

INVESTIGATION AND ANALYSIS OF POOR PLANNING DURING CONSTRUCTION PROJECTS

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ABSTRACT

This paper investigates the impact of poor planning and management on the duration of construction projects. The objective of this study was to identify the cause of delay in construction projects in Afghanistan and the analysis of the poor planning and managing of the Construction of Medical Laboratory in Herat, Afghanistan. Literature analysis discloses that poor project planning and management is cited by several researchers as a delay factor in the construction projects. The researcher concludes that poor planning and management of the construction projects may lead to several negative effects on the duration and completion of projects. A large number of construction projects in Afghanistan are facing delays during the implementation. Project delay negatively affects the prestige and dignity and causes failures and weaknesses of the projects that create distance between the people and the government and shows the incapacity of the Government in the implementation of the projects. Several similar studies from developing countries have been reviewed and a survey has been conducted for data collection from the different public organizations of Afghanistan. The significant causes of delay in the construction project in Afghanistan are; ineffective planning and scheduling of a project by the contractor, delay in progress payments by a client, poor site management and supervision of contractors by consultant and client, financial difficulties by contractor, insufficient controlling and monitoring by consultant and client, non-availability of the experienced technical staff of contractor, late in reviewing and approving design documents by a client, lack of communication and coordination between the parties, delay in delivery of materials to the site, political influences, and warlords intervention.

The method that has been used in this project to explain and solve the problems during schedule planning is to Earn Value Analysis with Primavera P6. Which this method presents a different baseline for any projects and it will show that if the project has not conducted insufficient time and budget, that's why it suggested for every construction project to be implemented by the same method.

Keywords: Construction Delay Analysis, Poor Planning, Earn Value Analysis, construction management, Afghanistan, primavera p6

I. INTRODUCTION

Construction Projects in Afghanistan

Entire infrastructure in Afghanistan has been destroyed during four decades of war, however, people have been deprived of every single basic need like water sanitation, education, health, etc. Upon collapsing the government of Taliban in 2001, Afghanistan was considered to the attention of world community by two subjects, first, the commitment of the world community and the United States of America for abolishing the insurgencies from Afghanistan and second profound engagement for developing and improving the infrastructures in various sectors of Afghanistan.

For this purpose, all the donors tried to help Afghanistan get out of crises and wars as well as helped to construct the development projects for enhancing the quality of the living, but unfortunately, majority of the projects were failed due to the very clear and hidden challenges especially budget plans all-around two previous decades. This failure has negatively affected all the sectors and prohibited the improvement of the government as putting negative effects on donors' contributions for the mentioned purposes (Afridi, 2016). Undoubtedly Afghanistan has been dependent on the donors' aids soon after collapsing the Taliban regime, but these aids were not well managed and the majority of the projects have been failed for this reason and many other profound factors like corruption, insecurity, poor qualification of the contractors' technical staff, payment delays by clients. Thus, the implementation of the projects is the responsibility of the government authorities (Gamil & Rahman, 2017).

Mainly two types of budgets are being launched in Afghanistan, Development budget which is using the governmental budget for the sake of all development projects around the country and the second is the operational budget which is adopted for the expenditures of the government and officials' salaries, etc.

Project Management

Achieving the objectives through a set of knowledge, skills, tools, and techniques is called the function of project management while this process is managing the project from the very beginning till the end (Wei, 2010). These activities and processes are in purpose of a specific outcome in some considered specific criteria like having a scope, budget cost, and satisfactory quality. However, a successful project will be completed on time within the budget cost and with satisfying quality. Thus, a project should have turned to its life cycle which is a chain of activities that a project passes through from the beginning until the end of a project started (Wei, 2010) with the Initiation phase as foundation

stage of a project continues by project planning is a manual for achieving the objectives of the project, and it generally provides a chart that the project team can refer to during execution. Following the next stage as the implementation phase of a project which is the core part of a project that mainly provides the deliverables. After that it is followed by monitoring and evaluation, which is during the project implementation, lots of things could happen unexpectedly, therefore, the monitoring and controlling phase, a tool to look for any sort of mismanagement is required to correct any mistakes during the implementation of a project. (Dinakar, 2014). The final stage is considered to be the deliverables as prepared based on the specifications and the project that are ready to be closed.

