.

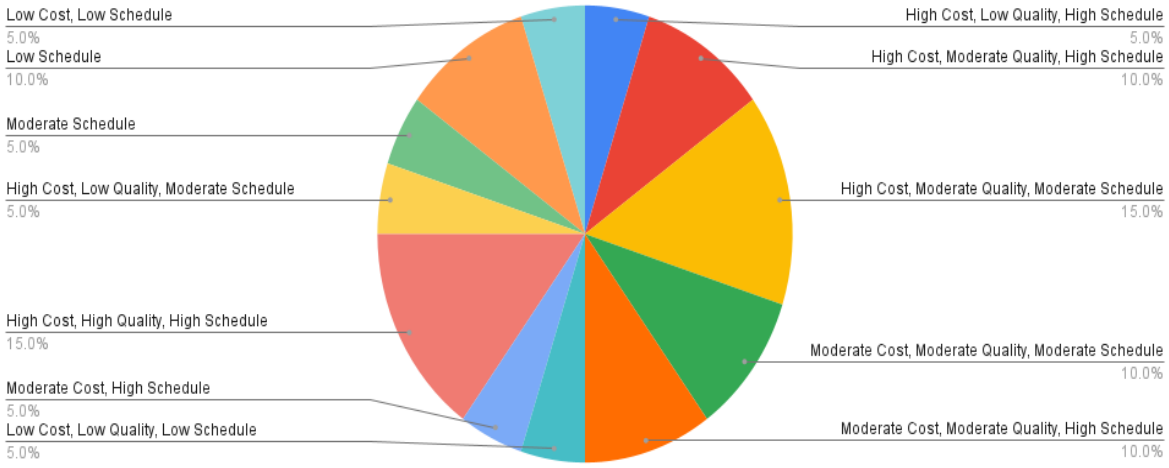

Figure 29 shows the degree of impact on main components of projects including cost, quality, and schedule applied from the type of Geographical condition and acess to the projects risks in construction projects in Afghanistan.

Geographical condition and access to the project also impacts projects execution therefore it should be assessed with separate feasibility study assessment. The report will show the possibility to decide whether project is implementable or not. Moreover, in some irrigation projects in Afghanistan unavailability of access road in approved BQ therefore it may cause to delay the project and affect the quality of the project as well.

Seeing the above chart, we can deduce that 15% participants agree with high cost, low quality and moderate schedule, 10% consent with low schedule, 10% high cost, moderate quality, and high schedule.

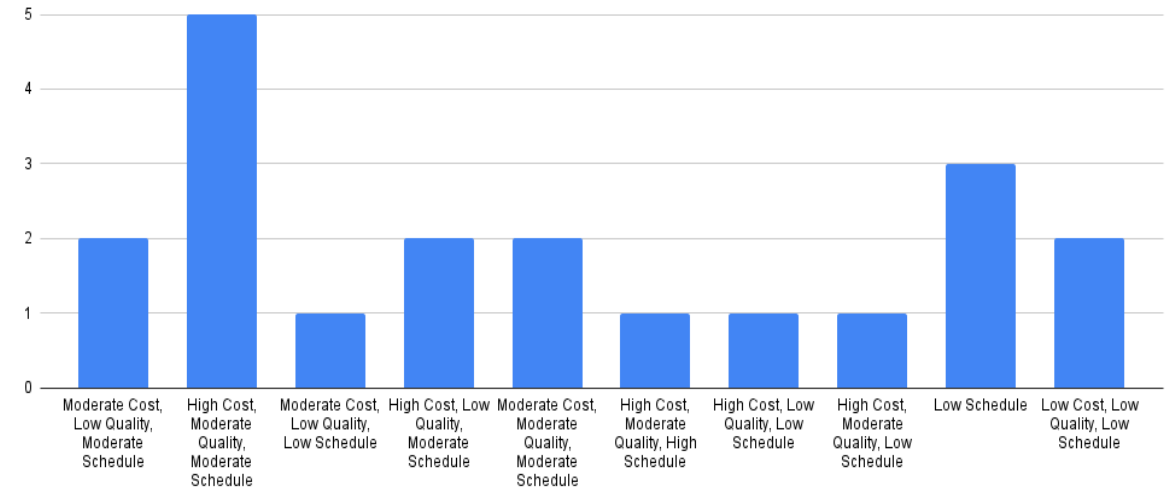

Figure 30 shows the degree of impact on main components of projects including cost, quality, and schedule applied from the type of price escalation risks in construction projects in Afghanistan.

