

Determination of Factors Affecting on Risk Incidence in State's Civil Projects: Case Study of Tehran and Zanzan Provinces

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Abstract: Improper designing, technological complexities, higher number of organizations and individuals involving in a project, diversity of the required specialties and extensive scope of the activities are among the reasons cause the state's civil project not to be completed within the time and cost as determined initially. So, the application of a well-organized system to optimize the investment in the civil project seems inevitable. The optimization procedures which cause the project to be completed within the initial time and cost may play a key role to eliminate the adverse and negative effects of the above-mentioned factors. This research is intended to examine the effect of application of risk management on elimination of such problems. According to the results, the contracting companies working in Zanzan and Tehran provinces have sometimes applied the techniques of project management and different factors such as the lack of adequate arrangement specifically, in Zanzan province, too many errors in feasibility and designing phases, contradiction and changes of regulations, variations and economic as well as political crises and disregard of project management standards are among main issues affecting on risk incidence in civil projects.

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1. Introduction

Civil projects are essential prerequisites for development and industrialization of the developing countries. Annual budget deficit, higher rate of inflation, irregularities existing in performance procedures, failure to achieve the ultimate goals of the project, the lack of competent consulting and contracting companies, failure to achieve the modern technology and to discontinue the under construction projects in the developing countries are among issues cause the costs required for completion the projects to be become doubled or tripled than the costs as expected initially. The lack of adequate management to allocate the budget for civil projects and improper as well as inaccurate performance of the project will impose a huge expense during commissioning period and cause the quality and efficiency of the project to be impaired. These issues will result to adverse cycle's altogether which aggravate each other and threaten the development of the countries as well. Each year, a significant part of national income is dedicated to investment in civil and infrastructure projects. Nowadays, given Improper designing, technological complexities, higher number of organizations and individuals involving in a project, diversity of the required specialties and extensive scope of the activities, the executors and designers of civil projects

found themselves confronted by many problems to achieve their predetermined goals and consequently these projects will not be completed within the time and costs as determined initially.

According to the studies, the main reason of these problems may be attributed to the lack of prediction of probable risks throughout the life of project. Today, implementation of risk management as one of nine clauses of PMBOK Standard is considered as a requirement in advanced countries to be met during construction projects. Given the effect of different factors on this issue specifically in huge investment public projects as well the sensitivity of the governmental, Non-governmental and supervisory organizations is of an extraordinary importance. Risk management, in fact, includes a series of activities such as determination of risk factors, risk analysis, determination of risk probability and its influence, examination of different scenarios of reaction to risk and control of risk. This paper intends to scrutinize the problems of civil projects and risk management technique. Then, the status of application of risk management in civil projects of Zanzan and Tehran provinces will be examined statistically using a field study and the effect of implementation of risk management to eliminate a part of state civil projects' problems will be examined statistically. Finally, the

results and findings of the researchers are analyzed and the authors will provide their own suggestions.

2. Status of State's Civil Projects

First of all, the status of state's civil projects will be studied from planning organization and strategic management standpoint and according to the reports issued in 2005. The results achieved in this way will help the researchers to formulate the objectives and research-related hypotheses. Since the reports on civil projects have not been issued after 2005, the examination of these reports is not possible.

2.1. Delay in Execution of State's Civil Project

Taking into consideration of the delay reasons of projects which their execution has fallen behind the time schedule are among the factors have a key role to determine the weaknesses of civil projects. Here, the major reasons of delay and their influence upon the projects have fallen behind the time schedule will be studied. In all issued reports, the delay factors are classified into three categories as follows: administrative factors (administrative organization, contractor, designing advisor and supervising advisor), credit-related factors (approved credit, budget allocation, payment made by the treasury and budget absorption) and problems resulting from environmental and social factors (shortage of materials, social problems, land and other similar factors. According to our findings, the highest rate of delays in administrative, credit and environmental and social factors are for administrative organizations (11.8%), budget deficit (30.2%) and land preparation (5.5%), respectively. In connection with the problems resulting from the weakness of administrative organizations, Islamic Revolution Housing Foundation has contributed to more delays with 21%.

About 60 % of delays in the projects run by Presidency Institution are attributed to the problems resulting from budget allocation deficit, while in connection with the problems resulting from credit-related factors, more than 42.1% of the projects handled by the Islamic Revolution Housing Foundation found them confronted by the approved credit deficit. Nearly 6.7% of delays caused in the civil projects run by the Ministry of Power are attributed to land preparation which is the highest rate among major administrative organizations, while the rate of delays caused in the civil projects run by the Ministry of Road & Transportation is only 6.4%.

2.2. The Quality of Execution of State's Civil Projects

According to the results obtained from supervisory visits' data as well as given the indicators as defined for the quality of civil projects, the execution quality values of 20.4%, 50.2%, 22.2% and 7.1% are evaluated as excellent, good, medium and weak quality, respectively. The quality of 33% of the projects run by the Ministry of Industries and Mines is evaluated as

excellent and the quality of 59.7% of the projects run by the Ministry of Science, Research and Technology is evaluated as good which in comparison with similar values in major administrative organization are considered as the highest values of quality execution.

2.3. Status of Execution of State's Civil Projects from Statistical Standpoint

Out of 3513 under supervision projects, it was supposed that the numbers of 1484 projects to be completed till the end of 2008. The results of supervisory visits indicate that the numbers of 613 projects (i.e. 41.3%) have been completed. The rate of completed projects replaced by the new one is 96.7%. It means that the numbers of 96.7 projects has been launched in comparison with each one hundred completed projects [1]. Among the major administrative organizations, the percent of projects completed by the Ministry of Industries and Mines (i.e. 12.5%) is considered as the highest value and the Presidency Institution with 11.1% has fallen behind the time schedule.

2.4. Weighted Average of Execution Duration of State's Civil Projects

Since the duration of execution of new projects has been evaluated 2.6 years and the weighted average of duration of execution of completed projects has been evaluated 10.7 years, so the administrative organizations have to consider all necessary factors in their executive planning in order to achieve their predicted objectives during execution phases through a proper resources management. By comparison of the average of duration of execution of new projects with the average of duration of completion of the projects in administrative organizations, it seems that the said organizations have not paid any attention to real duration of execution and instead have focused the concentration on the sustainability of the projects and commencement of new ones.

2.5. Examination of Status of State's Civil Projects as well as Target Provinces (Tehran & Zanjan) in 2007 and their Comparison

Given the performance of administrative organizations, the results of evaluation of national civil projects in different provinces of the country are as follows (Table 1).

