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Abstract

The increasing frequency of cost overrun and time delay in rural road projects has been a concern for the government of Afghanistan. Based on a review of the MIS data from the MoPW and MRRD, almost all rural road projects which were implemented from 2015 to 2020 was not finished within fixed cost and time. In this study, the researcher found out the causes of time delay and cost overrun of rural road projects in Afghanistan. The study dwells on the qualitative approach and an open-ended interview were conducted with 10 people which are project managers, projects engineers, and employees of MRRD and MoPW and their contractors. According to the interviewees, there are 25 factors behind time delay and cost overrun of rural road projects in the country (16 for time delay and 9 for cost overrun). As a result of the volume of work that has to be done and resources to be utilized, there is the need to adopt best practices and strategies to ensure efficiency and quality delivery of service. The study recommends that the Ministry of Public Works (MoPW) and Ministry of Rural Rehabilitation and Development (MRRD) as main implementers of rural road projects in the country must strive to improve on their administrative role of monitoring the various contract management methods. By considering best strategies, practices are always adhered to, so that there will be successful road projects delivering in term of fixed cost finishing with no further time extension.

Keywords: Time Delay, Cost overrun, Rural Roads, Delay, Causes

Introduction

Infrastructure plays a key important role in the economic development of every country as it brings social welfare and accessibilities. One main factor behind this socio-economic development of the countries is rural roads (Runia, 2010). Rural roads connect villages and districts to the cities and facilitate the accessibility of local people to the markets and other public entities, increasing the production and employment rate. Furthermore, according to Runia (2010), the development of other sectors such as health, education, agriculture and other similar services highly depends on the road and transport sector.

According to Afghanistan National Development Strategy (ANDS), the government of Afghanistan has increasingly invested in the road sector to bring social welfare, economic development, and connectivity in the recent twenty years. Due to the importance of this investment, the time and cost of projects are important determinants of road connectivity development and have an impact on how long will it take the country to achieve this goal (ANDS, 2008). According to Management Information System (MIS) data from the Ministry of Public Works (MoPW), between 2015 and 2021 a total of 920 projects consisting of 2950 km of rural roads were implemented by MoPW in rural districts of Afghanistan. Based on further claims by ANDS (2008), the Master Plan of Transport between 2017-2036, was planned to expand the road network of the country first to 78000 KM by 2014 and to 128000

Km by 2020 (ANDS, 2008). However, based on an audit report by Special Inspector General for Afghanistan Reconstruction (SIGAR), the road network of Afghanistan is not constructed and rehabilitated as it was planned. Many challenges including but not limited to cost overruns and time delays contributed to this failure (SIGAR, 2016). It could have been very helpful if researchers had evaluated the reasons behind these failures. The academic society of Afghanistan has not conducted a comprehensive study on the factors which contribute to the delay and cost overruns in the projects (in particular the rural road projects) of the country. The study identifies the major factors causing cost overrun and time delay in rural road projects in Afghanistan, and the study provides constructive recommendations for the rural road projects stakeholders (government, investors and project recipients) to avoid the problem and complete the projects within a fixed time and budget.

The rest of the study is organized in four sections with section 2 focusing on the literature review, section 3 discusses the methodology employed, section 4 outlines and presents the findings along with discussions, and section 5 concludes the study along with policy recommendations.

Literature Review

Theoretical Framework

There are various findings on the occasion of time delay and cost overrun by different researchers. Different authors used different theories to explore the determinants behind time delay and cost overrun. Studies show that no one theory can give us the determinants and causes of time delay and cost overrun of rural road projects. However, explanations from different theories including forecasting theory, prospect theory, triple constraints theory, and the agency theory uncover a combination of factors that can be considered to tell us the determinants of time delay and cost overrun. To better explore the causes and determinants of the problem, the researcher used a multiplicity of theories (Lukale, 2018).

Psychological Theories

Cantarelli et al. (2012) used behavioral theories to study the determinants of cost overrun and time delay of rural road projects. The researchers proposed the planning fallacy theory and perspective theory. In the planning fallacy theory, which was first discussed by Daniel Kahneman and Amos Tversky in 1979, we can predict how much time and cost we need to finish a given task. The theory helps individuals/organizations to underestimate the cost, time and risks of action plans. According to Kahneman & Tversky (1979), this happens when a given task takes a longer period and costs to complete than what is planned. Based on the author's discussions, the bias can affect the time and cost forecasts of a project while the estimates from observers on the outside can be a pessimistic bias by over-estimating the time cost of the projects.

The Agency Theory

The agency theory is broadly used in the economics literature (Alchian & Demsetz, 1972; Jensen & Heckling, 1976; Fama & Jensen, 1983). The theory gives an understanding of what relationship between project owners (MoPW as a principle) and their contractors (agents) can be maintained during project implementation. According to Fama & Jensen (1983), MoPW as residual claimants can be entitled to claim the completion of work in terms of on-time finishing the project within a fixed budget from their agents who are the construction companies with consideration of the parties' responsibilities, owners' interest, projects supervision and control.

Eisenhardt (2017) believes that agency theory is usually based on assumptions and claims that people are rational with their strong self-interests. But when, in a matter of risk, they don't take responsibility. The relationship in the theory says that the management of the construction companies as the (agent) are willing to receive more attention and contribution from the project owner (principal) such as MoPW and MRRD.

