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Studying the delay reasons of the civil projects (Case study: Dam construction Industry of Kermanshah Province)

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ABSTRACT

Whereas any delay in the civil projects result in the consumption of the state resources, decrease of profit, and loss of the opportunities, recognition of the delay factors will be of fundamental importance. In this study, after studying some of the dam-making projects of Kermanshah Province, 9 factors were introduced as the principal factors as follows with the respective priority and effectiveness:

1- Lack of suitable financing
2- Difficulties concerning ownership of lands
3- Postponed payments due to contractors
4- Lack of enough skill and experience in some of the contractors and week management practiced by them
5- Lack of efficient human force
6- Lack of materials
7- Lack of machinery
8- Inconsideration of the project shortfalls by the Client
9- Economic status and raised prices.

Introduction

One of the prominent difficulties concerning the execution of project is delayed execution of them (Mr. Dibaee, 2005). Generally, every action or incident prolonging the scheduling of a contract is called delay. Delay in the civil projects result in the consumption of state resources, reduction of profit, and waste of opportunities. For this reason, most of the developed and developing countries of the world are about to find the origin(s) of such delays in order to mitigate the delays of the future projects making use of them (Pahlavani & Zarei, 2005). In the dam-making projects, whereas establishment of dams play a great role in the economic development and prosperity due to controlling waters, they are of a remarkable importance. Moreover, parameters such as population growth, upgraded level of health, limitation of the sweat water resources, exceeding collection of underground waters and invasion of the infestation of the saline water all intensify the necessity of establishing dams (Hassanzadeh, 2007). In this article, 4 cases of the dam-making projects of Kermanshah Province and their delays were investigated.

The executive environment of projects is very complex and dynamic and such environment distinguishes the management of projects from the other non-project organizations. In every project, different factors cause the emergence of delays and identification of such factors in every project is done with the purpose to reach special objectives (Pahlavani & Zarei, 2005). Importance of controlling the surface waters, emergency of directive utilization of the wasted waters and agricultural development in dam-making projects have prioritized establishment of dams and avoiding the delays concerning utilization in civil projects (Hassanzadeh, 2007).

Dam industry in Iran returns to 2000 years ago and Iranians have a long record in this field (Bitaraf, 2007). During the history, different factors such as the interest for development and improvement of the occupied lands and erection of the protection walls against the invasion of enemies resulted in the establishment of many dams and walls. Study and designing of the big reservoir dams commenced as of 1948 and it found a practical nature as of the ending of 1951. After the Islamic Revolution of Iran, the state dam industry entered a new stage and government assumed reaching self-sufficiency in this field as its biggest and most principal objective such that statistics of the established dams after the Islamic Revolution reached 60 from 13 dams. Owing to such evolution, currently the state dam industry has reached the self-sufficiency stage (Hassanzadeh, 2007).

Importance of identifying delays in dam industry:

Considering the increasing importance of the state dam-making industry, commencement of the executive operations in big dams requires a precise and unified planning in line with the optimized use of time, manpower, machinery, and different equipment (Pour Mokhtar, 2007). In fact, with the increase of the state civil projects and development of the competitive domains of the executive companies and presentation of the better services and through meeting the customers' satisfaction, those companies who perform quickly and better in the execution of their contractual obligations will be successful. In terms of the position and value of science, considering the indicators of project management and different factors having effect on projects, realization of the time objectives is considered as one of the success indicators of projects. Therefore, taking into account this principal, analysis of the project hesitations and the compensation, reduction and prevention style of such delays is very important. This matter concerning the mutual relations of Clients and Contractors is such that Clients are about to find the origins of such delays in

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order to be able to calculate the compensation of the damages imposed on Contractors and to establish suitable estimations concerning the volume of the additional imposed expenses. Contractors also try to reach sufficient analyses and causes for setting the damage compensation and delay claims in conformity with the content of the related contract. In this connection, project management science for paying attention to delays and reduction of its harmful impacts and for the presentation of solutions in line with its development, occupies a special position and the results of it may provide a positive reflection of the executive management of such projects (Mehraban, 2006).

Considering the fact that DELAYS in each one of projects result in the waste of the national capitals and imposition of the additional expenses on the executive units, identification of delays is of a fundamental importance and study of it will help us to avoid the attributed causes in the similar projects (Aghaee Dibaee, 2005). In dam-making projects, besides waste of waters and imposition of damages to the state agricultural and economic sections it will also result in the lack of security due to the flood risks in some regions (Journal of the Ministry of Power, 2007).