As shown in the Table (1), Markazi Province has achieved the first rank with the point of 77, while Gilan province has achieved the last rank with the point of 30.4. The indicator of completion fulfillment of the projects shows that about 72.7% of predicted goals of national projects of Qazvin province in 2007 have been fulfilled. The value of latter indicator in Kohkilooyeh and Boyerahmad province is 12.5% which is the least value. The examination of the quality of execution of national civil projects as one of the most effective indicators demonstrates that the quality of the projects

of Zanjan province as one of targeted provinces of the present research is more ideal than other provinces. The highest value of indicator of achievement of one-year objectives relates to Zanjan province (107.3) and the lowest value is related to Ilam province (23.6). Since the quality of execution plays a key role in achieving the civil objectives of the state and makes possible to optimize the productivity of the resources, the elements' points of execution quality of national civil projects have been provided in terms of the province. This section includes general specifications of national civil projects in 2007 which are separated in terms of the provinces and includes the number and the amount of credit allocated to civil projects of state's provinces.

In 2007, more than 1696 agreements on civil project operation have been executed and within these agreements a credit more than Rls 191.3 thousands billion has been allocated for execution of 5014 civil projects. With 751 civil projects (15% out of total civil projects), Tehran province has the highest numbers of national civil projects among the different provinces of the country. In terms of credit allocation, Tehran province has absorbed a credit amounts to Rls 14.8 thousands billion (equal to 7.7% of total credits approved). Zanjan province has observed a credit amounts to Rls 1.2 thousands billion (equal to 1.7% of total credits approved).

Table1. , the results of evaluation of national civil projects in different provinces of the country

Province	% of Completion Fulfilled	Execution Quality	Achievement of One-year Objectives	Term of Execution	Method of work assignment	Delay Causes	Points
Zanjan	39.4	94.2	107.3	29.5	76.8	82.5	73.4
Qazvin	72.7	84.8	81.3	29.8	71.6	82.4	72
East Azerbaijan	44.1	88.6	50	48.6	78.6	71.7	66.4
Tehran	48.5	83.3	60.6	39.4	48.7	84.7	64.9
Hamedan	62.5	80.1	44.8	28.3	71.3	63.7	60.8
Semnan	34.1	77.6	40.5	39.1	61.4	88.2	58.4
Kordestan	48	82.5	35.5	31.6	67.7	22.8	54.4
Mazandaran	44.7	60.8	50.6	31.4	68	47.3	50.8
Ardebil	50	67.4	45.1	31	68.3	14.9	50
Gilan	31.7	10.9	32.5	27.9	74.6	76.3	30.4

For the purpose of calculation, Evaluation point of 100 has been considered.

2.6. Risk Management

There are many definitions of risk that vary by different application domains. In economic theory, risk refers to situations where the decision maker can assign probabilities to different possible outcomes (Knight, 1921). Similarly, in decision theory, risk is the fact that the decision is made under the condition of known probability over the states of nature (Luce and Raiffa, 1957). In project management, there is no consistent definition for risk (Ward and Chapman, 2003; Perminova et al., 2008). In the project management body of knowledge (Project Management Institute, 2004), risk is considered as "an uncertain event or condition that, if it occurs, has a positive (opportunity) or negative (threat) impact on project objectives." However, many practitioners and researchers in project management still consider risk to be more related to adverse effects on project performance (Williams, 1995; Boehm and DeMarco, 1997; Smith and Merritt, 2002; Ward and Chapman, 2003). From this perspective, project risk management seems to be about identifying and managing threats to the project. There is no doubt that risk is one of the factors give rise to above-mentioned problems and inadequacies. Literally, risk has been likened to two sides of a coin which one of its side represents the risk and its other side represents the damage. In other words, risk is a

multidimensional cube which each of its dimensions represents damage and intensity of damage, unreliability and risk level. It means that risk includes all above-mentioned concepts and this is for the reason that other words have been used instead of risk and all of them include the risk. Project risk management, one of the main subjects of project management (Raz & Michael, 2001), is the planning, organization, monitoring and control of all aspects of a project and it consists of risk identification, risk qualification, risk response development, and risk response control (Saynisch, 2005). Miller and Lessard (2001) pointed out that understanding and managing project risks in large engineering projects are challenging tasks at the early phase.

3. Methodology

It defines the approach, tools and data resources may be used for risk management in the project. The sufficiency of data availability and the flexibility existed in risk management and various types of measurements depend on the phase of project.

Roles and Responsibilities:

To take any action in connection with risk management planning, the leader will appoint the supporter and the members of risk management team. Risk management teams do not have any role to run the project and accordingly they can independently analyze

the project risks more fairly than project's investing team.

Budgeting:

The budget needed for risk management of the project is determined through budgeting.

Time Frequency:

It means that how often will risk management processes apply throughout the cycle of a project life. In order to make an effective decision, the results have to be prepared as early as possible. These decisions have to be checked periodically during the execution of the project.

Factoring and Interpretation:

Given the type and time frequency of qualitative and quantitative analysis of a risk, factoring and proper interpretation methods are applied. To ensure the compatibility, the methods and factoring have to be determined in advance.

Threshold:

It is considered as a measure on the basis of which a necessary action is taken. (By whom and how). Any employer, customer or a project investor may have a different threshold of risk. An acceptable threshold as an indicator helps the project team to measure the ratio of efficacy of execution of a reaction plan to a risk.

Reporting formats:

It describes the content and format of reaction plan to a risk. Reporting formats will determine how the results of risk management processes are documented, analyzed and transferred to the project team, internal and external beneficiaries, investors and others.

Follow-up:

It documents all the aspects of risky activities to be used in current projects. Those audited and not audited risk processes and their auditing methods are documented.

Field Study

As mentioned earlier, arrangement and distribution of standard questionnaires among statistical society of the research is one of the main tools for collecting the required information to examine the status of risk management in state's civil projects and determine the effect of risk management on eliminating of some of problems of such projects and collect the ideas of respective experts in this regard. The structure and questions of such questionnaires are designed on the basis of second part's library studies, authors' experiences; research hypotheses as well as the findings of other researchers. The final and main result of such questionnaires has a key role to determine the objectives of the research.

3.1 Statistical Population

Statistical Population of this research is consisted of a group of experts who have Bachelor's degree or higher and have some valuable experiences in

executing the state's civil project as the member of employer, consultant or contractor. Given their involvement in civil and industrial projects and direct participation in the projects, they can provide the research with proper and valuable information. Consequently, a single questionnaire is presented to each respondent personally and the number of completed questionnaires is considered as the result of follow-up made by the authors.

3.2. The Objectives of the Research

The main objective of arranging such questionnaires is to examine the status of risk management in state's civil projects and determine the effect of risk management on eliminating of some of problems of such projects.