Leruth & Paul (2007) studied the public expenditure management system in some developing countries. The researchers used an analytical framework according to agency theory. In other words, the principal-agent theoretical framework helped the researchers to better solve issues coming from public expenditure management systems. The findings in the article reveal that a sequence of relationships between the agent and their principal describes a public expenditure management system that results in serious potential problems between the agent and principal (Leruth & Paul, 2007). From the project planning and creating phase to their implementation stages, of course, there will be various decisions between the project owner and contractors that end up in unexpected outcomes for the projects. To think of principals' welfare and increase efficiency levels, the principals need to show some incentives for their agents and supervise their behaviour on consuming resources (Jaffe et al., 2004).

Cost Overrun

In the context of road construction projects, cost overrun can be defined as the amount by which expenses of a particular project overlap or increase more than planned. Cost overruns have long been considered a common phenomenon in large construction projects (Adam et al., 2017). Besides their implication on the sustainability of projects, cost overruns can negatively impact the financial status of clients and contractors as well.

Causes of Cost overrun of Rural Road Projects

For this research, the researcher studied several articles to find the reason why the construction of rural road projects in Afghanistan has a cost overrun issues and why they are not finishing within a fixed budget. The previous studies and research to find out the reasons are limited in the context of Afghanistan, but there were some similar researches and relevant investigations in other countries. In this study, we found many reasons behind cost overruns that are affecting the project's implementation. Adam et al. (2017) conducted a literature review investigation to explain cost overruns incidents in construction projects (Adam et al., 2017). The study summarizes the causes of cost overrun into eight broad categories which consist of poor management (site management, managerial skills, monitoring and control and slow decision making), organizational issues (poor management organization structure), improper planning (change orders, poor design, rework and low-quality labour planning), weather conditions, project complexity and duration, process-related issues, psychological issues (deception and optimism bias) and price-related issues. The study recommends that the causes behind cost overrun can be unique for each project, so mitigating their effects on different projects requires different approaches.

Corruption and Security Issues

Due to various reasons projects in Afghanistan are not completed within their initial budget (Niazi & Painting, 2018). Niazi and Painting (2018) state that the growing construction industry is the main contributor to the national GDP of Afghanistan, which constitutes around 10% of the country's GDP. They have identified 96 causes for project budget overruns. To find the main causes behind the cost overruns in projects implemented in Afghanistan, Niazi and Painting (2018) adopted a quantitative methodology. The authors developed a questionnaire and distributed it to 75 individuals including contractors, clients and consultants of construction projects in Afghanistan. The research found that the main causes behind cost overruns in projects implemented in Afghanistan are corruption, delay in payments, project financing, change orders, and security conditions of project sites.

Contract Type

Contract types have their effect on the completion of projects within the initial budget as well (Choi et al., 2020). Choi et al., (2020) in a study titled "Alternative Contracting Methods (ACM): Modeling and Assessing the Effects of Contract Type on Time-Cost-Change Performance" evaluates the effects of different contracting methods on the cost, time and change performance of 2,572 transport infrastructure projects in Florida, the United States

between 2002 and 2013. The study argues that there is a strong correlation between alternative contract methods and cost overruns in transport infrastructure projects. The study found that “ACMs with large project sizes are more prone to cost overruns”. In the meantime, Choi et al., (2020) argue that using a lump-sum contract methodology can result in the completion of the contracts within the budget. Additionally, the study found that cost-plus-time contracts are less effective in comparison to incentives/disincentives and no-excuse bonus contracting in terms of cost overruns.

Effective Construction Management, Fluctuation of Prices, Market Research and Analysis, and Projects Financing

Effective construction management is a key to the successful completion of projects, especially rural projects, which are geographically scattered and are limited in terms of resources. The absence of an effective construction management methodology can lead projects to cost overruns, reworks, poor quality, and delays (Tran et al., 2016). By doing this research, the authors were trying to come up with effective strategies to properly plan, design, develop, execute and manage rural transit projects. Tran et al., (2016) conducted a study on construction management challenges and best practices for rural transit projects. The study was based on surveys, disk scans of project documents, case studies and interviews with 33 U.S. departments of transportation and authorities of two Canadian provinces. Tran et al., (2016) in their study found out that the main challenges in the face of these projects that can lead to cost overruns are remote location of projects, the capacity of contractors, staffing issues, improper documentation, and communication issues, and environmental issues.

Cost overrun has been a noticeable phenomenon in construction projects and it occurs frequently (Ahady et al., 2017). Ahady et al., (2017) have researched the major issues that cause projects to exceed their initial budget in developing countries. This study claims that the causes of cost overrun can be different in each developing country. But there are some common factors such as fluctuation of prices for materials required in the project. Ahady et al., (2017) have gathered data on projects not completed within their initial budget in several developing countries including India, Nigeria, Indonesia, Saudi Arabia, Pakistan, Malaysia, Ethiopia, Palestine, and South Africa.

Time Delay

In the context of road construction projects, the time delay can be defined as the extension of planned or scheduled time in the completion of a project. For this research, we studied several articles to find the reason why rural road projects in Afghanistan are not finished in a fixed time and why they have been delayed and had time extensions. The most important of them are investigated as follows:

Weather and Climate Condition

Construction projects which contribute significantly to the GDP of Nepal are prone to delays as well (Subedi & Joshi, 2020). Subedi & Joshi (2020) conducted their research on the cause of delay and their relative importance on the completed projects in the Gandaki province of Nepal. They adopted a quantitative methodology to collect data with the help of a questionnaire. The questionnaires were distributed among 55 respondents. Their research resulted in finding 12 major factors which caused delays in these projects. Among all factors, weather conditions and climate conditions were ranked first.