Afghan currency is not stable and is changeable steadily therefore contracts with this currency may also affect the project and will pull it toward the risk area. The above chart shows that most of the participants agree with high cost, moderate quality, and moderate schedule. Some are consent with low schedule as well.

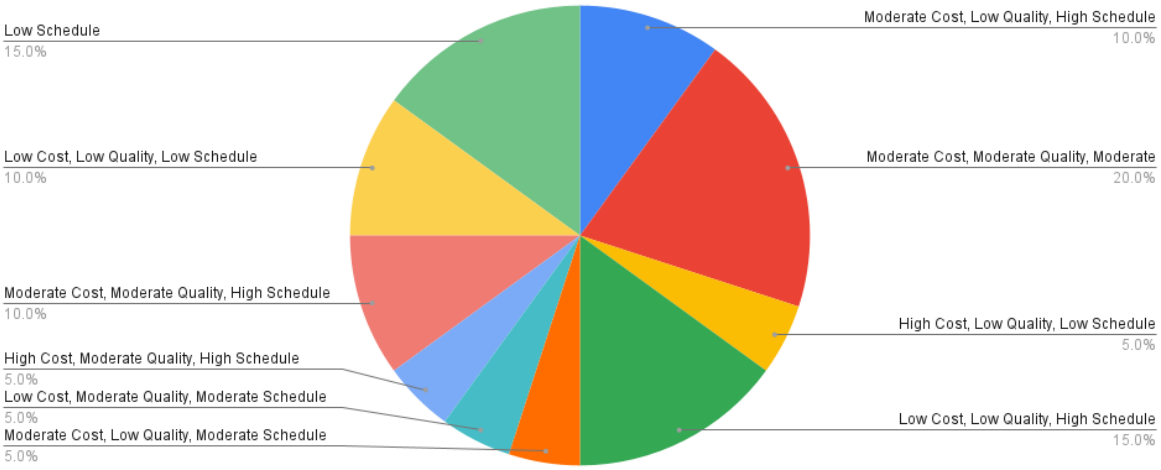

Figure 31 shows the degree of impact on main components of projects including cost, quality, and schedule applied from the type of community conflict risks in construction projects in Afghanistan.

Community conflict also impact project positively and negatively for example, if project is chosen by inhabitant's agreement in Afghanistan so the community will assist the contractor to implement the desired project smoothly and they will be agreeing to have full participation in monitoring and supervision as well, meanwhile those projects which are not chosen by the agreement of the community that will not be feasible to execute because of two reasons. First, people will never allow contractors labours to inter to the project area and, they will never participate to monitor and supervise the quality of the project as well. Therefore keen assessment in this regard is required to see the most recent need of people and then select the desired project.

The participants have been answered part two questionaries based on several years of experience in construction industry, that how those identified major risks are affecting the main three components of project (cost, quality & schedule). The summary of the data is shown in table 1.

Risk Types	Cost			Quality			Schedule		
	High	Moderate	Low	High	Moderate	Low	High	Moderate	Low
Security	High cost			Moderate quality			High schedule		
Feasibility Study	Moderate cost			Moderate quality			Low schedule		
Survey	Moderate cost			Moderate quality			High schedule		
Achieving the plan	Moderate cost			Moderate quality			High schedule		
Delaying in the delivery of materials	High cost			Low quality			High schedule		
Design	High cost			Low quality			Moderate schedule		
Variation order	Moderate cost			Moderate quality			Moderate schedule		
equipment's (machinery, labour…etc.)	High cost			Moderate quality			High schedule		
Type of contractors	Moderate cost			High quality			High schedule		
Safety	Moderate cost			Moderate quality			High schedule		
Covid-19, lockdown & health issues	High cost			Low quality			High schedule		
Lack of specialized	Moderate cost			High quality			High schedule		

individuals/employees			
Natural Disaster	High cost	Low quality	Moderate schedule
Geographical conditions & access to projects	High cost	Moderate quality	High schedule
Price escalation	High cost	Moderate quality	Moderate quality
Community conflicts	Moderate quality	Moderate quality	High schedule

Table 1 shows the summary of risks that effecting the main components of projects including cost, quality, and schedule.

