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## Construction Projects in Afghanistan: An Evaluation of Delay and Mitigation Mechanism

Muhammad Atif Ludin

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**Muhammad Atif Ludin**

## Abstract

*The construction industry plays a pivotal role in the infrastructure development of a country, thereby improving the quality of life. However, the construction industry is facing the problem of delays, thus triggering negative effects on project completion. This study endeavours to explore factors leading to delays in the construction projects in Afghanistan. The study employed a relative importance index to evaluate and check the importance level of factors leading to delays. The confirmation of these factors can support the provision of proper policies that reduce the frequency and severity of the factors. The study provides recommendations to help policymakers rectify policies accordingly.*

**Keywords:** *Construction industry, Afghanistan, Delay, Mitigation*

## Introduction

The construction industry has paramount importance in the achievement of socioeconomic development goals considering its size and potential in the development of an economy (Oladinrin et al., 2012). The market value of the construction industry is estimated at \$15.2 billion in Afghanistan, which shows its importance from a macro perspective (SIGAR, 2021). Construction projects are a catalyst for the development of economies (Ismail, 2007). The contribution of the construction sector to GDP is almost 10 percent, and 8 percent goes towards employment in Afghanistan. The construction sector in Afghanistan has been rapidly growing over the last two decades, albeit delays are also dominant. Thus, the phenomenon of construction project delays is quite visible in Afghanistan, leading to severe repercussions. To practice sound construction project management and avoid delays, which cause further losses for the government and seem to be harmful for the economy, the determinants of the delays need urgent re-examination. Project delays are widely acknowledged to be harmful to both the economy and the construction sector. In 2010, it was revealed that \$40 million of a \$300 million cost overrun of Kabul projects was due to delays in power plants and sustainability projects (SIGAR, 2010). This will allow mitigation actions to be taken and delays to be avoided, which will ultimately allow homes, schools, hospitals, markets, and other necessary infrastructure to be carried out promptly.

The delays in construction projects lead the parties to higher costs, disputes, abandonment of the project and, in most cases, litigation (Aibinu and Jagboro, 2002; Olusegun and Michael, 2011; Pourrostan and Ismail, 2011). Thus, Afghanistan was not an exception, as the office of special inspector general (SIGAR for Afghanistan, 2010) declared that contract delays led to cost overruns for Kabul power plants and sustainability to the extent of \$300 million, of which 40 million were directly linked to delays of projects in Afghanistan. Although a significant

number of studies have been done on the causes of the delays of projects in Afghanistan, it seems to be still tough to know which causes are the most critical. Most of these studies used a variety of measurement scales to evaluate the factors that led to the construction projects' being delayed. The study endeavours to identify the important factors causing delays in construction projects in the context of Afghanistan and to propose a mitigation mechanism. The rest of the study is divided into 4 sections, with section 2 focusing on literature covering the main factors of delay in construction projects, hypothesis, and theoretical framework; section 3 presents the methodology, including the nature of the study, population, sampling, data collection method, variables, and measurement; section 4 presents an analysis of factors using the relative importance index (RII); and finally, section 5 depicts the outcomes of the study, followed by the recommendations and limitations of the study.

## **2. Literature Review**

The construction industry, due to its size and potential, plays an important role in the achievement of national socio-economic development goals (Oladinrin et al., 2012). According to the office of the senior economic advisor, in 2017, the market value of the construction industry was \$15.2 billion in the Afghan economy, which shows its level of importance. The inability of the construction projects to be done within the preplanned scope of time is one of the most important concerns that can easily contribute to the wastage of resources and time and incur losses for the economy (A.A. Abiinu and G.O. Jagboro 2002). Niazi and Painting (2017) opined that the delay in construction projects in Afghanistan is due to corruption, a lengthy process of payments, financing of projects, and insecurity, which are generally identified and defined from a local perspective.

