

Investigating causes of delay in construction projects and presenting a solution (Case study of northwest projects of Iran)

Houshang Khalafizadeh^{1*}, Ramin Tabatabaei Mirhosseini², Omid Tayari²

¹ M. Sc. Student, Construction Engineering and Management Department, Islamic Azad University Science and Research, Kerman branch, Kerman, Iran.

² Assistant Professor, Civil Engineering Department, Islamic Azad University, Kerman Branch, Kerman – Iran.

*Corresponding author: Houshang Khalafizadeh

Abstract: The objective of this study was to investigate causes of delay in construction projects of northwest of Iran. Construction projects play a major role in economic and social development of a society. In Iran, enormous budgets are annually allocated to construction projects; however, most of them face delay during the execution. In this study, after studying and investigating some of water and soil projects in Ardebil Province, qualitative and quantitative causes of delay in the projects were evaluated. During this study, qualitative and quantitative factors related to regulations, employers, consultants and contractors were investigated. After analyzing these factors, it was determined that factors related to employer had the most fundamental role in execution delay of Emarat dam construction project. Factors relating to executor were also major causes of construction delay in project of covering leaking points of main canal and canal A in Dasht-e Moghan. The most important qualitative causes affecting both projects included credit deficiency and lack of allocating and approving the required credit at appropriate time. By identifying causes of project delay, suitable solutions can be adopted and duration of project construction can be shortened. Also, by correct time employment, various resources can be optimally exploited during execution of projects.

[Houshang Khalafizadeh, Ramin Tabatabaei Mirhosseini, Omid Tayari. **Investigating causes of delay in construction projects and presenting a solution (Case study of northwest projects of Iran)**. *N Y Sci J* 2014;7(10):43-47]. (ISSN: 1554-0200). <http://www.sciencepub.net/newyork>. 9

Keywords: Project management, Project scheduling, delays, causes of delay, water projects.

Introduction

Effect and role of construction projects in economic and social development of societies are an obvious matter. In Iran, enormous budgets are annually allocated for executing construction projects and these projects are launched according to predefined schedules and costs. Timely completion of each project under its predefined costs is considered among the success criteria of the project. However, most projects face delay during the execution phase and are completed later than the predefined schedule so that 90% of construction projects in Iran encounter cost-time increase. Also, based on the report of International Bank, 30 or 40% of construction projects in all countries experience cost-time increase. Delay in completion and operation of each project entails the following losses: 1. cost of delay in operation or lost revenue, 2. cost due to increased price of consumable resources, 3. increase in cost of work resources, 4. problems related to extension of permits and contracts, 5. cost of interest of the spent capital, 6. loss due to losing the competition market, 7. losing employment opportunities, etc. Delay in construction projects is a global problem and, due to allocation of enormous budget, this issue has been discussed and studied in all countries of the world. Therefore, researchers all

around the world have studied and investigated this issue.

In Saudi Arabia, 70% of projects have delay [1]. In Nigeria, less than 30% of projects are completed on time [2]. According to the studies done in Jordan, delay in construction projects mainly result from weakness of designers, changes imposed by owners, climate, land conditions, delay in completion and financial status [3]. In Hong Kong also, most projects have delays [4]. The most important causes of delay in construction projects in Lebanon have been identified as contractual relations and project management from viewpoints of contractors and consultants, respectively. Employers also believe that financial issues are the main cause of delay [5]. In Nigerian construction projects, deficiency of credit, changes in environmental conditions, shortage of materials and incorrect planning have been identified as the most important causes of delay [6].

Causes of delay and loss of capital in submarine projects in Ghana were investigated in [7], in which presenting statement by employers, weak management of contractors, supply of materials, weakness in technical execution and increase in cost of materials were identified as main causes of delay. Moreover, major causes of delay in project of Iranian airports network were determined as defect in studies, inefficiency in technical services, weakness of

contractor, rush in selection of contractor and lack of correct estimation of financial resources [8]. According to national research in Iran, main causes of delay of dam projects in Khorasan Province were specified as lack of sufficient knowledge about project control, lack of timely and appropriate notice about allocation with approved credits, imbalance between rates of adjustment and inflation, lack of supplying financial resources and inaccuracy in estimating workload of operations and time of project [9].