3.3. Questions of Questionnaire:

This questionnaire consists of three kinds of questions as follows:

First type questions:

Some questions on the specifications and experiences of respondent. These questions are as follows: Age, work experience, educational degree, field of study and executive position.

Second type questions:

Examination of the condition of civil projects of Zanjan and Tehran provinces in terms of application of techniques and approaches is one of the objectives followed by the researchers. These techniques and approaches may directly and or indirectly improve the risk management in the projects. For instance, insurance, consultant, standard, software, information systems and project management team working as well as quantitative techniques of risk management, value engineering, and value added engineering and hierarchical analysis may directly and or indirectly improve the risk management in the projects.

Work experience, educational degree, field of study and executive position may be regarded as the requirements and prerequisite of implementation of risk management system in the construction-related projects.

Third type questions:

These questions are regarded as the main questions of questionnaire and all hypotheses of the research are based on them. These questions intend to gather the opinions and views of statistical society about the factors affecting on increasing the project risk. These questions will examine the factors affecting on increasing the project risk in terms of three dimensions of time, cost and quality. Two hypotheses out of set of hypotheses of the research are hidden in these questions.

4. Research Hypotheses

- 1- Inadequacies of designing phase may give rise to risk occurrence in time, quality and cost of execution of the projects. (f1)

- 2- Selection of an incompetent consultant may give rise to risk occurrence in time, quality and cost of execution of the projects. (f2)
- 3- Failure to do the feasibility studies (technical, social, economic, financial, organizational, political and funding the project) may give rise to risk occurrence in time, quality and cost of execution of the projects. (f3)
- 4- Ignorance of expectations of the beneficiaries or the customer may give rise to risk occurrence in time, quality and cost of execution of the projects. (f4)
- 5- Any contradictions and inconsistencies between regulations of construction by-laws (civil projects) may give rise to risk occurrence in time, quality and cost of execution of the projects. (f5)
- 6- The economic and social issues and crises may give rise to risk occurrence in time, quality and cost of execution of the projects. (f6)
- 7- Frequent changes of the laws and procedures may give rise to risk occurrence in time, quality and cost of execution of the projects. (f7)
- 8- Many disagreements and contradictions between the executors of the project (such as consultant, contractor and employer) may give rise to risk occurrence in time, quality and cost of execution of the projects. (f8)
- 9- Improper use of project's planning and controlling systems may give rise to risk occurrence in time, quality and cost of execution of the projects. (f9)
- 10- The necessary requirements to implement risk management in civil projects of Tehran and Zanjan Cities are met. (f20)
- 11- The effect of the factors cause the cost-related risks of civil projects to be increased (f30)
- 12- The effect of the factors cause the time-related risks of civil projects to be increased (f31)
- 13- The effect of the factors cause the quality-related risks of civil projects to be increased (f32)

4.1. Analysis of Questionnaires

After extensive follow-up, the numbers of 35 questionnaires were obtained from the researchers. The

measurement criteria of questionnaires of second and third types include five choices as Likert as follows. Here, three parts of this questionnaire will be considered:

Criteria	1	2	3	4	5
2 nd Type	In most times	Always	Sometimes	Seldom	Never
3 rd Type	Very much	Much	Middle	Little	Very little

Questions about the Specifications of the Respondents:

Work Experience	Age	City	Valid	N
30	30	30		
0	0	0	Missing	
7.33	31.57	1.57	Mean	
1	24	1	Minimum	
18	49	2	Maximum	

Second Type Questions: Status Evaluation of Civil Projects of Tehran and Zanjan Provinces:

- 1- To place different insurance policies in construction industry;
- 2- Use of project management consultant;
- 3- Application of project management knowledge;
- 4- Application of project management software;
- 5- Use of information systems of project management;
- 6- Use of specialized committee during different processes of the project (team working);
- 7- Application of risk management techniques such as Monte Carlo Method;
- 8- Use of Value Engineering Technique;
- 9- Application of Value Added Management techniques;
- 10- Application of hierarchical analysis technique.

	Valid N	Missing	Mean	Std. Deviation	Skewness	Std. Error of Skewness
To place different insurance policies in construction industry	30	0	3.80	1.031	0.178	0.427
Use of project management consultant	30	0	3.57	1.073	0.095	0.427
Application of project management knowledge	30	0	3.30	1.022	0.378	0.427
Application of project management software	30	0	3.23	1.165	0.212	0.427
Use of information systems of project management	30	0	3.13	1.106	0.539	0.427
Use of specialized committee during different processes of the project	30	0	2.63	1.066	0.084	0.427
Application of risk management techniques such as Monte Carlo Method	30	0	2.77	1.040	0.110	0.427
Use of Value Engineering Technique	30	0	2.97	1.033	0.070	0.427
Application of Value Added Management techniques	30	0	3.23	1.278	0.061	0.427
Application of hierarchical analysis technique	30	0	3.40	1.102	0.106	0.427

Prior to analyze the hypotheses and in order to examine the condition of the civil projects of Tehran and Zanjan provinces in terms of application of the risks, approaches and software related to project's risk management, the researchers of the present research have asked some questions from the statistical society. The statistical society has claimed that it has placed insurance policies in relation to construction industry generally. Similarly, it has sometimes used the problems of project management and project management knowledge as well as project control software. Of course, given the knowledge the researchers have about the atmosphere of state's civil projects, these statistics have to be adjusted and to be decreased by one degree at least. Because, it is likely that the pride issue and supporting the project have affected upon answering these questions. However, these statistics may provide us with a criterion although with a minor error for judgment. As shown in the above table, the statistical society has stated that risk management technique, value engineering and value added management have been applied seldom to sometimes in civil projects. Risk management is considered in details in the present essay. Value engineering is regarded as a technique which has been used for last 50 years to decrease the costs or eliminate the problems in some of projects and has brought about brilliant results. Value added management technique is regarded as a technique which examines the time progress, cost progress and physical progress of the projects altogether. It determines the condition and weaknesses of the project and examines the future of the project as well. These three techniques are always used in major projects in advanced countries.

The Main Questions of the Questionnaire (Hypotheses No.: 1 to 13)

Uniform Distribution Test

There are various methods to do sampling. Here, simple random sampling method is used. Prior to test the hypotheses, we test the questionnaire using uniform test method to find out that the sample selected from the statistical society is randomly or uniformly.

The simplest discrete probability distribution is that distribution whose random variable has equal probability. Such distribution is referred to uniform distribution. For instance, if the values of random variable of $x (x_1, x_2, \dots, x)$ select an equal probability, then its discrete uniform distribution is given as follows:

$$F(x;k)=1/k \quad x=x_1, x_2, \dots, x_k$$

Here, we intend to demonstrate whether each six measures of the questionnaire, i.e., 1) very ineffective, 2) low effective, 3) relatively ineffective, 4) relatively effective, 5) effective, 6) very effective has equal probability or not. In other words, $f(x;6)=1/6$?