### *2.2 Pre-worked Research*

According to Prasad (2018), many variables, such as financial-related factors, tend to have an impact on the delay of construction projects in India. Meanwhile, they claim that the financial-related factors had a critical impact on the delay of construction projects in developing countries as well. Viles et al. (2019) revealed that the main causes of delays in construction projects are problems that happen during execution. Labor conflict, which covers 80% of the problem, is another source of delay in construction projects. They also claimed that problems in execution are based on unpredictable events and the administrative problems are due to weak cash flow management. Factors like weather or climate conditions, poor communication, lack of coordination and conflicts between stakeholders, ineffective or improper planning, material shortages, financial problems, payment delays, equipment or plant shortages, lack of experience or qualification or competence among project stakeholders, labor shortages, and poor site management were identified as factors delaying the construction projects (Hosseini and Durdyev, 2018; Rachid et al., 2018). Zidane and Andersen (2017) claimed that poor planning and scheduling, slow decision-making process, internal administrative procedures and bureaucracy within project organizations, resource shortages (human resources, machinery, equipment, poor communication and coordination between parties, slow quality inspection process of the completed work, design changes during construction, change orders, sponsor, owner, or client's lack of commitment and or clear demands (goals and objectives), office issues, and late, slow, incomplete, and improper design had negative impacts on construction projects in the world. According to David et al. (2016), culture is the dominant factor that tends to have an impact on the delay of construction projects. They further claimed that organizational culture in American construction companies is an important factor in the delay of projects, while "market" culture is the dominant organizational culture in Indian construction companies, which causes delays in

projects. This study aimed to qualify the relationship between a construction company's organizational culture and the delay of construction projects. Durdyev et al. (2017) believed that shortage of materials on-site, unrealistic project scheduling, labor absenteeism, late payment by the owner for the completed work, poor site management, delays by a subcontractor, and accidents due to poor site safety by the contractors and consultants were the main causes of project delays in Cambodia. They further claimed that late delivery of materials, a shortage of skilled labor, and the complexity of projects are other factors causing the delay of projects in Cambodia.

### *2.3 Theoretical Framework*

The dependent variable in this study is the delay of construction projects in Afghanistan, while the independent variables are categorized into seven major parts. Our first independent variable as planning, design, and engineering is a very crucial variable since the planning, design, and engineering phase of a project is the key to kicking off a project with an appropriate budget and accurate schedule. Planning, design, and engineering are the main independent variables that may cause the projects to be delayed and they are considered important factors (Zidane and Andersen 2017). Another independent variable which looks to have an impact on delays of projects and is considered important is the procurement process. The procurement process of a project ensures that all items and services are properly acquired. Therefore, as a factor of delay in projects, procurement tends to have an impact and is considered important in project delays (Richard and Hans, 2015). The third independent variable is the financial factors, which are claimed by Prasad et al. (2018). Financial factors play a vital role in adopting a project as they help the project access sufficient funds daily and meet daily expenses. Furthermore, human resource-related factors have an impact on project delays in their study. The study by Prasad et al. (2018) confirms that project execution also caused the projects to be delayed to an extent. They further believed that project execution was important among other variables in regard to the delay of projects. The sixth independent variable of this study is contract management, as it is believed that contract management is the important phase of a project in which we can oversee the projects as they are done in partnership between organizations. The last independent variable remains as "external factors," which is also confirmed by Chen et al. (2017). These external factors may have direct or indirect effects on the progress of a business, operation, or project.

## **3. Research Methodology**

The research approach is deductive, and a questionnaire on a 5-point likert scale is employed for a better understanding of the causes of delays in projects in Afghanistan. The factors have been analyzed in a manner to understand the importance index and level of severity among all variables. Therefore, since the approach of our study is to collect the primary data from the stakeholders of the project in Afghanistan, the agencies of the client, consultant, and contractors of the projects in Afghanistan were asked to fill in the relevant questionnaires for analysis. The population of the current study is the construction sector in Afghanistan, and the sample was collected from local engineering and construction contractor companies and relevant ministries that are working in the construction sector in Afghanistan. Meanwhile, in this research paper, the sampling method is discretionary or reasoned. As our research is based on a targeted area, only those companies and ministries that are generally involved in that construction have been selected. In order to analyze the severity and importance index between all independent variables, we have used the one-way Anova test and the RII method. The analysis method of this study was done through the RII method (Holt 2014), which helped us rank the importance level of each selected independent variable. Following the above

method, the *SI* (severity index) and *FI* (frequency index) are calculated, and later on, the importance level of each individual sub-factor is assessed. The formula for calculating the RII index is as:

$$FI/SI = \sum \frac{w}{A * N}$$

The character (*w*) represents the rating assigned (one to five) for each cause by the respondents, and the character (*A*) represents the maximum rating, which is 5, and it's the measure of significantly important or significantly agreed option in our Likert scale. Meanwhile, the character (*N*) is the total number of our respondents, which was 104 people out of 200.