5. Discussion

The importance of Risk Management and its tools are already described with details in literature review, this section will explain risk management techniques, findings, argument, and the factors that often affect construction projects in construction industries in Afghanistan. There may be several factors that pull project toward the risk but according to the research paper and investigations the following factors play vital role to be considered and described as below.

- Security Threats
- Poor Management Techniques
- Weak feasibility studies and assessment
- Variation in contracts and poor contract management
- Design problems and poor scheduling
- Long delaying in delivery of construction materials and procurement processes
- Variation in currency
- Types of contractors

Security Threats: Security is the main issue that has direct negative affection in implementation of construction projects in Afghanistan, however, most of the mega projects have been scheduled properly but due to the security issue and the site location of the project delay and seize the execution phase. Moreover, according to the response of research survey questionaries the main reason of delay in construction projects in Afghanistan is security with the percentage of 45.5%.

Poor Management Techniques: According to the research paper and survey 27.3% participants agree that poor management can lead to project delay in construction industries in Afghanistan due to several reasons including unavailability of skilled managerial techniques, weaknesses of project managers in handling the risk, and unavailability of proper risk assessment and the reporting portals as well.

Weak feasibility studies and assessment: Feasibility study is discussed in literature review; however, we will discuss the main aspects that influence quality project implementation due to this factor. Before every other stage, this is the main requirement of the project to do feasibility studies and assessments along with geotechnical investigation, domestic investigation, seeing the site from the prospective of environmental and hazards, safety and security measures, and social safeguards as well. For this purpose, different engineering teams in which all member of the mentioned subjects should be involved will have proper investigation to analyse and report every aspect separately to the donor to bring proper data for the planning phase. This survey and assessment will assist the design team to study the field better and prepare proper plan for the planning and budgeting phase.

According to research survey about 3% participants consent that weak feasibility studies and assessment can postpone the project implementation phase; however, this survey also reveals that poor feasibility studies can also cause the main components of the project such as cost, quality and schedule and the affect is moderate in all three parts of the project.

Variation in contracts and poor contract management: Contracts are basically prepared by government or donor side and is signed for the special purpose to execute a task or a project by implementing sector or contractor. Construction project's contract in Afghanistan have mainly two parts including General Condition of Contract and Special Condition of Contracts respectively. The general condition mainly has general aspects that describes the project criteria, and the special condition of contract is specialized for the proposed project which explains the main rules and regulation that the contractor should consider before signing the contract and are responsible to execute it during the implementation phase, however, according to the paper investigation most variation in contracts are from the donor site which influence project implementation and scheduling and the survey shows that variation affect moderate cost, moderate schedule and moderate quality as well.

Design problem and poor scheduling: Design is one of the biggest parts in construction projects that is done before the implementation phase, however, some essential plans including SSEMPs, Quality Control Plan, Safety and Health Mitigation Plan and Security Plans should be approved before practical implementation of the design and schedule. Poor design and scheduling can delay the project and it also have negative affection on project budget as well. According to the research paper about 3% of the participants agree that improper scheduling affect the project delay and it affects the main components including high cost, moderate quality, and moderate schedule as well.