II. METHODOLOGY

This research is based on a mixed research method, in which the researcher tends to mix both quantitative and qualitative research methods. While mixing both methods the researcher gains in breadth and depth of understanding, which helped the writer of this study in identifying the relationship between the poor planning and management of the project and the occurrence of delays in the construction projects. The case study of the project is focusing on the Construction of Medical Laboratory in Herat, Afghanistan.

Project Management Challenges In Afghanistan

Afghanistan is a country that has remained dependent on donors' aids, and since 2001 more than 100 \$Billion has been spent for development purposes in the country, but the projects faced many problems mainly in logistics, Security, and Capacity sections (David, 2010). Afghanistan has many insecure areas in almost every province and the security is a huge expense to the budget, causes about 5 to 15 percent of the whole project cost. Same with logistic issues, corruption in government and bad relationships with the neighboring government made a lot of problems over the border and sometimes with project contractors over lack of materials quality. Another thing that for many years projects struggled with is Capacity, mainly because of lack of capacity in design, finding skilled workers and managers. There are several capacity development programs held by the international community to help address these issues. However, the construction industry needs much more time and more capacity building programs to strengthen the construction firms for better and effective service delivery (David, 2010).

Some more factors are preventing these projects from development such as low project monitoring, three to four hand projects by subcontractors which led to fewer and fewer budget. In the past 10 years, internal and external non-governmental organizations (NGOs) were the biggest project implementers in the country. All the government organizations implemented the development projects through these NGOs (ADB, 2010). Hiring non-Afghan contractors rather than training the officials is also another major problem, lack of coordination between the public organizations and private sectors, lack of information, and many more (Sadeqi, 2014). These factors are not only on Afghan's side but there are some external factors too such as

Miscommunication between donors and Afghanistan's government, making contracts with foreign companies, preventing the government from monitoring, allowing too many subcontractors, lack of expenditure reports on project implementation by donor countries to Afghanistan's public sector. The donor makes a contract with a company outside the country, then the project goes to the second and third subcontracts which cause the quality to decrease and many more factors (Afridi, 2016).

A large number of construction projects in Afghanistan have experienced delays. This major problem forced donor countries to send some inspectors to Afghanistan, such as the World Bank, Asian Development Bank (ADB), and on top of that Special Inspector General for Afghanistan's Reconstruction (SIGAR). Their research shows many reasons for these delays, for example, a SIGAR research in 2010 indicated several factors contributing to project delay in a joint regional Afghanistan national security forces compound (JRAC), 4 projects including regional logistic center (RLC), Afghanistan national civil order police (ANCOP), uniformed police (UP), border police (BP). Projects started in 2008, so table 1 describes the project's original completion date based on the contract and actual project completion date, (Alamouti, 2017; Ibrahimi & Maley, 2019) (SIGAR, 2009).

Table 1. JRAC 4 projects completion date based on the contract and actual completion date

Project Name	Original date	Actual date
RLC	Sep 3, 2007	Oct 22, 2009
ANCOP	Nov 16, 2009	June 30, 2010
UP	Aug 16, 2009	Mar 28, 2010
BP	July 29, 2009	Ju 15, 2010

The main reasons for the delays in these projects and many similar projects that faced long term delays are listed below (World Bank, 2012):

- ✓ Insufficient funding
- ✓ Inadequate electricity
- ✓ Scope modification and changes during construction of the project
- ✓ Slow mobilization of equipment and resources by the contractors
- ✓ The design change of vertical alignment in mountainous areas
- ✓ The Afghan presidential election in 2009
- ✓ Numerous security incidents
- ✓ Security issues

Types of project delays

Rafieizonooz (2012) carried out a study that there are four basic ways to classify the type of delay:

- ✓ Critical or noncritical
- ✓ Excusable or non-excusable
- ✓ Compensable or non-compensable
- ✓ Concurrent or non-concurrent

A critical delay is an event that causes the delay to the completion of the work project within a stipulated period, and non-critical delays vice versa.