#### 4. Findings and Analysis

In this section, we have analyzed the collected data for all seven independent variables to find out the importance index (RII) of each individual variable in regards to the delay of construction projects. To achieve this goal, we use SPSS version 28, which is a cross-platform software and is mostly used for econometric analysis. To be precise in estimations, we find the best estimation model that fits our dataset. Meanwhile, the reliability test, which is done through Cronbach's alpha, is presented as well including the RII method.

##### 4.1 Reliability Test

Since we have a Likert scale questioner, we used Cronbach's alpha to measure the internal consistency or average correlation in this survey. The test of reliability through Cronbach's Alpha for the Likert scale questionnaire is suggested by Santos (1999). The results confirm that the instrument is acceptable and the reliability of the questionnaire is thus confirmed. The value of Alpha for the test of Cronbach's is 0.934, which means that our designed questionnaire is acceptable and the collected data is reliable.

**Table 1: Reliability Statistics**

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No of Items
.934	.937	60

Source: Data output from SPSS v 24.0

##### 4.2 Descriptive Statistics

The questionnaire was designed in a way to collect the demographical information of the respondents, thereby defining as if any of the respondents were clients, consultants, or contractors in any construction project. Out of the 104 respondents, 47 percent were clients, 19.2 percent were consultants; and 33.7 percent were contractors. The project profile, which defines the respondents' projects and their working background, is the last demographical information from which we found that the majority of the respondents were from building construction projects, as they cover 46% of the total number of respondents in aggregate. Further details in regards to the demographical information is presented as below in Table 2.

**Table 2: Demographic Analysis**

	Number	% of Total
<b>Role</b>		
Client	49	47.1
Consultant	20	19.2
Contractor	35	33.7
<b>Total</b>	<b>104</b>	

<b>Education Level</b>		
Diploma	29	27.9
Graduate	41	39.4
PhD	5	4.8
Post Graduate	29	27.9
<b>Total</b>	<b>104</b>	
<b>Experience</b>		
<5 Years	14	13.5
>15 Years	11	10.6
10-15 Years	28	26.9
5-10 Years	51	49.0
<b>Total</b>	<b>104</b>	
<b>Project Profile</b>		
Buildings	48	46.2
Others	25	24.0
Power	4	3.8
Transportation	14	13.5
Water	13	12.5
Supply/Irrigation		
<b>Total</b>	<b>104</b>	

Source: Data output from SPSS

### 4.3 Relative Importance Index of Delay Factors

The questionnaire was sent to 200 people, of which 104 responded correctly. Out of the 60 given factors, which are categorized into 7 IVs, it's observed that lack of contractor's experience and control over project (project execution), difficulties in obtaining construction materials from the market (procurement), lack of process for comprehensive dispute resolution (contract management), shortages of materials (procurement), high inflation, insurance and interest rates (external factors), unrealistic inspection and testing methods proposed in contracts (contract management), changes in government regulations and laws (external factors), unreasonable risk allocation in contracts (contract management), equipment breakdown and maintenance problems (project execution) and exceptionally low bids by contractor (planning design and engineering) were the top most important factors in the delay of the projects in Afghanistan. The lack of contractor's experience and control over projects, with ranking 1, and equipment breakdown and maintenance problems, with ranking 9, are the project execution sub factors that were found among the top ten most important factors that led the Afghanistan construction projects. The importance of this independent variable is also confirmed by Bagaya and Song (2016). The lack of experience further refers to the inability of the engineers, technical, and skilled labor who are working on the projects and overseeing the process of the projects as determinants were found to be among the most important factors in the project execution that led the projects to delay. Besides, the equipment breakdown and maintenance problems, which are defined as the usage of the equipment in an inappropriate manner and the lack of maintenance of the equipment, were found to have been important in the delay of the projects in Afghanistan.