To do this, Kolmogorov-Smirnov Uniform Test will be used. As shown in the table, since output sig of the table is lower than 0.05 for all variables except for hypothesis of f_{20} , then we can conclude that any of our variables except for variables of second type questions do not follow a uniform distribution pattern. In other words, the probability of each six measures to be selected will be varied.

The results of Kolmogorov-Smirnov Uniform Test are shown in the following table.

f32	f31	f30	f20	f10	f9	f7	f6	f5	f4	f3	f2	f1		
30	30	30	30	30	30	30	30	30	30	30	30	30	N	
2.00	2.00	2.00	2.00	2	2	2	2	2	2	2	2	2	Minimum	Uniform Parameters(a,b)
4.00	4.00	5.00	5.00	5	5	5	4	5	5	5	4	5	Maximum	
.433	.567	.433	.233	.400	.300	.367	.433	.367	.267	.300	.433	.400	Absolute	Most Extreme Differences
.100	.033	.300	.233	.167	.167	.300	.100	.233	.233	.300	.167	.200	Positive	
-.433	-.567	-.433	-.167	-.400	-.300	-.367	-.433	-.367	-.267	-.300	-.433	-.400	Negative	
2.373	3.104	2.373	1.278	2.191	1.643	2.008	2.373	2.008	1.461	1.643	2.373	2.191	Kolmogorov-Smirnov Z	
.000	.000	.000	.076	.000	.009	.001	.000	.001	.028	.009	.000	.000	Asymp. Sig. (2-tailed)	

a: Test distribution is Uniform.

b: Calculated from data.

Determination of Questionnaire's Error:

Prior to commence the analysis, the questionnaire's error has to be determined given the size of the sample and statistical society. Hypotheses used for calculation of the error are as follows:

Acceptable range is %95.

As a result:

$$Z_{\alpha/2}=1.67$$

$$n=30$$

$$P=1/2$$

$$N=160$$

The questionnaire's error is calculated according to the following equation:

$$n = \frac{N(Z\alpha/2)2p(1-P)}{(N-1)\epsilon^2 + (Z\alpha/2)P(1-P)}$$

By substituting the values, the value of ϵ is equal to 14.5%. Since we have chosen 95% for our project as well as given the cost-related limitations of the project, this value of 14.5% will be acceptable.

Validation of the Questionnaires:

To validate the questionnaires, SPSS13 software has been used. Cronbach's Alpha factor is used for this purpose. After validation of the questionnaire taking into consideration of Cronbach's

Alpha factor and each of the questions, it became evident that the general factor of Cronbach's Alpha is 0.858.

Table: Questions of the questionnaire

Table 6. Reliability Statistics		
N of items	Cronbach's Alpha based on standardized items	Cronbach's Alpha
13	0.880	0.858

Table 7. Item-Total Statistics						
Cronbach's Alpha if Item Deleted	Squared Multiple Correlation	Corrected Item-Total Correlation	Scale Variance if Item Deleted	Scale Mean if Item Deleted		
.839	.719	.659	27.237	42.7333	f1	
.843	.703	.593	27.390	43.3000	f2	
.847	.754	.536	28.585	42.9667	f3	
.842	.628	.616	26.961	43.0667	f4	
.841	.745	.619	26.809	42.8667	f5	
.848	.566	.526	28.392	43.2333	f6	
.845	.703	.595	28.395	42.8667	f7	
.859	.512	.353	28.993	42.8000	f9	
.855	.647	.414	28.409	42.7333	f10	
.888	.401	.072	30.626	43.1667	f20	
.834	.834	.819	27.338	42.8000	f30	
.833	.904	.826	27.275	43.0333	f31	
.843	.704	.618	28.185	43.2333	f32	

Description of Research:

As stated at the outset of this part, prior to duplication and distribution of the questionnaire, a final sample was completed by two qualified members of the statistical society on experimental basis and its probable problems were eliminated. Then the corrected questionnaire was seen by the esteemed professor and the respective consultant and approved accordingly. The context of the research was related prior to distribution of the research as described above. Then, the questionnaires were collected and for the purpose of examination of the questionnaire's relation, a structural relation method has been used. According to this method, the questions are classified based on the hypotheses and through SPSS13 Software; factor-based analysis was made for each classes.

Descriptive Test of Hypotheses:

Now, the hypotheses are coded once again according to their respective questions. Consequently, the hypotheses of 1 to 13 are changed into the codes of f1 to f13.

When the hypotheses are coded, they are examined individually in terms of whether they follow normal distribution or not. To do this, Kolmogorov-

Smirnov test is used. This method is based on maximum difference between two observed cumulative distributions in two groups. Given the output signification, it would become clear that which variable complies with normal distribution. If the output signification (p-value) shown as sig is known, there would be no need to know the statistical value of t and refer to t probable table for determination or proving zero assumption.

P-value shows the value of the area located under the curve (t) at the right side of (t) point and at left side of (-t) point. Here, n-1 stands for freedom of degree and $|t| > 1/96$. When (sig < 0/05), then H_1 assumption is rejected. In this case, we say that "the test is significant". Now, if the distance between the significant value and the value of 0.05 increases (or is lesser), the intensity of test signification will be more. It means that we will reject the H_0 more reliably.

Given the above explanations as well as the output of Kolmogorov-Smirnov test, it would become clear that only variable of f20 follows the normal distribution and H_0 assumption is rejected for other variables.

$$H_0 : \text{oki } \text{SIG} < 0.05$$

Opposite Assumption: H₁

If we intend to use normal distribution for our test and where we want to know whether a sample is belonged to a particular society, its average as well as its standard deviation has to be known. But often we

do not know anything about its standard deviation and then it is necessary to obtain it from the sample's standard deviation, provided that this distribution is near to normal distribution.

f32	f31	f30	f20	f10	f9	f7	f6	f5	f4	f3	f2	f1		
30	30	30	30	30	30	30	30	30	30	30	30	30	N	
3.3333	3.5333	3.7667	3.4000	3.83	3.77	3.70	3.33	3.70	3.50	3.60	3.27	3.83	Mean	Normal Parameters (a,b)
.60648	.57135	.56832	1.03724	.791	.774	.596	.661	.794	.777	.621	.740	.699	Std. Deviation	
.309	.360	.426	.185	.317	.252	.393	.277	.347	.273	.340	.273	.328	Absolute	Most Extreme Differences
.309	.258	.307	.183	.250	.215	.274	.260	.253	.273	.233	.207	.272	Positive	
-.264	-.360	-.426	-.185	-.317	-.252	-.393	-.277	-.347	-.207	-.340	-.273	-.328	Negative	
1.691	1.970	2.333	1.014	1.735	1.379	2.151	1.516	1.901	1.498	1.863	1.493	1.794	Kolmogorov-Smirnov Z	
.007	.001	.000	.255	.005	.045	.000	.020	.001	.023	.002	.023	.003	Asymp. Sig. (2-tailed)	

- a: Test distribution is Normal.
- b: Calculated from data.