In this study, a number of major projects of Ardebil Regional Water Company in northwest of Iran such as Emarat dam, and Moghan irrigation network were studied and analyzed. Also, a comparison was made between governmental and private contractors in terms of project execution and their effect on delay rate of projects was investigated.

Materials and methods

In terms of objective, this research was among applied studies and the aim was to investigate causes of delay in construction projects. Research method of this study was a mixed method; i.e. both qualitative and quantitative methods were used. In the first stage, qualitative research method was used in order to identify the issues in a heuristic manner. Then, quantitative method was applied to generalize results of the qualitative stage. Type of research method was descriptive and a questionnaire was used for data collection. Thus, descriptive analysis, descriptive statistics, measures of central tendency such as mean, mode and median and measures of dispersion such as range, standard deviation and variance were used to describe a variable. Also, correlation equations were applied to demonstrate type of relationship between two variables in a population or group.

Since complete knowledge and information about regulations and rules are required for qualitative and quantitative evaluation of a project, in the first step, these regulations and rules were precisely studied. Then, some qualitative and quantitative indices were defined for them. After completing the project information, in the second step, the contractor, consultant and employer were directly interviewed in order to study and collect viewpoints of the involved people. Questionnaires of different parts were prepared and distributed; these questionnaires contained qualitative and quantitative questions which covered main goals of the study. After collecting different viewpoints, the data were analyzed using SPSS software. Statistical population included individuals and members of Ardebil Regional Water Company, who were involved in executing projects of Emarat dam, irrigation network and Dasht-e Moghan drainage, along with consultants and contractors of the mentioned projects.

Results

During this study, the contractor, consultant and employer expressed their ideas and viewpoints about causes of delay in these projects and, for each project, the questions were classified into two qualitative and quantitative parts. These people separately answered each part.

Quantitative and qualitative causes of increase in duration of Emarat dam construction project

Causes relating to rules and regulations

1. Limitations in regulations of selecting the best contractor (based on less price at time of tender).
2. Limited authority of employer in selecting the best consultant in a single-choice way.
3. Low adjustment indices with respect to increase in execution costs (inflation).

Causes relating to employer

1. Budget deficiency (lack of allocation and approval of the required credit at suitable time).
2. Rush in preparation of tender documents despite insufficiency of studies in phase2.
3. Lack of removing physical obstacles1 of the project at suitable time (existence of obstacles on left coast of the river at construction site, equipment location of new site, batching location, Farazband lake, access roads, etc).
4. High level of bureaucracy in employment system and elongation of response time (correspondence with management of Iran water resources in terms of selecting consultant for studies of overflow hydraulic model, tri-axial tests).
5. Lack of the required follow-up and management by project executor (holding site meetings, managing and steering the project, etc).
6. Insufficient number of personnel of the employer team.

Causes relating to consultant

1. Weakness of consulting management (project director) in steering construction operations.
2. Weakness of resident supervising consultant head in management and steering.
3. Incomplete maps attached to the contract at the time of contract conclusion.
4. Technical weakness consultant

Causes relating to contractor

1. Incapability of contractor project director (weakness in management of drilling and injection contractor and site managers and weakness in coordination and transfer of issues to central office).
2. Weakness of site head and executive manager (inefficiency in management of drilling and injection contractor and executive personnel and weak contact with central office).

3. Lack of experienced personnel of technical office (weakness in preparing site maps, minutes of meetings and coordination with supervision office) Financial weakness of contractor.

4. Contractor's financial weakness

5. Lack of project control system and compliance with schedule in the contractor system and delay in presenting the schedule.

6. Incomplete and improper equipment of site according to the project schedule (imbalance between execution capability and schedule due to insufficient drilling machinery, experimental injection, sand and gravel production and heavy machinery in execution parts).