Project Owner, Contractor and Consultant related Factors

Delays in construction projects, specifically road projects are one of the most common phenomena (Aziz & Abdel-Hakam, 2016). Aziz & Abdel-Hakam (2016) directed a study on highway projects in Egypt to find the most important causes of delay and identify the approaches to complete projects within their initial completion date. The overall results show that the most important factors behind project delays were the equipment group, design group, contractor group, and material group.

Legal and Social Factors, and Organization Management

Time delays are common in all types of construction projects, and they are more project-specific (Venkateswaran & Murugasan, 2017). Venkateswaran & Murugasan (2017) in their paper assessed the causes of time delay in Road Over Bridge (ROB) projects in India. This study found that among the 29 factors, the major causes were land acquisition, an extra number of stakeholders, displacement of network disputes and claims, and legal requirements. Amoatey & Ankrah (2017) in a research paper investigated the causes of delay in road projects in Ghana to identify appropriate mitigating measures. The study showed that the five critical causes of delays, among others, in Ghana's construction industry are (1) delay in payment of completed work by the owner, (2) inadequate experience of contractors, (3) changes in the scope by the owner during project implementation, (4) delay in delivering the site to the contractor, and (5) inflexible funding allocation for project items. To overcome these challenges, the author suggested that a "holistic and integrated risk management model" should be in place for the entire construction process.

Conceptual Framework

The below figure represents a conceptual framework, describing time delay and cost overrun of rural road projects as dependent variables and the factors which are causing the problem as independent variables.

Figure 1: Conceptual Framework



Source: The author's compilation and the output are based on the insights from the literature review

Referring to the literature review, seventy-one factors were identified as causes of time delay and cost overrun. These factors are classified into ten groups based on their nature and similarities (Lukale, 2018).

Methodology

The research uses an inductive approach to better explore, interpret and analyze the causes of the problem (Khan et al., 2018). According to Khan et al. (2018), the research deals with the humans who are the main actors in the society, interpretivism approach helps the researcher better understands the differences between humans. Furthermore, this study adopts an interpretivism research philosophy which helps the researcher to take a good decision on the strategy, approach and data collection techniques (Lukale, 2018).

Sample selection Technique, Data, and Method of Analysis

The research targets ten officials who are directly involved in the rural road projects of Afghanistan. This technique is called non-probability purposive sampling (Khan et al., 2018). The technique helps the researcher to have access to the responders. The study uses an open-ended interview to collect primary data. The responses were recorded and translated and summarized in tables to develop themes subsequently. But before that, some main and sub-themes in the subject area were identified. The researcher applies a back-to-back translation procedure for further data processing upon interviewing in the Farsi language

(Brislin, 1970). According to Brislin (1970), the researcher considered two aspects of translation. One, those factors that were affecting the quality of translation. And second, how equivalence between source and targets can be assessed.

Translated data are brought into the tables and based on that some thematic codes are generated for diagrams and networks. These diagrams and networks discuss the causes of the subject problem. The process of sorting and classifying data in research is called coding (Boyatzis, 1998). To analyze qualitative data gathered through open-ended interviews, the researcher uses the coding technique accordingly (Swanson & Holton, 2009). The researcher first brings the key causes of the subject problem as main themes and sub-themes subsequently. The study uses the thematic analysis method to interpret and analyze the data (Khan et al., 2018). The researcher first generated some themes from the data in the table and with the help of these themes, some graphs and networks are developed to present a better understanding.

Analysis and Discussions

As discussed earlier in the methodology, the primary data are collected based on open-ended interviews. For thematic analysis, a priori codes and their inductive sub-themes are developed and presented in the below tables.

Table 1: Causes of Time Delay of Rural Road Projects in Afghanistan

Themes	A priori Codes	Excerpts	Inductive sub-themes	Codes	
Time Delay	TID	[Int 1]	When a contractor can't finish the project within its fixed time.	Not finishing the project within a fixed time.	TID 1
			Then the contractors ask us for a time extension.	Time extension	TID 2
			It's more common in all types of construction projects in Afghanistan, especially in rural road construction projects.	More common in Afghanistan.	TID 3
		[Int 2]	When a company is not able to finish or complete the work within its fixed time.	Not finishing the project within a fixed time.	TID 4
			Due to many reasons, we usually face this problem.	It's a problem	TID 5
			Through justifications and acceptable reasons and documents, we ask the owner at least one month in advance to give us a time extension.	Ask the owner for a time extension.	TID 6
			Then, there will be two options.	Two options	TID 6.1
			Either the owner accepts to give us a time extension.	Accept	TID 6.1.1
			Or, they don't accept.	Don't accept	TID 6.1.2
			In case they don't accept to give us a time extension and we couldn't finish the work within its fixed time, so they will charge us a penalty based on specific terms and	Penalty	TID 6.2