Long Delaying in Delivery of Construction Materials and Procurement Processes: Delivery of materials are mainly done in execution phase by contractor to execute the project due to designed schedule, however, delaying this process will delay the project and can cause it to be behind the schedule. Due to the unavailability of the access roads to the main project is also another reason that equipment and materials are not reaching to the proposed site area, on the other hand, Afghanistan is the country where most of the construction materials are imported from the foreign neighbour countries and the poor management to handle this process also affects the project to be delayed. According to the research paper most of the participants agree that delay in materials and equipment can cause in high cost, moderate quality and moderate schedule and unavailability of equipment such as machineries, equipment, and labour can also cause in high cost, high quality, and high schedule.

Variation in currency: Most of the mega projects in Afghanistan are government related projects and due to the government law Bill of Quantities (BOQ) are prepared by Afghan currency. Afghani currency exchange rate is not constant, and it might change regularly. Change in currency has direct impact on the equipment's and material's rate that can affect the project to be delayed. According to the research paper it has direct impact on high cost, moderate quality, and moderate schedule as well.

Types of contractors: To execute the project it is required to sign a contract between donor and contractor. Most of the projects in Afghanistan are signed with one contractor but it is divided by several sub-contractors which may affect the quality of the project. The sub-contractor maybe supplies dealers or contractors who supply labours. This may be discussed

with the main contractor in several meetings to have the proper and coherent plan to exhibit the sub-contractors and dealers. Seeing the research paper types of contractors can impact the main component of the projects such as moderate cost, high quality, and schedule.

6. Conclusion

From the results, it is clear shown that financial risk is higher than technical risk, physical risk, organizational risk, technical risk, environmental risk, and construction risk due to several reasons. The obvious reason is that Afghanistan is the kind of country where most of its mega projects are funding by various international donors, the donors are not transferring the budget or fund on time due to poor management of government, essential paperwork, and progress report of the projects.

The study also pointed that there were some projects that had been closed before even it started due to incomplete survey, feasibility study, and the allocated budget were not sufficient and site location of the project. Choosing the right site location for project is important, Afghanistan is the kind of country which has complex geographical condition and access to the project might be difficult, the result demonstrated that geographical condition and access to the project has direct impact on high cost and high schedule.

Due to security issues, social conflicts and political positions in Afghanistan are unstable, international technical staffs are coming from the neighbor countries, arrangement of security and accommodation for international staff are the reasons which has direct impact on high cost and high/extreme schedule. Borders are closing sometimes and importing engineering equipment's and construction materials for the projects are not reachable on time all these risks have direct impact on high cost and scheduling. Some of the projects are terminating because of low quality performance by contractors, security issues and community conflicts, these reasons will not allow contractors to complete the project.

Unprofessional, poor supervision, and monitoring is also the reason of having projects with low level quality and defective financial management of the projects. Types of donors are also playing the role for maintaining the good quality and risk mitigation and management throughout the project's implementation in Afghanistan, for e.g. ADB (Asian Development Bank) and world bank funded projects do not have enough focus on risk management and best quality works while USAID, US Army corps, German KFW bank and other donors are insisting too much regarding quality, safety and risk management.

In addition, on budget and off budget funded projects are also having clear difference in Afghanistan, in on budget construction project government is interfering always and is always concluded of low performance in all aspects of the scope of the project but oppositely off budgets are implemented directly under the instruction and supervision of donors or consultant teams and achieved greater result than on budget projects.

From the results in part two questionaries, it is clearly shown that there are numerous major reasons that is affecting main components of project (cost, quality & schedule).

- Security
- Feasibility study
- Survey

- Achieving the plan
- Delaying in the delivery of materials
- Variation order
- Equipment's (machinery, labors … etc.)
- Type of contractors (National and International level)
- Safety
- Covid-19 lockdown and health issues
- Lack of specialized individual/employees
- Natural disaster (earthquake, flood, snow … etc.)
- Geographical condition and access to projects
- Price escalation
- Community conflicts

7. Recommendation

The dissertation/research project has identified unproductive risk management practice in construction industry in Afghanistan in various stages particularly during the project preparation stage and execution stages. The following recommendations have been purposed as listed bellows.