7. Insufficient consumable materials (cement, stone materials, base materials for access road, ...).

8. Insufficiency of experienced workforce.

Others (climate)

1. Undesirable climate (rainfall, cold and hot weather, etc).

2. Disastrous events like flood.

Quantitative and qualitative causes of increase in construction duration of covering leaking points of main canal and canal A in Dasht-e Moghan

Causes relating to rules and regulations

1. Limited period of project agreement and consequently allocating limited and improper time with respect to the project workload.

2. Limitations of regulations in selecting the best contractor.

Causes relating to employer

1. Credit deficiency (not allocating the required credit at suitable time).

2. Rush in completing phase 2 studies and preparing tender documents in spite of insufficient studies.

3. Lack of removal of physical obstacles at suitable time.

4. Inefficiency of employer's technical office in approving maps and studies.

5. Inefficiency of the executor representative in making coordination between consultant engineers and employer and timely resolution of technical and executive problems.

6. Displacement of representatives of the project executor.

7. Changes in maps and construction method during the operation.

Causes relating to consultant

1. Rush in completing studies of phases 1 and 2 and consequently not determining a specific construction method prior to beginning the operation.

2. Incorrect time estimation (short contract time).

3. Incomplete geotechnical studies of the main canal before starting executive operations.

4. Incompleteness of attached maps to contract at time of contract conclusion.

5. Lack of timely declaration of executive agenda.

6. Weakness in design of consultant and consequently modification of maps after beginning executive operations.

7. Confirming unrealistic time schedule (impractical schedules).

8. Delay in response by consultant to technical and executive questions of contractor.

9. Weakness of consultant project director in making coordination between resident supervision team and higher monitoring supervision and also timely resolution of technical and executive problems at the site.

10. Inaccurate estimation of volumes

Causes relating to contractor

1. Weakness of site head and executive manager.

2. Offering low price to win the tender and thus financial problems during the execution.

3. Financial problems of contractor.

4. Formulating improper and inconsistent schedule with the execution potential including existence of many parallel activities in the schedule.

5. Depreciation of the machinery and weakness of management of the machinery.

6. Incomplete and improper equipment of site according to project schedule (imbalance of executive capacity and schedule).

7. Inefficiency of technical office in preparing executive maps and minutes of meetings.

8. Absence of project control unit in contractor system and lack of compliance with schedule.

9. Lack of workforce.

10. Insufficiency of consumable materials.

Others (climate, etc.)

1. Undesirable climate (rainfall, etc).

2. Disastrous events such as flood.

After analyzing the qualitative results using SPSS software, the results were classified into different areas, as presented in Tables 1 and 2:

Priority of quantitative causes of increase in duration of Emarat dam construction project was as follows:

First priority: Budget deficiency (lack of allocation and approval of the required credit at suitable time).

Second priority: Lack of removal of physical obstacles at suitable time (existence of physical obstacles on left coast of the river at construction site, equipment location of new site, batching location, Farazband lake, access roads etc.).

Third priority: Financial problems of contractor.

Fourth priority: Weakness of site head and executive manager.

Fifth priority: Disastrous events like flood..

Sixth priority: Insufficient workforce.

Priority of quantitative causes of increase in project execution period of covering leaking points in main canal and canal A in Dasht-e Moghan

First priority: Budget deficiency (lack of allocation and approval of the required credit at suitable time).

Second priority: Limited period of project agreement and consequently limited and un proportionate time allocation with project workload.

Third priority: Weakness of site head and executive manager.

Fourth priority: Offering low price to win tender which leads to financial problems during operation.

Fifth priority: Rush in completing phase 2 studies and preparing tender documents despite insufficiency of studies.

Sixth priority: Changes in maps and construction method during the operations.