Causes of Time Delay	CTD	[Int 1]	conditions of the contract.		
			There are many reasons that our contractors can't finish the work in the fixed time and projects will have a time delay.	Many reasons	CTD 1
			Weather and climate conditions can be a major reasons.	Weather and climate condition	CTD 1.1
			Some reasons from our address:	Project owner related factors	CTD 1.2
			We fail to have regular site management and project supervision.	Poor site management and projects supervision	CTD 1.2.1
			Due to lack of capability and sufficient similar job experiences by our contractors, they fail to finish the work on time.	Lack of experience by the contractor	CTD 1.2.2
			Improper planning and wrong project time scheduling can lead to time delays while implementing them.	Improper planning and time scheduling	CTD 1.2.3
			Due to financial issues and deficits in the budget, we can't process their payments and invoices on time.	Financial issues	CTD 1.2.4
			Challenges from the community and some government policies as well.	Legal and social-related factors	CTD 1.3
			Land acquisition is one main problem for us to overcome.	Land acquisition	CTD 1.3.1
			Issues raised by local communities.	Issues by local communities and villagers	CTD 1.3.2
			Some environmental aspects and policies are made under government policies.	Government policies	CTD 1.3.3
			There are some important reasons in the ministries.	Organization management	CTD 1.4
			We have problems in the contract management department.	Poor contract management	CTD 1.4.1
Any delays in mobilization can have causes on finishing the projects in terms of on-time finishing.	Delay in handing over the site to the contractor	CTD 1.4.2			
During the implementation phases of the projects, we see poor quality of project design and the low accuracy they have.	Changes in project design	CTD 1.4.3			
Slow decision-making by top-level management causes us to have time	Delay in decision making	CTD 1.4.4			

			delays in completing the projects.		
			Big projects with high complexity require to have more detailed and accurate time estimation and scheduling, otherwise, we fail to complete them on time.	Inaccurate scheduling of projects	CTD 1.4.5
			Lack of project documentation and drawings for a specific part of a project.	Incomplete projects documents/drawings	CTD 1.4.6
		[Int 2]	There are many reasons from our address that affects us not to finish the work within its fixed time:	Contractor related factors	CTD 1.5
			One main reason can be a shortage of resources and materials in rural areas that we have to supply from the cities. Providing fuel and other important things from the cities to the job site takes time.	Shortages of resources and materials.	CTD 1.5.1
			Road construction and its assets like culverts, retaining walls besides the road and a river, bridges, washes and other structures require equipment and machinery.	Shortage of machinery and equipment	CTD 1.5.2
			Lack of proper and regular coordination between us and the project's owner can also be a reason.	Lack of coordination	CTD 1.5.3
			Another challenge that is causing time delay, is bribery and corruption in the country.	Bribery and corruption	CTD 1.5.4
		[Int 1]	The ministry needs to develop a comprehensive and detailed geological, hydrological and environmental background study of the project and its locations.	A detailed hydrological study of the project locations should be conducted	STRTRY 1
			Maintain significant inter-organization coordination and use our available resources efficiently during the phase of project implementation.	Maintaining an inter-organization coordination	STRTRY 2
			It's the responsibility of the project owner to solve all legal and community-raised issues before awarding the contract.	Project owner must solve all legal and social factor issues	STRTRY 3
Strategies to fix the problem	STRATEGY				

	Effective organization management will help both project owner and their contractors to identify the risks which are causing time delays.	Make organization management more effective	STRGY 4
[Int 2]	Committed, well-qualified and expert employees will always help us to have more accurate project estimation and schedule.	Having committed and expert employees	STRGY 5

Source: Output from interview transcribe

Table 2: Causes of Cost Overrun of Rural Road Projects in Afghanistan

Themes	A priori Codes	Excerpts	Inductive sub-themes	Codes	
Cost overrun	Cor	[Int 1]	When a contractor can't finish the project within its estimated budget. Then they ask us for cost variation and amendments to complete the implementation of the projects. Its more common in all types of construction projects in Afghanistan, especially in rural road construction projects. Where their locations are distinct and in remote areas.	Not finishing the project within its fixed cost Project cost variation and contract amendment More common in rural road construction projects in the country.	Cor 1 COR 2 COR 3
		[Int 2]	Due to cost variation and contract amendment, our projects will have a cost overrun so they can't be finished at their estimated cost. Due to many reasons, we usually face this problem. Through justifications and acceptable reasons and documents, we ask the owner of the project for cost variation and contract amendment.	Completing the projects with cost variation and contract amendment It's a problem Ask the owner for cost variation and contract amendment.	COR 4 COR 5 COR 6
		[Int 1]	Due to many reasons, most of our projects will have cost overrun issues. Poor project management from our side in the ministry. And they are like: Several changes in the scope of projects even during its implementation phase and adding new tasks and work in the projects which were not in the plan and estimation. Changes in the project size and design. For example, in one particular section of a road, there was a culvert but now we changed it to a bridge which causes more money. It's more happening between a unit price type of contract and lump sum type. Lack of effective construction management methodology from our side and lack of site supervision	Due to many reasons Organization and construction management Changes in the scope of the project Changes in size and design of the project Poor planning and choosing an inappropriate type of contract. Poor construction methodology	COC 1 COC 1.1 COC 1.1.1 COC 1.1.2 COC 1.1.3 COC 1.1.4
		[Int 1]	Due to many reasons, most of our projects will have cost overrun issues. Poor project management from our side in the ministry. And they are like: Several changes in the scope of projects even during its implementation phase and adding new tasks and work in the projects which were not in the plan and estimation. Changes in the project size and design. For example, in one particular section of a road, there was a culvert but now we changed it to a bridge which causes more money. It's more happening between a unit price type of contract and lump sum type. Lack of effective construction management methodology from our side and lack of site supervision	Due to many reasons Organization and construction management Changes in the scope of the project Changes in size and design of the project Poor planning and choosing an inappropriate type of contract. Poor construction methodology	COC 1 COC 1.1 COC 1.1.1 COC 1.1.2 COC 1.1.3 COC 1.1.4
		[Int 1]	Due to many reasons, most of our projects will have cost overrun issues. Poor project management from our side in the ministry. And they are like: Several changes in the scope of projects even during its implementation phase and adding new tasks and work in the projects which were not in the plan and estimation. Changes in the project size and design. For example, in one particular section of a road, there was a culvert but now we changed it to a bridge which causes more money. It's more happening between a unit price type of contract and lump sum type. Lack of effective construction management methodology from our side and lack of site supervision	Due to many reasons Organization and construction management Changes in the scope of the project Changes in size and design of the project Poor planning and choosing an inappropriate type of contract. Poor construction methodology	COC 1 COC 1.1 COC 1.1.1 COC 1.1.2 COC 1.1.3 COC 1.1.4
		[Int 1]	Due to many reasons, most of our projects will have cost overrun issues. Poor project management from our side in the ministry. And they are like: Several changes in the scope of projects even during its implementation phase and adding new tasks and work in the projects which were not in the plan and estimation. Changes in the project size and design. For example, in one particular section of a road, there was a culvert but now we changed it to a bridge which causes more money. It's more happening between a unit price type of contract and lump sum type. Lack of effective construction management methodology from our side and lack of site supervision	Due to many reasons Organization and construction management Changes in the scope of the project Changes in size and design of the project Poor planning and choosing an inappropriate type of contract. Poor construction methodology	COC 1 COC 1.1 COC 1.1.1 COC 1.1.2 COC 1.1.3 COC 1.1.4