Following are the importance reasons of propounding the delay matter in dam making:

1- Water resources are of a crucial importance. Therefore, identification of delays may help us avoid the waste and disuse of this natural reserve through optimal utilization of them.

2- Dam-making projects are of principal and substructural state projects. So the precise identification of the delay causes and proper planning in line with the solution or mitigation of them will result in the omission of the main curbs in front of the due utilization of projects.

3- In most projects, prolonged delays cause projects to be left incomplete. Doubtlessly, this matter will waste remarkable financing in these projects.

4- With the prolongation of delays in the dam-making projects, efficiency and productivity of some important projects is mitigated (Sabzehpour, 2006).

5- Iran has a dry nature and it necessarily reserved water and conducted it to arid regions. The average state precipitation is 250mm and two third of it happens around Alborz and Zagros ranges (one third of the country) and only such fields are suitable for agriculture and utilization. Therefore, establishment of dams helping the control of water helps us to distribute water suitably in other arid areas.

6- Big dams are of main origins for supplying electricity required by the country and, currently, 30% of the electricity required by the country is supplied through the water dams. Considering the benefits of using the hydroelectricity compared to the thermal power plants, most of countries are about to develop the hydroelectricity section (Prof. Berka, 2007).

Research Method:

The current research is a descriptive study in which the dam-making projects of Kermanshah Province are studied. In this study, it is tried to identify main delays of these projects. For this purpose, 4 dam projects including Shian, Zagros, Azadi, and Soleimanpour reserve dams were analyzed.

The statistics universe of this study consisted of clients, consultants, and contractors throughout of Kermanshah Province and the statistical sample of this study included 15 expert individuals including 4 Clients, 5 Consultants, and 6 Contractor that each one of them had the minimum experience of 10 years in different provincial projects.

Tools for gathering information included interview, questionnaire, and SPSS Software.

Research Execution Stages and Methods:

Gathering information through workshops and technical offices of projects: considering the facts that analysis of a project needs having full information concerning all aspects of it, therefore, for the identification of the status of projects, it was tried to study the projects through studying the reports, correspondences, and statements existing at workshops as the first step in order to reach information about the prevailing delay rates and the related executive barriers.

Interview with the executive agents of the projects (Client, Contractor, and Consultant): after receiving data about the considered dam-making projects, in the next step, an interview was conducted for the precise identification and recognition of the executive agents of these projects who were closely involved in the prevailing problems and shortfalls of these projects. The interview method was semi-free such that the interview questions were prepared and assigned to those being interviewed. The included questions had been extracted through the project documents including 21 questions that they covered fully the research objectives.

Providing questionnaire: after summing up and studying comments of interviewees, the general delay cases in case of these projects were identified. Then for the determination of the main delay factors and for the prioritization of them considering the specific situations of every project, a special questionnaire was provided and distributed among the interviewees and they were required to present their own solutions besides prioritizing 20 cases of the delay reasons for every project. Alpha of the considered questionnaire was calculated making use of SPSS Software and data acquired from 15 questionnaires according to the following table:

Table- Determination of the rate of Krunbatch's Alpha:

Krunbatch's Alpha	N of cases
0.924	15

Analysis of results making use of SPSS Software: after collecting questionnaires, the acquired results were analyzed making use of SPSS Software and the Descriptive Statistics and considering the priorities introduced by those being interviewed and the principal delay factors of the dam-making projects of Kermanshah Provinces were identified and the separate related solutions were commended.

Table 2- Under study dam-making projects of Kermanshah Province:

First Project: Shian Reserve Dam		Second Project: Zagros Reserve Dam	
Name of the Project:	Shian Reserve Dam (50km of the Southwest of Kermanshah)	Name of the Project:	Zagros Reserve Dam
Site of the Project	West Eslamabad- Shian Village	Site of the Project	Kurak Bottleneck- Kurak Village- Gilane Gharb Village
Client	Regional Water of Kermanshah	Client	Regional Water Joint Stock Co. of Kermanshah
Consultant	Abdan Faraz	Consultant	Abdan Faraz Consulting Engineers
Contractors	Jahad Nasr Kermanshah	Contractors	Power Production and Civil Engineering Co.
Term of the Contract	24 months	Term of the Contract	54 Months
Conclusion date	July 19, 2004	Conclusion date	Sept. 08, 2003

Agricultural need	24 Million M^3	Agricultural need	Public Bid
Objectives of the Project	Reserving and adjusting the mirage flows of Shian Development and improvement of 3600 ha of the lands of Shian Plain Enforcement and preservation of the drainage status of the water table of Shian Plain	Objectives of the Project	Transfer of water to the agricultural lands Reserving water for the peak consumption months Avoiding the waste of the waster of Alvand Frontier River