Table 1. Quantitative results of increase in duration of Emarat dam construction project in percent

	Average of employer's opinion	Average of consultant's opinion	Average of contractor's opinion	Average of opinions
Causes relating to rules and regulations	7.63	12.35	5	8.29
Causes relating to employer	53.5	41.25	51.25	48.66
Causes relating to consultant	11.5	7.75	12.5	10.58
Causes relating to contractor	25	35.25	21.25	27.16
Others	3.38	3.5	10	5.36

Table 2. Quantitative results of increase in project construction duration of covering leaking points in main canal and canal A in Dasht-e Moghan in percent

	Average of employer's opinion	Average of consultant's opinion	Average of contractor's opinion	Average of opinions
Causes relating to rules and regulations	8.4	8.65	8	8.35
Causes relating to employer	30.6	26.42	29.54	28.83
Causes relating to consultant	24.24	22.44	31.47	26.06
Causes relating to contractor	32.81	34.52	24.54	30.58
Others	108	7.22	6.5	5.17

Priority of qualitative causes of increase in duration of Emarat dam construction project was as follows:

First priority: Credit deficiency (lack of approval and allocation of the required credit at suitable time).

Second priority: Lack of resolution of physical obstacles (existence of physical obstacle on left coast of the river at construction site, equipment location of new site, batching location, Farazband lake, access roads, etc.).

Third priority: Financial weakness of contractor.

Fourth priority: Insufficient workforce.

Fifth priority: Weakness of site head and executive manager (weakness in management of

drilling and injection contractor and executive personnel and weak contact with central office).

Sixth priority: Offering low price to win tender and consequently causing financial problems during execution.

Priority of qualitative causes of increase in project execution duration of covering leaking point in main canal and canal A in Dasht-e Moghan was as follows:

First priority: Credit deficiency (not allocating the required credit at suitable time).

Second priority: Limited period of project agreement and thus limited and unproportionate time with respect to project workload.

Third priority: Rush in completing phase 2 studies and preparing tender documents in spite of insufficient studies.

Fourth priority: Weakness of site head and executive manager.

Fifth priority: Changes in maps and executive method during execution.

Sixth priority: Changes in maps and construction method during the operations.

Conclusion

In this study, after investigating two projects in Ardebil Province located in northwest of Iran and using methods including interview and questionnaire, various factors were identified and classified into qualitative and quantitative groups and the following results were extracted after the analysis:

1. Employer-related factors played a major role in delay of Emarat dam construction project.
2. Contractor-related factors played a major role in project delay of covering leaking points in main canal and canal A in Dasht-e Moghan.
3. In both projects, the most important qualitative and quantitative causes were credit deficiency and lack of approval and allocation of the required credit at suitable time.
4. Contractor management weaknesses in both projects the increase in runtime is important.
5. By identifying delay causes, efficient solutions can be adopted and execution period can be reduced.
6. Proper use of time parameter could lead to optimal exploitation of various resources during the execution.

References

1. Assaf, Sadi A., Al-Hejji, Sadiq (2006), Causes of delay in large construction projects, *International journal of project management*, 24, pp349-357.
2. Odeyinka HA, Yusuf A, (1997), The causes and effects of construction delays on completion cost of housing project in Nigeria. *J Financial manage property construction* 2(3), pp31-44.
3. Ayman H. Al-Momani, (2000), Construction delay; a quantitative analysis, *international journal of project management* 18(1), pp51-59.
4. Chan DWM, kumaraswamy MM. (2002), Compressing construction duration: lessons learned from Hong Kong building projects. *Int journal of project management* 20(1), pp23-35.
5. Mezher TM, Tawil W. (1998), Causes of delays in the construction industry in Lebanon. *Engineering Construction and Architectural Management Journal* 5(3), pp252-263.
6. Mansfield NR, Ugwu OO, Doran T. (1994), Causes of delay and cost overruns in Nigerian construction projects. *International Journal of project management* 12(4), pp254-260.
7. Frimpong, Yaw, Oluwoye, Jacob, Crawford, Lynn, (2003), Causes of delay and cost overruns in construction of groundwater projects in a developing countries, *international journal of project management* 21(5), pp321-326.
8. Ghotbi, Zohreh (2001), Investigating causes of delay of construction projects of Iranian airports networks, M.Sc.
9. Azad Fahmi, Hossein (2002), Investigating causes of delay and consequences resulting from lack of timely completion of dams in Khorasan Province, M.Sc. thesis in executive management, Education and Research Institute, Ministry of Energy.

10/11/2014