			especially in rural road projects can lead projects to cost overruns.		
			Adding new structures and assets to the projects during their construction and implementation period can be a significant cause behind cost overruns.	Adding additional works	COC 1.1.5
			Successful managers and talented estimation engineers can do the estimations more accurately.	Inaccurate projects cost estimation	COC 1.1.6
			Otherwise, wrong cost estimations of projects will bring many problems including cost overruns later.		
			Unforeseen conditions of the job site which were not included in the project planning phase and design can be another factor in cost overrun of the rural road construction.	Unforeseen conditions of the job site	COC 1.2
			Road construction requires more detailed geotechnical studies during its survey, design and estimation period. Missing or insufficient study makes our estimation poor.	Insufficient and lack of technical studies of the project estimation	COC 1.3
		[Int 2]	Road construction in remote and rural areas of Afghanistan is tough. There are many reasons from our address that negatively affect the projects not to finish them within estimated cost and they are as:	Contractor related causes	CTD 1.4
			Rural road projects are crossing different locations, villages and districts which are insecure.	Security challenges	COC 1.4.1
			The period between project design and estimation, and its actual starting phase is usually one year. Of course, in the course of this one year, there will be changes and fluctuations in the market prices.	Fluctuation of construction material prices in the market	COC 1.4.2
Solutions for cost overrun problem	SCO	[Int 1]	To decrease cost overrun problems from the address of the organization as the project owner and their construction management perspective, we first need to build our employee's capacity and knowledge of construction management.	Build employees (both project owner and contractor) capacity on construction management knowledge. Gather more	SCO 1
			It's the responsibility of the entity as the project owner, to have a detailed study of the project's geographic location, environment, weather, and climate conditions before its survey and design phase.	A detailed geographic study of the project location should be conducted	SCO 2
			The companies should also visit the location of the projects before they participate in the tendering process of the projects.	Companies should visit the site before participating in the tendering process	SOC 3

[Int 2] It's the responsibility of the entity as Project owner the project owner to consider should have accurate cost estimation of material updated during their first and last estimation market rate of each project. This can be done analysis through a regular market research rate analysis once every quarter. Project owners must consider We need to identify the corruption and security issues serious problems in the country. We risks which have to consider the role of local communities as a major factor in contributing making the location of project more to corruption safe and secure. So, these and fight communities should be engaged in against them. the projects. Also, engage communities in the projects

Source: Output from the interview transcribe

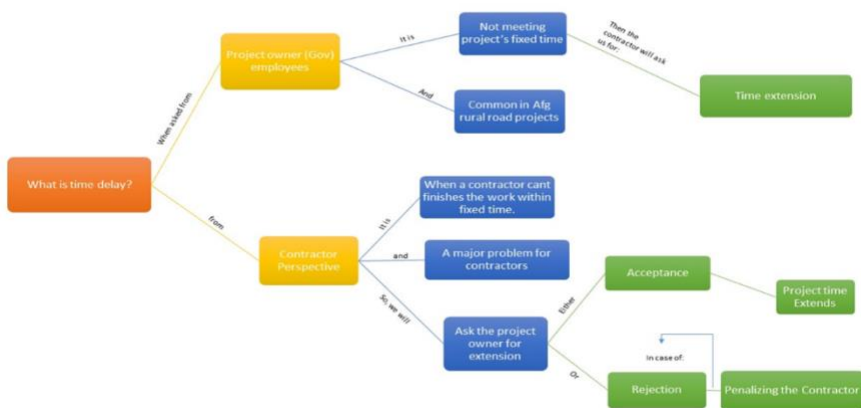
Thematic Network Diagrams

Below diagrams are presenting the required thematic networks. These themes are developed based on the information from the recorded interviews and coding tables accordingly.

Thematic Analysis for Causes of Time Delay

The data to find the causes of time delay is analyzed and interpreted in the three below steps or figures. The description of time delay from both the project owner's and their contractor's perspective is reflected and analyzed in figure 2. Further, the causes of time delay are reflected in figure 3 and subsequently, strategies and solutions to overcome the time delay problem are shown in figure 4.