Third Project: Azadi Reserve Dam		Second Project: Soleimanshah Reserve Dam	
Name of the Project:	Azadi Reserve Dam and the affiliated installations	Name of the Project:	Soleimanshah Reserve Dam
Site of the Project	90km of Javanrood Town	Site of the Project	Kermanshah-Songhor-Soleimanshah Village
Client	Regional Water Joint Stock Co. of Kermanshah	Client	Regional Water Joint Stock Co. of West Kermanshah
Consultant	Abdan Faraz Consulting Engineers	Consultant	Aab Niru Consulting Engineers
Contractors	Khatamolanbia Civil Station (Besat Institute)	Contractors	General Electric Co.
Conclusion date	Sept. 14, 2004	Conclusion date	March 10, 2001
Maximum height from river	56m	Type of dam	Soil or clay core
Level of spillway in the dam site	1054 km^2	Capacity of the reservoir	48 Million M^3
Objectives of the Project	Supplying the water required for the dry lands Supplying drinking water for the villages around the dam Avoiding the damage of big floods Providing the recreational facilities	Objectives of the Project	Supplying the drinking water of Songhor Town Supplying the agricultural water of Songhor Plain Creation of the recreational installations in the area

Analysis of results of the study:

In the stream of the interviews made with the executive agents, every one of them expressed his/her comments and attitudes towards the delay reasons. Considering their responses, the delay causes were classified in different points of view including those of Clients, Consultants, and Contractors in a separate fashion. Most of them pointed out similar cases. Generally, 47 delay factors were identified through 4 studied projects that followings are some of them:

1) Lack of suitable financing
2) Difficulties concerning occupying lands
3) Practice of non-technical policy in the execution of projects
4) Lack of materials such as cement, iron, etc
5) Lack of proper scheduling
6) Lack of precise studies to be carried out by the Consultant
7) Client imposing his ideas on those of consultant and contractor
8) Undue supervision fee and studies
9) Lack of specialty of some of the consultants and contractors considering the newness of some dam-making skill in Iran.
10) Deficiency of the pricelist in dam-making
11) Unsuitable weather conditions
12) Simultaneous execution of several projects by the Client
13) Lack of enough time in the studies section
14) Lack of machinery
15) Not paying serious attention to the project control debate
16) Continuous change of the executive maps
17) Lack of tracking the project deficiencies by the Client
18) Delayed payments to the contractors
19) Non-convention of the continuous sessions in workshops in line with the solution of the project difficulties
20) Lack of financing in the first executive months of the project
21) Selection of relation between the contractors and consultants
22) Illogical and non-actual adjustments
23) Unconformity of pricelist with the actual work expenses
24) Incomplete supply of the bid documents
25) Existence of some greedy contractors
26) Unsuitable rights of the governmental contractors
27) Lack of precision in the studies of Phase 1
28) Lack of specialty and enough experience in some contractors
29) Weak technology
30) Lack of expert and efficient manpower
31) Lack of equipment used in excavation and grouting
32) Lack of support of some local caretakers
33) Probable increase of the work quantities and non-calculation of the work volumes at the beginning of the project
34) Higher interest of bank loans
35) Undue statements
36) Dependence of fees to the project time
37) Economic status and raised prices
38) Lack of attention to the quality of works
39) Weak management of the contractor companies
40) Non-correspondence of fees with the efficiency of individuals
41) Lack of the project executive in some projects
42) Unsuitability of credits with the project subjects
43) Political difficulties resulting from the economic boycotts
44) Non-coordination between the executive agents
45) Non-coordination between designing and execution
46) Legal tasks of contracts
47) Existence of factors such as cultural heritage during the work execution

Classification of the delay factors:

Generally, we may classify the identified delay factors in 4 groups based on the effect and share of each one of the executive factors in the establishment of it as follows:

Factors related to the failure of the Client:

- Lack of financing
- Land occupying difficulties
- Client imposing his ideas on those of consultant and contractor
- Irrational adjustments
- Lack of precision in selecting contractor and consultant
- Lack of materials such as cement, iron, etc
- Undue supervision fee and studies
- Deficiency of the pricelist in dam-making
- Simultaneous execution of several projects by the Client
- Lack of tracking the project deficiencies by the Client
- Delayed payments to the contractors
- Lack of financing in the first executive months of the project
- Selection of relation between the contractors and consultants
- Unconformity of pricelist with the actual work expenses
- Lack of the project executive in some projects
- Unsuitability of credits with the project subjects
- Legal tasks of contracts
- Non-coordination between the executive agents