Excusable Delays are delays that are unforeseeable and beyond the control of the contractor and Non-Excusable Delays vice versa. The difference between these two is significant in that it determines which party is liable for the delay.

Compensable delays are caused by the owner. An example of this would be the late release of drawings from the owner's architect. Non-compensable delays mean that although an excusable delay may have occurred, the contractor is not entitled to any added compensation resulting from the excusable delay(Dinakar, 2014; Wei, 2010).

The concurrent delay happens when two or more delays resulting from independent causes overlap during the same period.

Case Study: Construction of Medical Laboratory
 Laboratory project for quality of medicine and healthy production in Herat of Afghanistan was built to control the quality of spices, health products, and food. This quality laboratory was built on a 1250 square meter area with three stories (MUDL, 2020). The building was built by the Ministry of Urban Development with the high standards of engineering and facilities required to cost more than 117 million Afghanis (1,600,000 USD) with the original duration of 411 workdays. The project details and architectural plan and the actual plan of the project shown in figure 1 and table 2.



Figure 1:- Architecture And Actual Plan

Project	Description
Project Code	MUDH/125/2018
Contractor Company	Herai Alpha Construction Company
Contract Start Date	31/Jan/2018
Contract Finish Date	25/July/2019
Location	Next to Herat airport, at

Table 2. Laboratory project details

	Industrial Park of Herat
Coordinates	34.2007312271744N, 62.211794927716255E
Altitude	963.0m

Explanations And Reasons For Stopping The Project- Based on the Contract

- ✓ Clause number 1064/681 from the ministry of urban planning and housing, from the date of 31/January/2018 to date 12/February/2018 had been changed, and working on the project has 12 days of the delay (MUDL, 2020).
- ✓ Due to lack of land in Herat city and postpone conquering the area to the construction company in the industrial area of the Herat the project had 96 days more delay and started on 19/May/2018(MUDL, 2020).

According to details that have mentioned above scheduling with Primavera has not begun. After delivering land to the construction company the project management with Primavera for the operation of the project has been started. As it is shown in figure 2 the WBS (work break down structure), starting and the finishing date of each activity, durations, total float, and the relationship between each activity of the Medical Laboratory project In Herat, have been scheduled with Primavera P6.

To prevent the repetition and the large number of project activities, no need to write each of them in the following. The project's WBS includes the Preliminary & General, 1st story, 2nd Story, 3rd Story, Septic Tank, Fire Alarm & Firefighting system, Water Well, Miscellaneous Works, De-Mobilization.