To do this, we have used t- distribution. It is similar to normal distribution, but the area located at under the curve is greater at two extremes and its shape will vary based on the number of the samples. In other words, whenever the numbers of the samples are increased, t-distribution is more similar to normal distribution.

Now, we consider again our main assumptions:
 H₀= μ=3
 H₁= μ≠3

$$\bar{X} = \frac{\sum f_i X_i}{n} = 1/6\{1 + 2 + 3 + 4 + 5\} = 3$$

Generally speaking, we are going to know what the answers of the respondents are alike. Are they upper than the average of the codes? "Effective" or lower than the average of the codes. "Ineffective".

Test of Hypothesis of f20 (Inferential)

As stated before, since the significant value of above hypothesis for variable f20 is equal to 0.255, then the assumption of H₀, i.e. the normality of f20 is accepted. It means that the test is significant. Since, f20 follows a normal distribution, then a unilateral t-test has to be used for examination of I assumption. Given the output of t test, since, the significant value is equal to 0.000, then H₀ assumption in I test is rejected. It means that the questions included in the questionnaire were important for the respondents.

Std. Error Mean	Std. Deviation	Mean	N	
.18937	1.03724	3.4000	30	f20

Test Value = 0					
95% Confidence Interval of the Difference		Mean Difference	Sig. (2-tailed)	df	t
Upper	Lower				
3.7873	3.0127	3.40000	.000	29	17.954

Table 3-7 show T- Distribution.

Now, we have to find the direction of this significance. Effective or Ineffective? To do this, descriptive statistics are used. In other words, the skewness has to be determined.

Positive Skewness: Positive skewness relates that the length of tail is directed to the right side, i.e. accumulation of data is directed to the left side. In other words, codes of 1, 2 and 3. Ineffective and or low effective.

Negative Skewness: Negative skewness relates that the length of tail is directed to the left side, i.e. accumulation of data is directed to the right side. In other words, codes of 4, 5 and 6. High effective.

Given the average of 3.4, assumption of f20 is accepted. It means that all requirements of implementation of risk management in civil projects of Tehran and Zanjan provinces are sometimes to generally meet. Of course, we cannot accept this assumption more reliably. If we want to compare the condition of Tehran and Zanjan provinces, we will find out that (according to assumption of f20), the said assumption has been accepted more reliably in Tehran province (average of 3.92) while this average in Zanjan province is just 3. It means that all requirements for implementation of risk management in Tehran province have always been met in most of the projects, while these requirements have sometimes been met in Zanjan province.

Test Value = 0					
95% Confidence Interval of the Difference		Mean Difference	Sig. (2-tailed)	df	t
Upper	Lower				
4.3821	3.4641	3.92308	.000	12	18.623

Test Value = 0					
95% Confidence Interval of the Difference		Mean Difference	Sig. (2-tailed)	df	t
Upper	Lower				
3.5453	2.4547	3.00000	.000	16	11.662

Test of other Hypotheses (Inferential)

Those tests we are going to use in this part are called "Non-Parametric" test, because data distribution is not normal.

f32	f31	f30	f10	f9	f7	f6	f5	f4	f3	f2	f1	Valid	N
30	30	30	30	30	30	30	30	30	30	30	30	Missing	
0	0	0	0	0	0	0	0	0	0	0	0	Mean	
3.3333	3.5333	3.7667	3.83	3.77	3.70	3.33	3.70	3.50	3.60	3.27	3.83	Std. Error of Mean	
.11073	.10431	.10376	.145	.141	.109	.121	.145	.142	.113	.135	.128	Median	
3.0000	4.0000	4.0000	4.00	4.00	4.00	3.00	4.00	3.00	4.00	3.00	4.00	Mode	
3.00	4.00	4.00	4	4	4	3	4	3	4	4	4	Std. Deviation	
.60648	.57135	.56832	.791	.774	.596	.661	.794	.777	.621	.740	.699	Variance	
.368	.326	.323	.626	.599	.355	.437	.631	.603	.386	.547	.489	Skewness	
-.294	-.732	-1.220	-.580	-.037	-.859	-.484	-.716	.236	-.406	-.480	-.409	Std. Error of Skewness	
.427	.427	.427	.427	.427	.427	.427	.427	.427	.427	.427	.427	Range	
2.00	2.00	3.00	3	3	3	2	3	3	3	2	3		

As mentioned earlier, the variables in hypotheses of f1, f2, f3, f4, f5, f6, f7, f9, f10, f30, f31 and f32 have not specific distribution. So, non-parametric methods are used for testing the hypotheses. When the samples are small in size, they are used frequently. It is true in the present questionnaire.

$$\left\{ \begin{array}{l} H_1 : \mu_i \neq \mu_j \\ H_0 : \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_6 = \mu_7 = \mu_8 = \mu_9 \end{array} \right.$$

KRU	
87.957	Chi-Square
15	Df
.000	Asymp. Sig.

As stated before, to test averages' equality, a non-parametric test will be required. Kruskal-Wallis test is regarded as a non-parametric synonymous test through which a unilateral variance is analyzed. If you are going to test zero hypotheses, the data has to be selected from single samples of the societies which their forms are the same. Given the output of this test,

When we analyze the data, some cases may be happened in which we may be far away the required assumptions seriously. In such cases, we may need some procedures which require fewer hypotheses concerning the society. These procedures are generally called non-distribution or non-parametric tests. These procedures do not require a particular distribution, although some of them do require few hypotheses about the form of distribution. One of the disadvantages of non-parametric tests is that discovering real difference is less likely. In other words, the strength of non-parametric tests is not the same as those tests which require the normality of society as an assumption such as t-test.

since the sig. value of the test is 0.000, then H₀ hypothesis is rejected. It means that there is a significant difference and since sig. value is differed from the value of 0.05 greatly, then the equality of averages is rejected more reliably.

Here, a question is raised: To which direction this inequality approaches? As stated before, we will descriptive statistics again for this case. Given the Skewness line as indicated in Table 8-3, we can identify different types of skewnesses. For negative skewnesses, the length of the tail is directed to the left side. In other words, the data are accumulated in the right side and the hypotheses are accepted accordingly. For positive skewnesses, the length of the tail is directed to the right side. In other words, the data are accumulated in the left side and the hypotheses are rejected accordingly. As shown in the table, all the hypotheses, except for f4 hypotheses have been accepted.