- Practice of non-technical policies in the execution of projects
- Higher interests of bank loans

Delay factors related to the consultant

- Lack of precise studies to be carried out by the Consultant
- Probable increase of the work quantities and non-calculation of the work volumes at the beginning of the project
- Lack of enough time in the studies section
- Continuous change of the executive maps
- Non-coordination between designing and execution

Delay factors related to the contractor:

- Existence of some greedy contractors
- Unsuitable rights of the governmental contractors
- Lack of specialty and enough experience in some contractors
- Lack of equipment used in excavation and grouting
- Weak management of the contractor companies

Delay factors in which all the executive agents play role:

- Lack of suitable scheduling
- Lack of specialty of some of the consultants and contractors considering the newness of some dam-making skill in Iran.
- Lack of enough time in the studies section
- Lack of machinery
- Weak technology
- Lack of expert and efficient manpower
- Undue statements
- Dependence of fees to the project time
- Economic status and raised prices
- Lack of attention to the quality of works
- Non-correspondence of fees with the efficiency of individuals
- Incomplete supply of the bid documents

Natural and unpredictable factors:

- Unsuitable weather conditions
- Lack of support of some local caretakers
- Political difficulties resulting from the economic boycotts
- Existence of factors such as cultural heritage during the work execution

Analysis of the questionnaire results:

After specifying the delay reasons and filling questionnaires, the questionnaire results were calculated with the help of SPSS Software and the respondents specified the effect rate of each one of the factors through putting the delay factors in one to twenty priority range. It also must be mentioned that factors known as the main delay factors are those allotting frequency more than 50% to themselves (Diagram 1). The acquired results are as follows: **lack of suitable financing** was known as the most important delay cause that based on table related to the frequency distribution, 15 of them were selected that 80% of the respondents stated it in the first priority, 6.7% in the 5^{th} priority, 6.7% in the 6^{th} priority, and 6.7% in the 9^{th} Priority.

Difficulties of occupying lands:

Thirteen individuals selected this option that 15.4% of the respondents stated it in the first priority, 38.5% in the 2^{nd} priority, 7.7% in the 3^{rd} priority, 7.7% in the 4^{th} priority, 7.7% in the 5^{th} priority, 7.7% in the 8^{th} priority, 7.7% in the 11^{th} priority and 7.7% in the 20^{th} priority.

Delayed payments of contractors:

Thirteen individuals selected this option that 15.4% of the respondents stated it in the 2^{nd} priority, 7.7% in the 3^{rd} priority, 7.7% in the 4^{th} priority, 7.7% in the 6^{th} priority, 7.7% in the 7^{th} priority, 7.7% in the 8^{th} priority, 7.7% in the 10^{th} priority, 7.7% in the 12^{th} priority, 15.4% in the 16^{th} priority, 7.7% in the 19^{th} priority, and 7.7% in the 20^{th} priority.

Lack of sufficient skill and experience in some of the contractors and weak management presented by them:

12 individuals selected this option that 8.3% of the respondents stated it being in the 4^{th} priority, 8.3% in the 5^{th} priority, 16.7% in the 7^{th} priority, 16.7% in the 8^{th} priority, 16.7% in the 9^{th} priority, 16.7% in the 11^{th} priority, 8.3% in the 17^{th} priority, and 8.3% in the 19^{th} priority.

Lack of efficient and expert manpower:

Ten (10) individuals selected this option that 20% of them stated it being in the 3^{rd} priority, 10% in the 4^{th} priority, 10% in the 8^{th} priority, 10% in the 9^{th} priority, 10% in the 13^{th} priority, 10% in the 15^{th}, and 10% in the 17^{th} priority.

Lack of materials:

Ten (10) individuals selected this option that 10% of them stated it being in the 2^{nd} priority, 10% in the 7^{th} priority, 10% in the 8^{th} priority, 10% in the 12^{th} priority, 10% in the 14^{th} priority, 20% in the 15^{th}, 10% in the 16^{th} priority, and 20% in the 19^{th} priority.

Lack of tracking the project deficiencies by the Client:

Ten (10) individuals selected this option that 20% of them stated it being in the 5^{th} priority, 10% in the 7^{th} priority, 20% in the 11^{th} priority, 10% in the 13^{th} priority, 10% in the 14^{th} priority, 20% in the 15^{th}, 10% in the 16^{th} priority, and 20% in the 19^{th} priority.

Lack of Machinery:

Ten (10) individuals selected this option that 10% of them stated it being in the 4^{th} priority, 10% in the 6^{th} priority, 30% in the 11^{th} priority, 10% in the 12^{th} priority, 10% in the 14^{th} priority, 10% in the 15^{th}, 10% in the 17^{th} priority, and 10% in the 20^{th} priority.