The results of RII show that some factors related to the procurement phase of construction projects, such as difficulties in obtaining construction materials from the market (ranking 2) and shortages of materials (ranking 4), were among the top ten important factors that caused construction projects to be delayed. The importance of subfactors in the procurement phase of construction projects is also confirmed by Youcef and Bjorn (2017). The difficulties in

obtaining construction materials from the market are described as importing the approved imported or produced materials into the Afghanistan market. Meanwhile, the shortage of materials is also explained by macro factors such as the banning of the importing of those materials by the government, the lack of demand for those raw materials, and therefore it is found to have a higher priority on delays on projects in Afghanistan. In accordance to the results of the relative importance index for the current study, it is observed that lack of process for comprehensive dispute resolution, with a ranking of 3, unrealistic inspection and testing methods proposed in contracts, with a ranking of 6, and unreasonable risk allocation in contracts, with a ranking of 8, which are all subfactors of contract management, are found to have the highest importance among 60 factors as they are listed among the top ten most important reasons for delays in projects in Afghanistan. The importance of the contract management factor in the delay of the construction projects is also confirmed by Oussen Bagaya and Jinbo Song (2016). The lack of a process for comprehensive dispute resolution is defined by the lack of good negotiators between contractors and the beneficiary, as they cannot negotiate and solve the raised problems in a fruitful manner, which is found to have a tense importance in the delay of the projects in Afghanistan. In addition, the unrealistic inspection and testing methods proposed are defined as the inability of the consultants who are in charge of inspection and testing of the materials of the projects, which are revealed to have impotence in the delay of the projects in Afghanistan.

Some external factors, such as high inflation, insurance rates, and interest rates (with a ranking of 5) and changes in government regulations and laws (with a ranking of 7), were also among the top ten important leading factors of projects' delays in Afghanistan's construction sector. The existence of external factors in the delay of construction projects is also confirmed by Chiu and Joseph (2017). Inflation, as an external factor which increases the prices of commodities, is found to have an important role in the delay of the projects. Meanwhile, the fluctuation in the interest rates may cause the contractors to take a loss as they may cause the projects to be delayed due to higher expenditures. It is worth noting that the changes in governmental laws and regulations, which are also defined by the increment of the tax rates, governmental fees, and working time of labor (changes in labor law), were found to have importance in the delay of the projects in Afghanistan. Meanwhile, the exceptionally low bids by contractors, which is one of the subfactors of the planning, designing, and engineering phase with a ranking of 10, is also found among the top ten most important factors of delays in projects in Afghanistan.

Furthermore, the relative importance index method revealed that the top least important factors of delay are, as such, poor scope definition by the contractor; inadequate early planning of the project; lack of experience or incompetence of the contractor's key staff; late payment from a contractor to subcontractors or suppliers; force majeure: war, revolution, riot, strike, earthquake; changes in design by the owner or his agent during construction; ineffective project planning and scheduling; poor site management and supervision mistakes or changes in design criteria provided by the employer; and contractors' financial difficulties. Furthermore, related to all the rankings of relative importance, the index method is presented in table number 3 as below:

**Table 3: Relative Importance Index**

Main Variable	Sub-factors	RII	Ranks
Project Execution	Lack of contractor's experience and control over project	0.663462	1
	Difficulties in obtaining		2
Procurement	construction materials from market	0.609615	