1. Lack of management awareness was identified as a key reason that project staffs don't have sufficient self-reliance for applying risk management techniques, risk management process, how to identify risk factors in projects and how to mitigate and minimize these risks. Seminars, workshops, and consistent trainings are essential for the project staffs in order to implement risk management techniques to complete the projects successfully on time and within allocated budget.
2. A special consideration must be given for managing financial risk and construction risks.
3. Creating an exceptional risk management team is highly essential in the construction projects in Afghanistan.
4. Consideration of sufficient budget in construction projects for risk management and mitigation works within scope of HSE (Health, safety and environmental) departments of contractors.
5. Hiring of professional staff to know and work efficiently in regard of risk management and mitigation techniques and to plan for avoiding risks during the execution stage of projects.

8. Limitation of the Research

The scope of this dissertation/research was limited to the study of risk management in construction projects in Afghanistan. Hence, a primary questionaries survey has been performed in private, governmental, international and NGO projects, the survey questionaries were answered by project managers, quality assurance, and by various engineers. It was difficult to gather the data fully from governmental projects. The main limitation for this research was the allocated time while studying master's program modules alongside with completing the research project.

9. Conclusion

In summary, this paper argued that what kind of risk management techniques should be used to identify risk factors, how to mitigate and respond to those identified risk factors in construction projects executing in Afghanistan. The present findings confirms that what are the main reasons of construction projects delay in Afghanistan. The analysis leads to the following conclusions, poor management techniques, types of contractors, delaying in the delivery of materials, and equipment's (machinery, labour …etc.) are the core key risk factors that deduce for delaying the construction projects in Afghanistan. Overall, our results demonstrate a strong effect of how much risk management is important in construction projects in order to complete the projects within budget and on time.

In addition, these finding provide additional information about that financial risk is also critically important, because most of the mega projects in Afghanistan are funding by numerous international organizations/donors. Some of the financial risks in constructions industry are currency exchange rates, income taxes, inappropriate estimation of the projects, working items, unexpected increment in price of materials, procurement, and delay in payment process. These are some of the main financial risk factors which have direct impact on the construction projects. Results provide a basis for that a proper management is essential from beginning until the completion of construction projects.

The researcher has described the questionaries survey analysis in previous chapter, our results demonstrated that there are some main risk factors that delay construction projects in Afghanistan.

- The result demonstrates that security is one of the biggest motives with the maximum 45.5% percentage response rate, this shows that the maximum delays occurring in construction projects in Afghanistan are due to security issues. Security has direct impact on high cost, high schedule, and moderate quality.
- Poor management techniques are also part of the main reason with the 27.3% percent response rate.
- Defective feasibility study and imperfect design are also the major risk factors as per the questionaries survey response that projects are delaying, consequently a proper feasibility study and efficient design would assist both contractors and clients to complete the project successfully on time. The study also pointed out that feasibility study has moderate impact on quality, cost, and schedule while design has direct impact on high cost and moderate schedule.

- Inaccurate schedule is another reason for which both clients and contractors are responsible. Accordingly, both clients and contractors should assess the various risk factors. Subsequently, assessing and identifying risk factors must be considered in planning and in precises scheduling, which could assist the project to prevent cost overflows and time.
- From the results, it is clear that project managers, safety and environmental managers are the responsible persons for identifying risks factors and how to mitigate those risks in projects in order to complete the project within plan, budget and schedule.
- Our results demonstrate that lack of specialized individual/employees and equipment's (machinery, labor … etc.) are also the main significant risk factors which have direct impact on high schedule, moderate quality, and moderate cost. Overall, in

the construction industry in Afghanistan contractors are the accountable person for providing workers and equipment's. Hence, this activity is also under the direct control of contractors.

- Poor performance is also part of the risks and responsibility lies with a contractor, as the client doesn't have direct contract with sub-contractors and responsibility is directly lies on the contractors. Our results demonstrate that contractors have the highest degree of impact on quality, schedule, and cost.
- Lack of resources and delaying in the delivery of materials is also one of the key risk factors and has the highest degree of impact on schedule and cost. Furthermore, for this activity contractors are the accountable person, as it is clearly declared in the contract it is the responsibility of contractors and contractors must plan appropriately to avoid such kind of delays/risks in the project.