Economic status and raised prices:

Nine (9) individuals selected this option that 11.1% of them stated it being in the 3^{rd} priority, 22.2% in the 4^{th} priority, 11.1% in the 9^{th} priority, 1.1% in the 11^{th} priority, 11.1% in the 14^{th} priority, 11.1% in the 18^{th}, 11.1% in the 19^{th} priority, and 11.1% in the 20^{th} priority.

Final Resolution:

From among the above 9 recognized factors following results were achieved based on the acquired frequency percentages and their effect on delays:

Lack of the suitable financing:

With the frequency rate of 100 percent, it was recognized as the first delay factor.

Difficulties of occupying land and delay in the payments of contractors:

With the frequency rate of 86 percent, it was recognized as the second delay factor.

Lack of efficient and skilled manpower, lack of materials, Lack of tracking the project deficiencies by the Client, and lack of machinery:

With the frequency rate of 66.7percent, it was recognized as the 4^{th} delay factor.

Economic status and raised prices:

With the frequency rate of 66.7 percent, it was recognized as the 5^{th} delay factor.

Frequency Percentage

Diagram 1:

Frequency Percentage of the Delay Factors in Dam-Making Projects of Kermanshah Province

Conclusion:

In this study, studying 4 cases of the dam-making projects of Kermanshah Province and use of the tools such as interview and questionnaire, 47 factors were identified as the delay

reasons and classified accordingly. After the descriptive analysis of the achieved results with the help of SPSS Software, 9 factors with the maximum frequency rate (over 50%) were selected as the main delay factors and considering the research achievements, solutions were suggested for every one of the delay indicators with the hope that these solutions will help the managers of the projects in the desirable development and realization of the related objectives. Since the principal goal of thi s research is to try to reduce the project time, practice of solutions that can mitigate the project delays will be helpful, because the proper time management may help them to have an optimal use of the entire project resources during its execution.

Since every study is carried out in line with reaching to special objectives, with the identification of the main delay reasons, the research objectives (study of the delay factors, recognition of factors with the maximum influence, presentation of suitable solutions) are also met.

Followings are the suggested solutions:

Lack of suitable financing

Increased budget of the civil projects by the government

Assigning a reference for the economic justification of projects before their execution

Use of securities

Assigning projects to private section and use of their capitals

Land occupying difficulties:

- Solving and settling the land occupation problems before the execution of the project
- Required financing for compensating the land damages by the Planning and Management Organization before the commencement of any executive operation.
- Assigning a clear-cut law concerning land occupation
- Establishing coordination between organizations in terms of occupying lands considering the sensitivity of some projects.

Non-payment of the credits of contractors:

- Paying receivables of the contractors by the government
- Appointment of the contractors of the private section and paying much attention to them
- Application of strong contractors with reliable financial base

Lack of enough skill and experience in some of the contractors and weak management presented by them:

- Assigning big projects to experienced and skilled contractors
- Use of the contractors of the private section and supporting them
- Avoiding the occurrence of any relational problem in assigning projects to contractors
- Fighting against delinquencies and acquisitiveness of contractors
- Appointment of contractors after making sure of their efficiency

Lack of efficient manpower:

- Client should taking into account his ability in relation with every project.
- Selection of contractors based on their experience, ability, and records

Lack of materials such as cement, round bar, etc:

- Endeavoring to solve some customhouse difficulties and tariffs
- Proper management in the distribution section
- Reducing amount of exports and use in the local consumptions
- Increasing the local production capacity

Lack of tracking shortfalls of the project by the management:

- Supplying the project resources by the Client at the time of contract
- Convening continuous meetings at the site of the plant for analyzing difficulties and shortfalls
- Continuous issuance of report concerning the executive process of the plan and the existing barriers by the contractor
- Precise estimation of the required tools at the beginning of the project
- Precise selection of contractor and consultant

Lack of machinery:

- Assigning required facilities for the purchase of machineries for banks
- Supplying the required machinery
- Importing second-hand machinery

Economic status and raised prices:

- Practicing full supervision by the government and the related organizations concerning inflation and expensiveness
- Strengthening the management in the materials section
- Purchase and reserve of the required materials in workshops by the client
- Paying attention to the expensiveness matter of materials
- Government should devise a plan for the projects enabling it to assign materials with lower costs to the projects.

Therefore, if suitable solutions are applied, results of this study can be useful for the similar projects. It shall be stated that besides the identified factors, there are other factors may result in the delay of different projects that these factors are different depending on the type and condition of every project.

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