Figure 2. The description of Time Delay

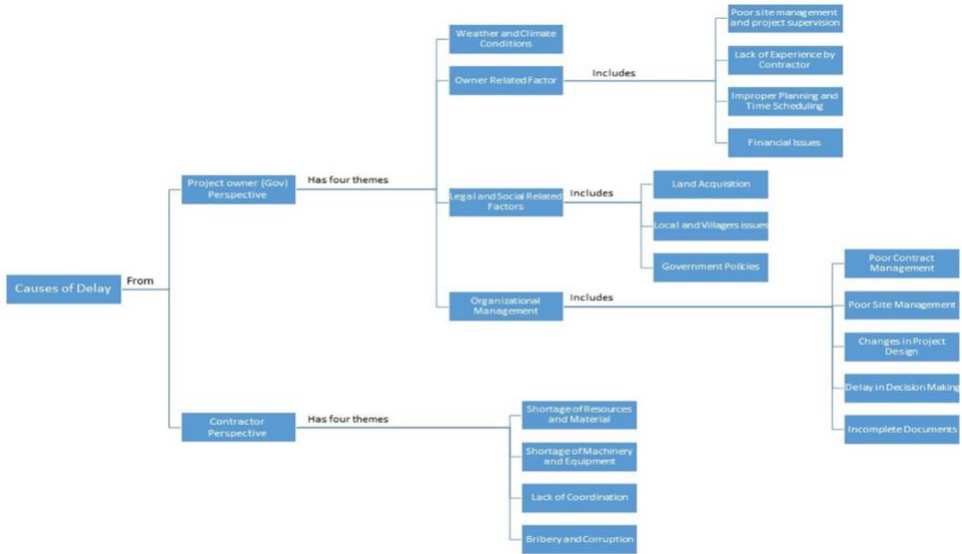


Source: Authors' Compilation

Referring to the above figure 2, Time Delay is a pre-determined theme. When asked the interviewees what is their definition of that, they answered: “when a company/contractor can’t finish the implementation of projects within their fixed time”. According to the interviewees, the time delay is a common problem in the country, especially for the construction of rural road projects in Afghanistan. When it occurs, the contractors ask their project owners to give them a time extension. So, there will be two options. Either the project owner accepts and gives their contractors extra time to complete the works or rejects. In case of rejection, the owner will apply penalties based on the terms and conditions

of the contract. According to the interviewees, there are several reasons behind this problem. And they are shown in figure 3.

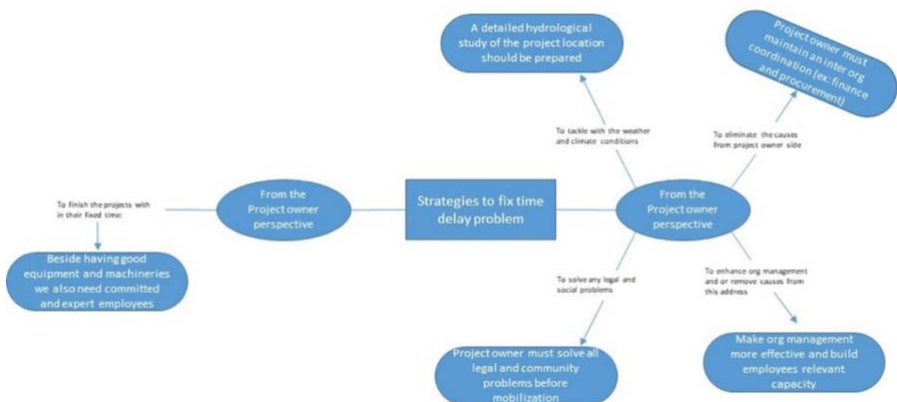
Figure 3: The Causes of Time Delay



Source: Authors' Compilation

Referring to the above figure 3, when the interviewees were asked about the causes of time delay for rural road projects, the responses show many reasons behind this problem. For ease of interpreting the reasons, the author classified them into appropriate categories. As shown, the reasons such as poor site management, lack of experience by contractors, improper planning and scheduling, and financial issues are brought under the main theme of “project owner-related factors”. Other reasons such as land acquisition, issues that are raised by the communities where the projects are being implemented, and some government policies are known as major causes of projects time delay seen in figure 3, they are brought under the main theme of legal and social-related factors which are having an impact on rural road projects implementations. On the other hand, some other causes were determined by the contractors. By referring to the above figure these causes are bribery and corruption, shortages of equipment and machinery, resources and materials which can have a significant impact on projects implementation in terms of on-time finishing.