5. Analysis & Conclusion

Hypothesis: Assuming the inadequacies of designing phase may give rise to risk occurrence in time, quality and cost of execution of the projects which accepted by the statistical society. As shown in Table 8-3, this hypothesis and hypothesis No. 10

having the average of 3.83 has been accepted more strongly by the statistical society. More emphasis made by the respondents may be attributed to the weakness resulting from the processes currently applied in the executive and technical systems of the country. In such systems the credits of civil projects are appropriated after the budget notified by the government and the government submits the budget bill with more delays and the approval of the budget bill by the Islamic Consultative Assembly postponed to the end of August or September, accordingly. On the other hand, since the real description of the project depends on this date, so the governmental organizations are practically compelled to minimize the duration of execution of designing phase to be able to launch the execution phase of the project on due date. Non-professional haste by a governmental employer will cause some of the needs of the project's beneficiaries to be forgotten or some designing mistakes to be made. This errors and inadequacies are emerged during execution phase and will cause the designing to be updated or modified.

More generally, those contractors who had participated in the bidding based on the basic designing and provided their time schedule and quotation will complain about this modification and designing and legal disputes between two parties are intensified. From contractors' point of view, any changes in the execution plans will impose new tasks on them generally followed by many risks. Since, these contractors do not assume the costs of such risks and their consultants do not assume any legal responsibility in this regard, so the consequents of such risk will be directed toward the contractors. To maintain their interest margin, the contractors try to negotiate with the employer and revive their lost interests which this case causes new legal suits to be raised.

Incompetency and the weakness of designing team (consulting engineers) and lack of use of skilled and experienced experts to translate the needs of the beneficiaries into engineering projects is regarded as another problems cause the design-related risks to be increased. Incompetency and sometimes and inattention of designing team toward the rules and technical requirements applicable in the country will give rise to many problems during execution of the projects and will cause the contractors to become entangled in many troubles during execution of the projects and funding the renovation costs and changing the conditions necessary for the execution of the new projects.

Inability of the governmental organizations to supervise the plans proposed by the consultants is regarded as another problem causes the plans not to be executed smoothly and the quality and quantity of

designing phase will not practically be supervised, accordingly. Consequently, the respective consultants will focus their concentration on simple and routine plans and the cost-effectiveness, modernity and efficiency are excluded. Clearly, such consultants will never think of exploiting skilled and experienced experts and new techniques. The wage of consulting engineers is very low comparing those who work in developed countries and this is one of the most important factors which have not to be ignored.

Hypothesis 2: Selection of an incompetent consultant may give rise to risk occurrence in time, quality and cost of execution of the projects. Similar to the first hypothesis, it is accepted with the average of 3.27 (relatively high effectiveness). This hypothesis is one of the weakest hypotheses in the current research and in spite of its acceptance; it has the lowest rank among other 13 hypotheses.

As mentioned earlier, the executive and technical system of the country plays a key role in this regard. In such a system, the consultants are evaluated based on the availability of the experts and the numbers of previous tasks and are evaluated by the planning deputy of the presidency. Unfortunately, many of such consultants submit their forged documents to this organization to obtain their ranks. Naturally, such consultants will not be able to meet the needs of the employers and projects' beneficiaries. On the other hand, given the inadequate scientific capability of the governmental employers as well as lack of proper judgment, the selection process of the consulting engineers is not performed appropriately and incompetent consulting engineers are selected accordingly. Although, it has to be mentioned that a supervision phase has been included in job description of consulting engineers in our country. This phase together with detailed designing phase will cause the pricing not to be performed exactly and consequently those contractors whose quotations are lower, will be the winners of the bids. It is worthy to note that inadequate professionalism of the governmental employers to supervise the designing phase plays a key role in this regard.

Hypothesis 3: Failure to do the feasibility studies may give rise to risk occurrence in time, quality and cost of execution of the projects.

This hypothesis with the average of 3.6 (qualitative criteria of relatively high effectiveness) has been accepted by the statistical society. This hypothesis and the first hypothesis are nearly among the tasks of consulting engineers and the weakness of this organization is completely substantial in these two hypotheses.

The difference between this hypothesis and the first one is that the governmental organizations award the execution of this phase superficially or as

determined before to the consulting engineers or they perform it themselves through governmental facilities.

Although the feasibility phase is regarded as an unimportant phase of a project in terms of cost and time, but it plays a key role to achieve the aims of a project. A principle question is answered during this phase:

“Has the project to be done? Is it possible to execute the project given the current condition? Are there any alternatives to achieve these aims?”

There are so many civil projects in the country which are in execution stage and most of them are regarded as failed ones. So, if they were studied in terms of feasibility, they may never reach the designing and execution phases and then billion dollars of the state's budget may not be detained. In administrative and technical systems of the country the government notifies the projects to the respective ministries and then the respective ministries notify them to the concerned organizations and then the initial feasibility studies are done by governmental organizations through their own expertise capacities. Naturally, due to inadequate technical expertise as well as lack of sufficient and in-depth studies of different aspects of these projects, a superficial decision is made. The suggestions made by the respective ministries were studied on the basis of special criteria such as government's Macro policies; political pressures imposed by the members of the parliament and other influential figures, bargaining of Directors General of the provinces and easy to yield projects and were submitted to Parliament as budget's bill. The parliament ratifies the projects on the basis of similar criteria and then the ratified projects are notified to the government. Land preparation studies in which upon capacities of each area, special industries are proposed are among cases which included in decisions made by the ministries and Majlis as well as 25-year plans, but the approved projects will not be able to meet the requirements of such plans.

Naturally, when the administrative organizations are required to execute the approved civil projects, since the budget has been notified already to them and they know that budget return regarded as negative score for them, they shall be obliged to perform predetermined zero phase studies (feasibility studies) to obtain the governmental permission for executing designing phase. In fact, feasibility studies are not performed during this process, but the project will be justified and the consulting engineers try to justify the plans from technical, economic, social and political points of views through manipulation of the figures and unilateral comparison of the projects.

When these projects are executed, they would not be able to achieve the goals for which they have been suggested.

Lack of formulated instructions and specified terms and conditions to accept the civil projects and the significant effect of political and taste-related pressures imposed by the directors in different levels on acceptance or rejection of civil projects are among the most important issues we have to take into account and they were mentioned in advance. Such projects which not to be launched from technical, economic or social points of views, but for any reasons they are being executed, are entangled with some severe problems or principally they were not funded properly during execution phase. These two conditions would be followed by some modifications or delays in executing the project and will cause the investment risk for the contractors to be increased. For instance, those projects which are not executable within the suggested arrangement will be passed, but during execution phase, administrative costs of the projects like these would not be able to justify the goals resulting from its execution. Sometimes, the governmental employers who observe such projects will stonewall to appropriate the credits cause the contract to be terminated by the contractors.