Contract Management	Lack of process for comprehensive dispute resolution	0.623312	3
Procurement	Shortages of materials	0.553212	4
External	High inflation, insurance and interest rates	0.511538	5
Contract Management	Unrealistic inspection and testing methods proposed in contract	0.494231	6
External	Changes in government regulations and laws	0.482692	7
Contract Management	Unreasonable risk allocation in contract	0.473077	8
Project Execution	Equipment breakdown and maintenance problem	0.467308	9
Planning, Design and Engineering	Exceptionally low bids by contractor	0.465385	10
Financial	Delay in payment for extra work/ variations by owner	0.463462	11
Human Resource	Lack of skilled operators for specialized equipment	0.455769	12
Planning, Design and Engineering	Inadequate integration on project interface	0.448077	13
Human Resource	Shortage of labor	0.448077	14
Financial	Delay in settlement of contractor claims by owner	0.446154	15
Project Execution	Works in conflict with existing utilities	0.444231	16
Project Execution	Site accidents due to negligence and lack of safety measures	0.442308	17
Project Execution	Delay in mobilization by the contractor	0.440385	18
External	Government tendering system requirement of selecting the lowest bidder	0.440385	19
Human Resource	Poor skills and experience of labor	0.438462	20
Financial	Gap between construction costs and stage payments	0.438462	21
Project Execution	Inappropriate or obsolete construction methods	0.434615	22
External	Issues regarding permissions/ approvals from another stakeholder	0.430769	23
Project Execution	Non-performance of subcontractors and nominated suppliers	0.428846	24
Human Resource	Poor labor productivity	0.426923	25
Project Execution	Delay in inspection and testing of completed work	0.425234	26
Contract Management	Errors or inconsistencies in project documents	0.423077	27
Contract Management	Noncompliance with conditions of contract	0.423077	28
Contract Management	Ambiguity in specifications and conflicting interpretation by parties	0.423077	29
External	Public interruptions	0.421154	30



Project Execution	Owners slow decision-making process	0.417308	31
Contract Management	Variation orders/changes of scope by owner during construction	0.417308	32
External	Differing or unforeseen site/subsurface conditions	0.415385	33
Planning, Design and Engineering	Delays in producing design documents by contractor	0.415385	34
External	Adverse weather conditions	0.413462	35
Contract Management	Unrealistic contract duration imposed by owner	0.413462	36
Planning, Design and Engineering	Inaccuracy in estimation of materials	0.409615	37
Project Execution	Poor monitoring and control	0.409615	38
Planning, Design and Engineering	Delay by owner in revision and approval of design documents	0.405769	39
Planning, Design and Engineering	Errors and omissions in design made by designers	0.401923	40
Procurement	Shortage of materials	0.432512	41
Project Execution	Rework due to errors during construction	0.432414	42
Planning, Design and Engineering	Improper technical study by contractor during bidding process	0.396154	43
Planning, Design and Engineering	Improper or inaccurate cost estimation by contractor	0.396154	44
Procurement	Delay in delivery of imported materials and plant items	0.394231	45
Planning, Design and Engineering	Unclear and inadequate details in drawings and inadequate details in drawings	0.392308	46
Planning, Design and Engineering	Poor design with constructability problems	0.386538	47
Project Execution	Failure to provide required construction site by owner	0.386538	48
External	Project fraud and corruption	0.378846	49
Financial	Delay in monthly payments from owners	0.378846	50
Planning, Design and Engineering	Poor scope definition by contractor	0.372155	51
Planning, Design and Engineering	Inadequate early planning of project	0.371154	52
Human Resource	Lack of experience/incompetence of contractor's key staff	0.369231	53
Financial	Late payment from contractor to subcontractors or suppliers	0.369231	54
External	Force majeure: war, revolution, riot, strike, earthquake	0.367308	55
Planning, Design and Engineering	Changes in design by owner or his agent during construction	0.365385	56
Planning, Design and Engineering	Ineffective project planning and scheduling	0.359615	57
Project Execution	Poor site management and supervision	0.353846	58

Planning, Design and Engineering	Mistakes/changes in design criteria provided by the employer	0.346154	59
Financial	Contractors financial difficulties	0.342308	60

Source: Authors Compilation

## 5. Conclusion and Recommendations

The accomplishment of a construction project depends on the assistance of all the parties involved in that project. Many factors could hamper the submission of construction projects. The accomplishment of carrying out construction projects in a timely manner and without any obstacles in the operation, application, submission, and accomplishment of the projects is one of the most important predetermined goals. The obstacles to the implementation of the construction project are a disorder that is very undesirable because it would be very harmful to all parties. The phenomenon of delay in construction projects is still a big problem in every country as it may lead the economies to incur losses, create disputes among the contractors, abandon the project, and, in most cases, litigation. This research paper is initiated to find out the most important factors causing delays in construction projects in the context of the Afghanistan construction sector, which is proven to be a major source of losses for the economy and a threat to the public interest too. A survey questionnaire was designed to collect the awareness of clients, contractors, and consultants about the importance of the given factors on the delay of construction projects, and the delay causes were then ranked according to their relative importance index.