Figure 4: Strategies to Solve the Time Delay



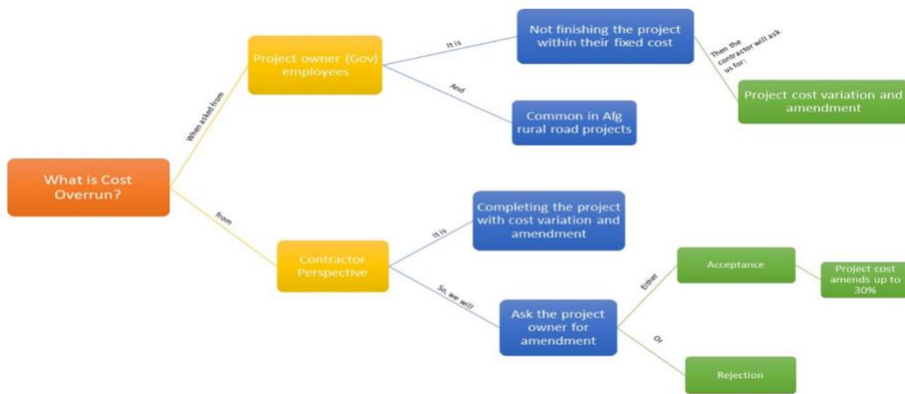
Source: Authors' Compilation

To overcome this problem, the interviewees were asked to give us any solutions or applicable strategies. Their appropriate responses are shown in figure 4. After identifying the reasons and causes of time delay, the interviewees were asked to propose any strategies and solutions to fix the issue of time delay. As shown in figure 4, some strategies and solutions are presented based on project owner experience. These strategies are more focusing on contract management issues and legal and technical issues. The interviewees from the project owner side, believe that applying those strategies and strengthening the weaknesses will help us a lot to finish and hand over the projects within their fixed times.

Thematic Analysis for Causes of Cost Overrun

The data for the purpose of studying the factors which are causing the rural road construction projects not to finish within their fixed or estimated cost is discussed in the below figures likewise the analyzing the causes of time delay, the cost overrun concept will be first described in figure 5. Furthermore, its causes will be shown in figure 6 and at the end, some strategies and or solutions for solving the problem which is proposed both by project owners and their contractors will be interpreted in figure 5.

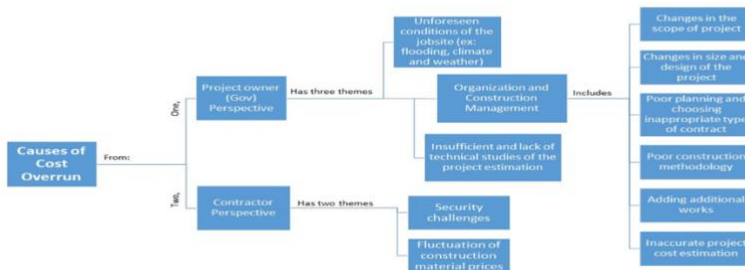
Figure 5: Description of Cost Overrun



Source: Authors' Compilation

Referring to the above figure 5, Cost Overrun is a pre-determined theme. When asked the interviewees about the description of cost overrun, they answered: “when the company can’t finish the construction of a project within their estimated cost and an extra cost variation occurs”. Based on the primary data, it shows that most of the time, the construction of rural roads in Afghanistan had a cost overrun problem. According to the interviewees, there are several reasons behind this problem. And they are shown in figure 6.

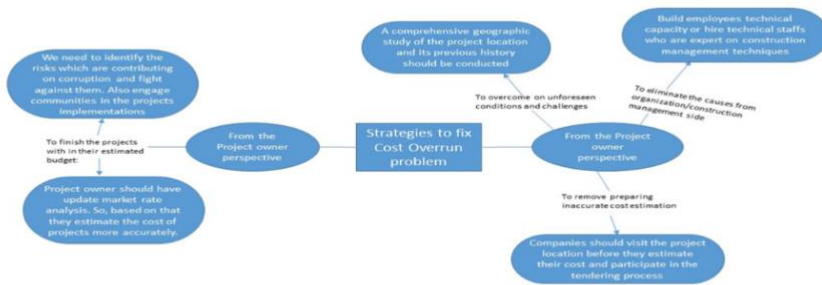
Figure 6: The Causes of cost overrun



Source: Author's Compilation

Referring to the above figure 6, when the interviewees were asked about the causes of cost overrun for rural road projects in Afghanistan, the respondents answered including many reasons behind the issue. The reasons are categorized in sub-themes such as unforeseen conditions, construction management issues, and some other reasons as shown above are mentioned from the address of the project owner (here, government) perspective. Some other reasons like security challenges, cost of construction material and fluctuations in the market are themed under the main theme of contractor perspective. To overcome this problem, the interviewees were asked to give any solutions or applicable strategies. Their appropriate responses are shown in below figure 7.

Figure 7: Strategies to Solve the Cost Overrun



Source: Author's Compilation

Finally, after identifying the aforementioned causes behind the cost overrun of rural road construction projects in Afghanistan, the interviewees were asked to recommend any strategies and solutions to fix the issue of cost overrun. As reflected in the above figure 6, some strategies and solutions are presented based on the project's owner also their contractors' experiences. These strategies are more focusing on contract management issues and legal and technical issues. The recommenders believed that applying those strategies will significantly help us to reduce the issue of project cost overrun in terms of implementing rural road construction projects in the country.

Conclusion

The main purpose of this thesis research is to find out the causes of time delay and cost overrun of rural road projects in Afghanistan. In this regard, an open-ended interview questionnaire was designed to gain relevant information from both the project owner's side (government) and their contractors. A ten minutes interview was recorded and transcribed. After that, the relevant information was transformed into the coding tables to develop thematic networks. The interpretation of the diagrams presented the answers to the research questions. The 25 causes were found (16 for time delay and 9 for cost overrun), grouped and analyzed. Weather and climate conditions, improper planning, financial issues, land acquisition and community challenges, fluctuation of material prices in the market, shortages of resources, materials and equipment, and delays in the payments were the top 8 identified causes. The researcher in this study used a traditional approach of actual finishing time and cost of projects versus estimated time and cost in defining time delay and cost overrun. Although this approach is believed to be more common in the business administration field but has been criticized for not considering a third dimension which is called the value of the work performed (Fleming & Koppelman, 2003).