Hypothesis 4: Ignorance of expectations of the beneficiaries or the customer may give rise to risk occurrence in time, quality and cost of execution of the projects. This hypothesis has been rejected on the basis of inferential analysis and related statistics. Additionally, the acceptance of this hypothesis has been rejected on the strength of its descriptive analysis. The authors believed that the rejection of this hypothesis is very unlikely, because in fact withdrawal of the consulting engineers to meet the demands of the customer or to exert taste to make the changes in the designing by the members of consulting team and as a result tendency toward design changing during execution is an inevitable phenomenon which could not be rejected and apparently, the respondents of this project 36% of which were consulting engineers have not confirmed this issue as the reason of the problems. The reason of rejection may be attributed to non-tendency to highlight the errors committed by the consulting engineers during the execution of the projects or insignificance of the designing phase from contractors or employers points of views. The researchers believe that the rejection of this hypothesis demonstrates the regrettable morale prevailing at the industry and construction society of the country. According to this outlook, all the projects are viewed in execution phase and then designing phase is downgraded to drawing phase. In advanced countries, time and cost are regarded as the most critical factors of this phase, particularly feasibility phase in order to prevent the poor and low yielded projects. By concentrating on this phase, the direct as well as indirect costs of execution phase are minimized. But in

our country, given the state's planning system and more delays in notifying the budget appropriated to the civil projects, the governmental employers try to complete designing phase as soon as possible.

Hypothesis 5: According to this hypothesis, any contradictions and inconsistencies between regulations of construction by-laws (civil projects) and its effect on projects' inefficiency have been accepted by the statistical society. As shown in Table 8-3, the average of 3.7 as a descriptive statistical data has obtained from the analysis of the questionnaires. Qualitative interpretation of the average of 3.7 indicates that the great effect of contradictions between the regulations on projects' failure has been acknowledged by the statistical society. For the first time as of 1950s, the position of state's administrative and technical system has been subjected to contextual changes due to different conditions.

For instance, assessment methods of the contractors and how the projects are awarded to them have been evolved at least five times. These subsequent changes which may be attributed to tastes and the policies imposed upon then government are not harmonized with time circumstances, economic conditions and other current legal regulations of the country such as labor law; social security and commerce act and cause the threefold factors of labor to be entangled with marginal issues. On the other hand, since the time average of the execution of major and minor projects is varied from 5 to 15 years, the subsequent changes in technical systems and rules and regulations cause many problems and claims to be raised by the parties in most of the projects.

Hypothesis 6: According to this hypothesis, the economic and social issues and crises may give rise to risk occurrence in civil projects and it has been accepted with the average of 3.33. It is understood that the civil projects are among the most significant projects in terms of Rial, the volume of physical labor and multiplicity of the beneficiaries in our country. Generally, those issues and problems of the society will cause some troubles to be made in these projects. Naturally, the contractors who are in the first rank in terms of risk taking will be exposed to much damages resulting from the crises and social and economic issues. This case is of a great importance in advance countries. In these countries, the investment-related issues and problems are studied by the international economic institutions and the risk of investment in the countries is determined. The risk of investment is very high in our country, because a long-term economic management is not applied in our country and economic and strategic decisions are subjected to fundamental and significant changes from a government to next government and from a minister to the next minister. On the other hand, improper

management of foreign affairs caused economic pressures to be imposed on the country externally and consequently the problems to be increased. Economic sanctions are a typical of these pressures. In addition to economic problems, the civil projects are entangled with social problems. In addition to economic problems, the civil projects are usually entangled with social difficulties as well. The difficulties a society usually to be entangled with them could be arise from economic or political crises and sometimes they may be attributed to the lack of cultural development. Usually, the role of the economics and economic stability in social crises is highlighted by the researchers of social research.

In the present research, the contractors are usually involved in some issues such as unexpected surge of demand for construction materials by the people without any real interpretation and or participation of ordinary people in the tenders of specialized projects. These conditions are happened from time to time and due to market stagnation. Generally, such issues will cause the administrative costs of the projects to be escalated. Therefore, the duration of execution of the project will be subject to modifications and sometimes the execution of the projects is suspended temporarily due to lack of funding or change of the policies of the contractors or local pressures.

As mentioned before, improper economic management is regarded as the one of the major problems of the contractors. Also, the involvement of local organizations that play a key role in the economic sector must be included. For instance, the rigidity of some provincial banks to provide bank facilities, the governors' meddling with the method of execution of the projects and funding the projects.

The last point we are going to mention here is the inflationary and stagnancy policies of the governments as the one of important problems the contractors are involved in. In such policies, the civil budgets are usually notified very late and on the other hand, the contractors are caught in a morass of bankruptcy due to improper funding by the respective banks and the contractors are occasionally forced to resort immoral ways to guarantee the survival of their company.

Hypothesis 7: This hypothesis which has been accepted with the average of 3.7, is similar to Hypothesis No. 5. The issue of inconsistencies between the laws and regulations is debated on the strength of hypothesis No. 5, while hypothesis No. 7 will treat the frequent changes of the laws.

Here, the issue of frequent changes in government's policies, particularly economic affairs is typically emphasized. Additionally, successive changes in the rules and procedures could increase the risk of investment as the same as changes of macro

policies for the contractors and consultants. The main reason of this issue may be attributed to bad management of the rules and regulations in the country.

The issue of management of rules and regulations is among the advanced issues which advanced societies strive to eliminate the unnecessary and redundant rules and procedures and limit the legislation channels and adapt the new rules more strictly through reviewing the traditional and existing rules and conforming them to political, economic and social strategies of the countries. One of the reasons of establishment of rules management in these countries is the tendency of the members of the parliament toward passing the laws which meet the needs of a part of the society in short term. Besides, the governments insist on to apply their tastes for state's macro plans under the new rules and regulations. Unfortunately, the jurists of council of guardians who are regarded as the final gate of passing the laws and regulations would not consider the consequent effects of the laws completely and would not include the contradictions of these laws with other state's rules and regulations. On the other hand, some of the laws and regulations passed by the government in the Cabinet are notified to executive organizations without they are reviewed by the respective supervisory organizations. In such cases, the contractors may survive on these conditions. They may forecast the upcoming changes of the rules through corruption acts or defend their own rights through employing influential attorneys at law.

Another issue raised in this regard is that the frequent changes of laws and regulations will cause the appropriate decisions concerning taking part in tenders or quotation not to be taken definitely by the contractors and time and cost-related risks not to be taken by them in this way.