10. Future work

Further research is needed to delimitate about the financial risk factors in construction projects in Afghanistan and it is a question for future research to investigate, why most of the project managers in Afghanistan are responsible for all the project activities, dealing with clients, dealing with supervision teams, dealing with governmental staff, invoices etc.? These are the reasons that project manager cannot concentrate on construction projects to complete on time and within budget. There are various kinds of departments but why there is no department/board for risk management or risk specialist department at least in ministry level, risk management manual should be included for the guidance of technical people who are actively participating and running the construction projects.

11. Acknowledgement

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12. References

Aloko, M.N. (2018). *Risk Assessment Process for Construction Projects in Afghanistan*. [online] Available at: https://dx.doi.org/10.22161/ijaers.5.8.26.

- Bahamid, R.A. and Doh, S.I. (2017). *A review of risk management process in construction projects of developing countries*.
- B. Misra, K. (2017). *Risk Analysis and Management*. [online] Available at: https://www.researchgate.net/publication/241003133_Risk_Analysis_and_Management_An_Introduction?enrichId=rgreq-9e5c6e2f420c402e5048ad9e4e288159-XXX&enrichSource=Y292ZXJQYWdlOzI0MTAwMzEzMztBUzozNTg5MjU2OTk0MzY1NDRAMTQ2MjU4NTk2Mzc5Mg%3D%3D&el=1_x_2&_esc=publicationCoverPdf.
- B. Landage, A., Mhetre, K. and Konnur, B.A. (2016). *Risk Management in Construction Industry*. https://www.researchgate.net/publication/301589805.

- Faqiri, Dr.A. and Rasool, Dr.A. (2018). *ROLE OF RISK MANAGEMENT IN CONSTRUCTION PROJECT IN AFGHANISTAN*.
- GAJEWSKA, E. and ROPEL, M. (2011). *Risk Management Practices in a Construction Projec*. [online] Available at: https://odr.chalmers.se/bitstream/20.500.12380/144253/1/144253.pdf.
- Guide, A., 2001. Project management body of knowledge (pmbok® guide). In *Project Management Institute*.
- Harold Kerzner (2017). *Project Management : A Systems Approach to Planning, Scheduling, and Controlling*. [online] *EBSCOhost*, Hoboken, New Jersey: Wiley. Available at: http://eds.b.ebscohost.com/eds/detail/detail?vid=2&sid=17023ef8-63f7-43f5-a289-e36dfd70209c%40pdc-v-
- Hosaini, S.B. and Singla, S. (2019). *Significant Factors of Delay in Construction Projects in Afghanistan*.
- Iqbal, S., Choudhry, R.M., Holschemacher, K., Ali, A. and Tamošaitienė, J. (2015). *RISK MANAGEMENT IN CONSTRUCTION PROJECTS*. [online] Available at: http://www.tandfonline.com/loi/tted21 [Accessed 9 Feb. 2021].
- Niazai, G.A. and Gidado, K. (2012). *Causes of Project Delay in the Construction Industry in Afghanistan*.
- Miladi Rad, K. and Yamini, O.A. (2016). The Importance and Use of Risk Management in Various Stages of Construction Projects Life Cycle (PLC). *Canadian Center of Science and Education*, [online] 11. Available at: http://dx.doi.org/10.5539/mas.v11n1p48 [Accessed 20 Jun. 2021].
- Mcleod, S. (2019). *Likert scale definition, examples and analysis*. [online] Simply Psychology. Available at: https://www.simplypsychology.org/likert-scale.html.

RolandWanner (2019). *The Differences Between Internal and External Risks in Projects*. [online] Roland Wanner. Available at: https://rolandwanner.com/the-differences-between-internal-and-external-risks-in-projects/.

- Szymański, P. (2017). *Risk management in construction projects*. [online] Available at: http://www.sciencedirect.com.
- QuestionPro (2018). *Quantitative Data: Definition, Types, Analysis and Examples | QuestionPro*. [online] QuestionPro. Available at: https://www.questionpro.com/blog/quantitative-data/.