Implications and Recommendations

According to the findings of this research, to prevent a similar problem and to implement rural road projects within their fixed cost and time, the following recommendations are advised for both project owners and their contractors.

Agencies and the Contractors

The worst weather, the bigger size of the projects and the unstable prices of materials in the market, the more chances of occurring time delay and cost overrun. Land acquisition, contract management and delay in payments were also identified as causes of time delay and cost overrun, alongside community problems, legal challenges, organization management and errors in the design of the projects. Delay in payments is common in government-funded projects, and usually, the reason is the centralization of decisions, too much paperwork, and bureaucracy (Aljohani et al., 2017).

Having discussions about the risks related to rural road projects is not enough; they need to be measured and their impact on the time and cost of the projects should be identified. The project's accurate time and cost estimations will help us more on reducing the risk during its implementation stages. Moreover, accuracy in mobilization in the field and land acquisition can significantly impact reducing the risks of time delay and cost overrun. On the other hand, projects documents including, survey, design, estimation and bidding documents must be clear and understandable for the parties. Inappropriate and complicity of documents will lead to delays in the implementation of the projects, which ends in cost overrun and time delay. There is an instance by Greiman (2013) that shows how missing documentation leads to time delays and cost overruns. In a big dig project in the US. The management of a consultant company was pushed to submit a request for proposal before finishing the project design by the owner. Subsequently, changes in the contract documents resulted in incomplete documents in the bidding and finally increased the actual time and cost of projects during their implementation (Greiman, 2013).

According to Akomah and Jackson (2016), in a study, contractors' performance on-site management factor grouping was ranked third, with poor planning and scheduling topping the list in this category, followed by wrong time and cost estimations and poor projects supervision. The researchers believe that effective site management by contractors will have a significant role in their performance in successfully finishing the project. It has also been investigated that most contractors fail because they don't have the relevant experience and managerial skills to manage the project team (Akomah & Jackson, 2016).

Academic Implications

This study and its findings may provide additional knowledge to the existing literature on the topic of time delay and cost overrun of rural road projects in the context of Afghanistan. The researcher believes that there is still more room for further investigations by many other researchers on the subject.

Practical Recommendations for Projects Owners

Ministry of Public Works (MoMP) and the Ministry of Rural Rehabilitation and Development (MRRD) in Afghanistan are the main public agencies, that are implementing rural road projects in the country. These entities are involved in rural road construction projects from the planning phase up until implementation and finishing. So, below recommendations are given to them:

- To overcome the problem from the address of weather and climate conditions: The ministry should have a comprehensive and detailed feasibility study of the geological, hydrological and environmental background of the project and its locations. By learning the job site's climate conditions, both parties can handle the situation and will try to finish the work before the coming winter.
- Maintaining an inter-organizational relationship: this issue can have an impact on the overall performance of the organization in terms of on-time finishing the physical work of the projects. In other words, to eliminate the causes of time delay from the ministry

side, significant inter-organization coordination and efficient usage of available resources can help us a lot to reach the goal.

- To eliminate the causes of time delay from the address of legal and community-raised issues: It should be the responsibility of the government or project owner to solve these issues before awarding the contract. Once the contractor started the work, they should proceed with the work without any issues from the community side.
- Management in an organization: its key important idea that all employees of the organization who are involved in the projects, should have due knowledge. In this regard, we need to have relevant training and technical engineering capacity-building programs for employees and keep them updated with the best engineering methods for road construction.
- Poor geographic study and survey, design and inaccurate project estimation can significantly cause projects not to finish within their fixed time and cost. So, it's the responsibility of MoPW and MRRD as the project owners, to have a detailed study of the project, geographic location, environment, weather and climate conditions, and any other unforeseen probabilities that can negatively affect the project before its survey and design phase.

Practical recommendations for contractors

Private construction companies are the contractors of the project owners who are responsible for implementing the construction of the rural roads. To finish the work within a fixed time and budget, the contractors are suggested below recommendations:

The construction companies should visit the location of the projects before they participate in the tendering process of the projects. By understanding the project location, community, weather and climate conditions, distance from the market, and transportation, they can more accurately decide on how to supply and transport their raw material in the location and also their cost estimation and offer for the whole project will be more accurate. In the end, the risk of cost overruns and time extension issues will be reduced. Committed, well-qualified and expert workers and other employees who have the best knowledge of work on the job site can help the companies to handle the task of every project according to plan and goals.

Limitations of the Study

This study is done for a thesis project by an MBA student. The researcher mainly focused on rural road construction projects. And the main implementing agencies for these projects in the country are MoPW and MRRD.

Based on sampling methods, the researcher targeted five formal employees from MoPW and MRRD and five others from their contractors who were engineers and directly involved in rural road construction projects to interview and collect data. As long as the questionnaire format was an open-ended interview and the researcher had to record the interviewee's responses, it was difficult to encourage especially the government officials for interviews and record their responses accordingly. In the context of Afghanistan, government employees are less likely to give and share relevant information about their projects and jobs.

Future Research Agenda

The researchers in this study used a traditional approach of actual finishing time and cost of projects versus estimated time and cost in defining time delay and cost overrun. Although this approach is believed to be more common in the business administration field but has been criticized for not considering a third dimension, which is called the value of the work performed (Fleming & Koppelman, 2003). They believe that even those projects within a fixed budget could have experienced time delay and cost overrun only if the value of the performed works were considered. The researchers suggest earned value management, which deals with received value considering the project owner's resources, which are cost

and money spent on projects. This area of study needs further investigation by researchers in the future.

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