It is worth mentioning that the causes of delays to the projects are categorized into seven important main factors, and the survey included 49 clients, 20 consultants, and 35 contractors. Out of the given factors, it was revealed that lack of contractor's experience and control over project (project execution), difficulties in obtaining construction materials from the market (procurement), lack of process for comprehensive dispute resolution (contract management), shortages of materials (procurement), high inflation, insurance and interest rates (external factors), unrealistic inspection and testing methods proposed in contract (contract management), changes in government regulations and laws (external factors), unreasonable risk allocation in contract (contract management), equipment breakdown and maintenance problems (project execution) and exceptionally low bids by contractor (planning design and engineering) were the top most important factors in the delay of the projects in Afghanistan. Out of the seven given main variables, it's revealed that contract management seems to be the most important factor of delay in construction projects within Afghanistan, as the results show that out of the eight given sub-factors, there were three among the top ten most important factors. Besides, some other sub-factors of project execution, procurement, and external factors were among the top ten most important factors. It is worth noting that none of the financial or human resource subfactors were among the top ten most important factors in the delay of construction projects in Afghanistan, leading to the conclusion that the aforementioned factors did not play a significant role in the delay of construction projects in Afghanistan.

### 5.1 Mitigation Mechanism

Delays in projects have negative effects for the different parties who are involved in construction projects. Therefore, to improve the implementation of projects, all parties need to work together in a joint effort. The results of the semi-structured interview suggest some of the following mitigations in the responsibility matrix between clients, contractors, and consultants as presented in Table 4.

**Table 4: Mitigation Mechanism**

Seq	Mitigations Measures	Responsibility			
		Category	Contractor	Client	Consultant
1	Hire expert and qualified staffs	Preventive	Yes		
1	Recruitment of expat staffs (In leading Positions)	Preventive	Yes		
1	Contractors shall launch onsite and offsite capacity building trainings for the staffs in managerial and leadership skills	Preventive	Yes		
2	Parties shall agree on different brands of each material (difficulties on obtaining materials)	Preventive	Yes		Yes
2	Pre-purchasing of materials for longer period (difficulties on obtaining materials)	Corrective	Yes		
2	Adjusting local products instead of importing goods (difficulties on obtaining materials)	Preventive		Yes	
2	Signing of forward contract with suppliers (difficulties on obtaining materials)	Preventive	Yes		
3	Parties shall have qualified negotiators	Corrective	Yes	Yes	
4	Prior to the commencement and execution of the projects, contractors and clients shall deeply analyze external and internal factors on shortage of materials	Preventive	Yes	Yes	
5	The sooner you're able to approve design packages and lock in prices, the better your costs (Integrate trades early, and pay them quickly)	Corrective	yes		yes
5	To transfer funds and shift them into lower cost portfolios	Corrective	yes		
5	Seek lower cost insurances	Corrective	yes		
6	Contractors shall observe ACI, IBC, ASTM rules and references during agreements and signing of contracts	Preventive		Yes	Yes
7	Parties shall have contingency plans for the unexpected events	Preventive	Yes	Yes	
7	Contractors Union shall have influence on government in case if any changes occur in Laws and Regulations (the changes shall not impact ongoing projects)	Corrective	Yes		
8	The contract shall be realistic from time, material and payment perspective	Preventive		Yes	
9	Realistic prove of quantity of equipment which are required by contractor	Preventive		Yes	

	Contractors shall either hire professional technicians or seek		
9	The client is better to evaluate the bid documents whether the lower prices are realistic for execution of	Preventive	Yes
10	the activities	Preventive	Yes

Source: Authors Compilation

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## About the Author

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**Mr. Muhammad Atif Ludin**, Alumni MBA, and Member Research Society Kardan University, Kabul Afghanistan. <ludin20@gmail.com>

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