On the other hand, any and all changes of the rules and procedures during the execution of a project cause some unpredicted costs to be directed toward the contractors which these costs would not be compensated by the employers. In addition, the priorities of the managers may be changed and timely notification of the budget to be ignored by high ranking managers. It is worthy to note that the changing the interpretation of the laws, may in turn double the problems of the contractors which in turn results from the frequent changing the managers and or assigning the poor and inexperienced managers to handle administrative organizations.

Hypothesis 8: Disagreements and contradictions between the executors of the project and their effects on occurrence of the problems within the projects are discussed in this hypothesis and it has been accepted with the average of 3.77 by the statistical society.

In civil projects, there is usually a claim between those who are in charge of the projects, particularly the employer and contractor. The factors that play a key role in raising a claim is as follows:

The first factor is directors' more intrusion into the affairs and or execution of the project under higher supervision of the employer and exercising their own taste in the method and quality of executing the project. In most of cases, the contractor will expose its benefit to a great risk due to these modifications resulted from exercising the unnecessary tastes and in other cases, the final user would not be satisfied by the quality of the work performed under these conditions. Therefore, changing the higher supervisor or employer's representative may give rise to new troubles.

The claim between the consultant and the contractor is regarded as the second factor. Due to lack of sufficient executive experience, some projects are proposed by the consulting engineers. The significant numbers of these projects are involved in many problems due to lack of administrative facilities or a defective designing. Therefore, a contractor who has invested a great deal of money on the project will sustain project failure's risk in terms of time and cost. When a project is failed, non-payment the fee would be the only risk directed toward the consulting engineers, while the contractor has entered the project with its own credit and investment. As a result, the consulting engineers would not undertake to comply with the requirements of time, cost and quality of the project and therefore the contractors would defend against the projects suggested by the consultants and raise the claim. Because of this, the complicated and fearlessly plans suggested as the governmental projects are failed in its initial stages in our country.

The claim between the consultant and the employer is regarded as the third factor. Then, there is always a concern that the consulting engineers may have not considered the employer-related problems in their designing and the employer may be exposed to financial damages. So, this factor may cause some unrelated opinions to be expressed by the numbers of the managers of governmental organizations within first and second phases of designing. This reason of this issue may be attributed to the following scenarios:

First of all, if the taste imposed upon the consultant was accepted by him or her, his or her responsibility for proper designing will be negated and all responsibilities will be directed toward the employer. In second scenario, if the consultant refuses to accept the taste imposed upon him, the subordinate departments of governmental organization will usually implement their stonewalling during approval of the project and as a result, the duration of project execution and related costs are directed toward the

consulting engineer. Under these circumstances, the employer will try to implement its own changes through imposing pressure upon the contractor and in all such cases time, cost and consequently the quality of the project would be affected. Nowadays, application of planning and project controlling software-based systems in developed and developing countries as a critical tool for project managers has been accepted. But unfortunately the advantages and disadvantages of planning and project controlling software-based systems are still being debated in our country and such systems are not used in major projects in our country. Then when the activities of a project are not identified, the sequence of these activities could not be formulated and consequently time, resources and the cost of activities could not be estimated appropriately. Under these circumstances, supplies planning for timely provision of the materials and machineries required for the project as well as predicting the activities-related risks and preparing preventive scenarios could not be possible at all.

In minor projects, any deficiency could be coped with through experience, but in major projects in which the volume of works and numbers of involved persons are increased significantly, lack of use of a modern -computer-based and comprehensive planning system and lack of timely provision of the materials will cause the delays resulting from the risks and direct and indirect costs of the project to be increased significantly.

Hypothesis 9: On the strength of this hypothesis, the statistical society assumed that improper use of project management system will give rise to many problems during execution of the project. The issue of application of project controlling software in civil project as a question was raised and the statistical society as the respondent announced that they have used such software in most of civil projects. Of course, it is worthy to note that application of project control software in our country is only limited to time planning and consequently manpower and cost were not planned based on such software.

Hypothesis 10: it is one of the most important hypotheses of this research. The bed required for establishment of risk management in civil projects of Tehran and Zanjan provinces has been studied upon this hypothesis. This hypothesis has been presented according a single questionnaire in which the techniques and software required for implementing risk management in a civil project have been listed.

By glancing briefly down the tables and accepting the hypothesis No. 10, it is found out that the bed required for the execution of the civil projects in two mentioned provinces are sometimes to oftentimes is ready. This bed with the qualitative criterion of sometimes and oftentimes has been ready in Zanjan

and Tehran provinces, respectively. It means that, the bed required for establishment of risk management system as one of the leading techniques of project management in Zanjan province and its counterpart is not ready under any circumstances. We have to bear in mind that the data provided by the statistical society are probably optimistic values.

The issue of underdevelopment of the provinces against Tehran province is among the issues which have been mentioned in great numbers of articles and lectures. Taking into consideration of this point that the higher volume of the projects are implemented in the provinces as well as the scientific and experimental weakness of the contractors, consultants and employers who are working in the provinces, we can certainly affirm that the problem of civil projects of the country will never be solved under any circumstances and as long as the high ranking officials of the country do not include the distribution of training facilities and skilled man power in the provinces in their working policies, any chance of improvement can be expected. As mentioned in the second chapter of this research, Zanjan province is one rank above Tehran province in terms of duration of execution of the projects. It is demonstrated the statistics issued by planning management organization are not in compliance with the criteria existing in project management systems and or the criterion applied for selecting the provinces is a special one which is applicable in our country.

In the last three hypotheses of this questionnaire, the effect of the factor influencing upon strengthening the cost, time and quality-related risks of the project has been studied individually. In each of these three hypotheses, the effect of the factors mentioned in the first ten hypotheses on cost, time and quality as first, second and third priorities has been confirmed by the statistical society.

Cost-related risks of higher rank have been accepted, because in case of any problems during execution of project, the role of project's budget as a shield is usually highlighted. Generally, given the bed existing in the civil projects of the country as well as current culture among different groups of the society, the issue of costing and saving are more important than time. Delay in execution of the projects as penalty would not be directed toward the contractor. On the other hand, the politicians do not have any anxieties over time management and the people do not show any sensitivity to suspended projects. Therefore, time is of less important against the cost. In developed countries, the issues of time and sooner commissioning are more important than huge investment and the sensitivity of the parties and the people to performance of the governments in tax and revenue management. The issue of quality is sometimes ignored and in case of

budget deficit and or accelerating the completion of the projects, the quality as an item is usually ignored due to political pressures and this will cause the quality of the projects to be declined significantly and maintenance costs of the projects to be increased and life cycle of the projects to be decreased as well.

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