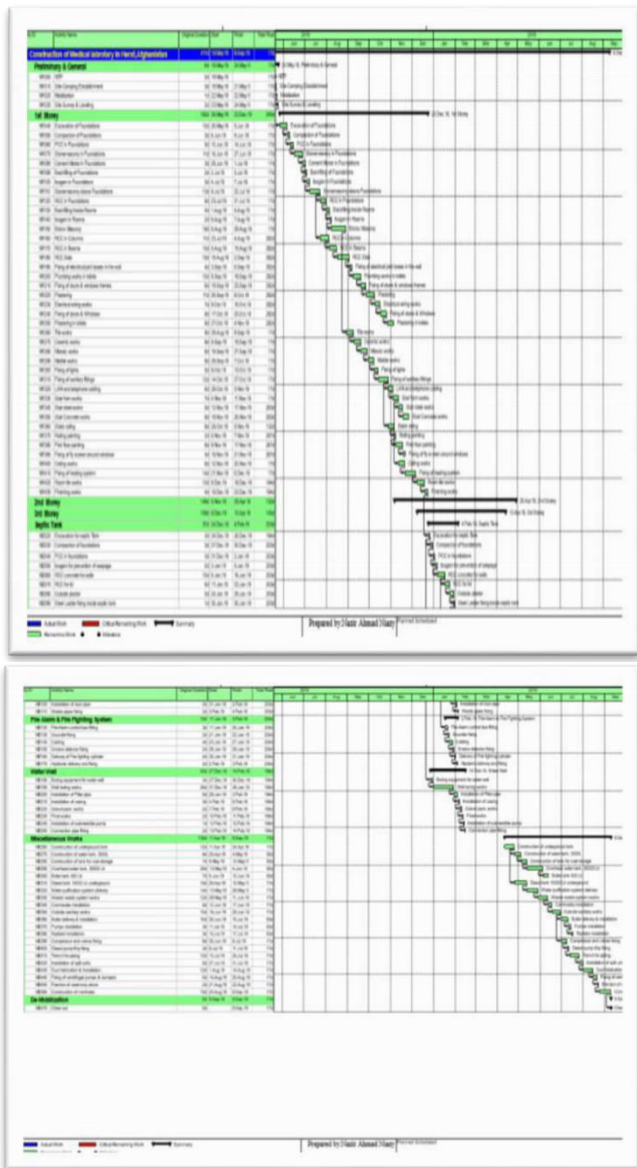


Figure 2: Project WBS, start and finish date of each activity, Durations

Earn Value Analysis of Construction of Medical Laboratory InHerat, Afghanistan Using Primavera P6

Analyzing of this project have been used by Earn Value Analysis. Most of the construction project suffers from cost and time overruns due to multiple factors (Nalawade, Ghode, & Vaidya, 2019; Nimal&Jamadar, 2017). Earn value analysis (EVM) gives an early indication that either project is on a delay or over budget at any particular day by tracking it. So it concludes that primavera p6 is the best tool to Earn value analysis in the construction industry (Ghasemzadeh, 2014; Nalawade et al., 2019).

Earned Value Key Parameter:

- ✓ **Planned Value (PV):-** This is the cost that we planned to spend on the various activities of the construction project.
Planned value = % Planned work finished * (BAC)
Budgeted cost at completion
- ✓ **Earned Value (EV):-** This is the cost that shows the worth of the work done as spent the money in the construction project.

- ✓ **Actual Cost (AC):-** This is the cost incurred in performing various activities of the construction project.
Actual cost = Hourly Rate * Total hour spent
- ✓ **Cost Variance (CV):** The distinction between earn value and actual cost.
Cost variance = Earn Value – Actual Cost
If the cost variance is positive the project is underrun from planned value.
- ✓ **Schedule Variance (SV):** The distinction between earn value and planned value.
Schedule variance = Earn Value – Plan Value.
If the schedule variance is positive the project is ahead of schedule and vice versa.
- ✓ **Cost Performance Index (CPI):-** This is the ratio of the worth of work done to actual cost accomplished in doing an endeavor.
Cost performance index = Earn Value / Actual Cost.
If the CPI ratio is below one it shows the activities are consuming more cost to finish the work and vice versa.
- ✓ **Schedule Performance Index (SPI):-** This is the ratio of the worth of the work done to planned value
Schedule performance index = Earn Value / Plan Value
If the SPI ratio is below one it shows the activities are consuming more time to finish the work.

Following step by step of the procedure is required.

A: Creating a New Project

The project is created under the respective division in the enterprise project structure. The project should assign the calendar which can be global, resource, calendars. Steps to assign the Construction of the medical laboratory project in the Herat.

1. log in to primavera
2. Click the add button and select EPS
3. Project id and project name
4. Planned start and must finish by date for the project
5. Open project

B: Define the Work Break Down Structure

A work breakdown structure (WBS) in project management and systems engineering, is a deliverable-oriented take a part of a project into smaller sections.

C: Creating a Calendar for Activity and Resource

For creating the calendar go to enterprise in the toolbar and select calendar then global calendar, project calendar, and resource calendar. Select calendar if we want to change the working day like introduce Special Day (Eid) change in working hours, then select the modified option.

D. Define Activity

To create the activity in the project select activity option in the directory button. Then, the press adds the activity in the command bar.

E: Define Activity Duration

when planning the work duration is the entering original duration field.

F: The Relation Between the Activities

This is done by assigning predecessor, successor, and Lag with a significant relationship with the activity.

G. Performance Schedule

All activity must be scheduled according to the relationship between various activities by pressing the F9 button.

H. Allocating Resources

The resource is attached to activity for completion of the activity.

I. Creating a Baseline

Analyzing on this project have done after 90% of its work, Baseline is a standard benchmark based on the standard performance of the project. To create a baseline select the project option in the activity toolbar and then select the baseline after creating baseline assign(Rafieizonooz, 2012).

J. Updating Schedule

After assigning a baseline again made a schedule to update the project baseline to project for analysis.

K. Earn Value Analysis

Earn Value analysis is a venture execution evaluation methodology. EVA is the way towards measuring the venture struggle with a pattern task(Nimbal&Jamadar, 2017). Earned esteem investigation application help in giving standard to the assessment of comparatively go about as a control time and cost arrange.

After calculate and compare as a planned schedule with actual work schedule We came to the following conclusion.

III. CONCLUSION

Finally, it will be stated that the Construction of Medical Laboratory project which is studied above is located in Herat, Afghanistan. This project after earn value analysis by utilizing Primavera P6. The start of the project as it was planned on (19, May 2018) and the budget was determined 117 million Afghanis. Earn value analysis is about controlling and managing the time and budget of the project. Procedures of the earned value analysis are reliable calculated according to standard formulas which are named as, Planned Value, Earned Value, Actual Cost, Cost Variance, Schedule Variance, Cost Performance Index, and Schedule Performance Index. The bill of quantities (BQ), scheduling of the project, bill of resource, architectural maps, which was collected from the respective Ministry of Urban Planning, were analyzed by primavera P6 after the analysis of the data was analyzed in earn value analysis. As the result is stated in table 3.

Based on the negative cost variance of the project it hadn't done as it was planned. The schedule variance is negative so, the project is running behind the schedule. The CPI ratio is less than one it shows the activities are consuming more cost to finish the work. The SPI ratio is less than one it shows the activities are consuming more time to finish the work. The results show that the project is not finished on time as it was planned so the budget of the project was not sufficient as it was planned budget.

Table 3: Analysis Data of the Project to Earn Value Analysis

Tracking date	19.may.2018
Original duration	411workdays
Budgeted total cost	117 million Afghanis
Plan value	$90\% \times 117 \text{million Afghanis} = 105.3 \text{million Afghanis}$
Earn value	$90\% \times 113.5 \text{ MA} = 102.15 \text{ million Afghanis}$
Actual cost	113.5million Afghanis
Schedule variance	Earn Value – Plan Value $102.5 - 105.3 = -3.15 \text{ million Afghanis}$
Cost variance	Earn Value – Actual Cost $102.15 - 113.5 = -11.35 \text{ MA}$
Schedule performance index	$102.15 / 105.3 = 0.97 \text{ MA}$
Cost performance index	$102.15 / 113.5 = 0.9 \text{ MA}$

The reasons that cause the delay of the project are:

- ✓ There was no land to implement the project so, the date was delayed from 12/February/2018 to 19, May 2018.
- ✓ The second reason for the delay was not having access to the map because the Ministry of Urban was not giving the map to the contractor from 10.July 2018 to 12, July.2018.
- ✓ The third reason was the weather conditions, the project was under construction but the work was stopped two times by the Ministry of urban observers, for the first time from 12, January 2019 to 15, January 2019 and for the second time from 30, January 2019 to 10, February 2019.
- ✓ Due to the rains, the project was stopped by the supervisor from 29, March 2019 to 13, April 2019.
- ✓ Not being ready actual steps at the site area to take action in the whole project and also not having permission from the respective ministry to start the work like bricklaying and many more reasons at site area from 16, April 2019 to 08, June 2019.
- ✓ Due to the many changes in the bell of quantities and structure plans and many other problems, the project stopped 180 days.
- ✓ Recent epidemic (COVID-19) had a negative effect on the operation like providing the HVAC and VRF system by the Chines Company which was responsible to provide the project stopped from 10.december, 2019 to 17, January 2020.

Providing reasons and details about the function of the project has brought this conclusion to the table that there wasn't cooperation and arrangement between the respective parties. Considering all aspects with the practical ways and using the correct project management tools like Primavera p6 application and other helpful necessary tools that have a positive effect on having run the project until it reaches the end goals.

EVA Parameter	Tracking
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