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Effect of Investigating the Challenges in the Management of Civil and Oil & Gas Industry Projects by Using Knowledge Management in Projects Fields

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Abstract- Project management components are key elements. Factors associated with failure and non-fulfillment are faced the project with main challenges. In this research to understand the relationship between PMBOK areas in the oil and gas industry construction project management better, some evaluation parameters were determined. Based on 10 knowledge areas & experience of project case studies were determined as a comprehensive hypothesis and it is called: "Influence of PMBOK area on oil & gas construction project management industry." This study contains a lot of professionals & experts points of view in this context with 266 people, 248 questionnaires were analyzed correctly. Following the results of testing of testing P-values, significant level is less than 0.05 and positive regression coefficient with high reliability of 99% in all stages of hypothesis can be said that there is a significant relationship between the studied cases and project management knowledge areas. Since the fact that integration management has the largest scope, influence of all items in this section were measured as an impressive component. The results of this study were suggested as an instruction in order to improve the projects in the oil & gas industry. It can be added to the success of projects by reducing the exciting challenges such as: delays, increase the cost and negative risks of changes, with maintain the quality and customer satisfaction.

Keywords- Project management knowledge, Ranking of management knowledge, Project integration, Statistical analysis, Project scope.

I. Introduction

The projects are always engaged with challenges regarding their nature and governing conditions. In process of time, along with the growing development of technology and its effects on the industries and diverse workplaces, the challenges facing them are also changing and increasing. Since oil and gas projects are considered as the economic basis of the country, hence paying attention to the emerged challenges in them and applying the provisions appropriate to the occurred circumstances and making a suitable decision is very crucial [1].

The project management is the application of knowledge, skills, tools and methods in the project activities in order to satisfy the project requirements. These skills are divided into 10 groups according to the topic and 5 groups based on nature. Therefore, the application of project management knowledge is recommended for accomplishing the civil projects. Challenges & unfulfillment of successive projects in the oil & gas industry indicates that the project management knowledge bases are not specified in the project management plan from the integration management plan due to delinquency in preparing the project charter & risk management identification & stakeholders. Correct identification of the project phases, proper comprehension of projects contract, familiarity with the project management knowledge area and the necessity of employing it in the projects especially in important projects show that this knowledge applies from the beginning to the end of the project. During this period of time, 47 processes are investigated by the areas of the project management knowledge in different phases and their results are continuously controlled [3, 4].

Considering this matter, it shows that what factors can contribute to the success of the projects and the reduction of the encountered challenges in the project management. In this research, we have tried to investigate the existing challenges in the civil projects of the oil and gas industry and specify the effect of the project management knowledge and its related processes on the identified challenges.

The role of shading devices in reducing the thermal gains inside the building is very important. It is an acceptable reality that penetration of daylight inside the building produces a beneficial effect on occupant health and also increases their productivity. The appropriate shading has ability to filter the incident solar radiation and allowing daylight with reduced solar gain inside the building.

II. Literature Review

According to the statistics, most of the projects in Iran straggle alone the timing &cost. Big and national projects of the country are 64% behind schedule averagely. The most important reasons of delay and failure of the projects in Iran include: 1- the lack of the financial credits, 2- the weakness of the contractors and the lack of skilled manpower, 3- the weakness of the project management system [2].

The project management institute, PMI, is undoubtedly one of the most credible centers which has made a lot of efforts in the collection of information and analysis of the best project management methods and documentation and distribution of the project management knowledge by involving more than 700000 members (January 2014) and also has represented valuable services already. PMI is recognized in all of the five continents of the world and has a very high reputation [14].

The history of the project management in the world is usually known as the management of great projects such as the construction of Egyptian pyramids, the Great Wall of China and or Persepolis by Darius command. Each of these projects is among the huge and complicated projects in the human history which are constructed by high standard quality and employment of great manpower. Although the history of project management in the modern world reverts to the first years of the 1900's .Henry Gantt became the pioneer of the next rapid move during 1950 and 1960's in the military and aerospace projects of the United States and then England by developing his innovative bar graph [14].

The basis of the project management system is the Deming or continuous improvement or PDCA cycle. Plan: thinking, Do: execution, Check: control, Act: proceeding.

Fig. 1-1. Project Management Cycle

Lack of integration is the biggest problem in the project. There might be sufficient potential in the components but they do not have good coordination. The area of the project integration management knowledge is continuously active throughout the project; the project always needs integration. This field of knowledge affect can be observed in all process groups [2, 8].

The most important objective of the project management is to achieve the project objectives and reach success in them. The project management helps the managers and clients with the aim of success and reduction of the negative risks and accelerating the project operation. Proper identification of the project management knowledge areas helps them to approach the project objectives. The dependence of Iran's economy on the oil revenue may be discussed in a research which implies the special importance of optimally exploiting the numerous resources of oil and gas. Currently, the main operational limitation and constraint on the development of Iran's oil and gas industry is the inaccessibility to the necessary technical, managerial and financial knowledge [2,5,13].

According to Schlumberger organization which is one of the active reputable organizations in the oil industry at the international level, some of the important results of applying the policies of the knowledge management in this project-oriented company includes a cost saving of more than 200 million dollars along with other intangible benefits. In order to the knowledge management to be practical & realized, an output-oriented attitude should be approached to it. Moreover, its infrastructures and prerequisites should be taken in to consideration by the persons responsible for the knowledge management, especially at marco level [5,9].

According to another research in this field, the most effective parameters in the success or failure of a project are concepts such as planning, monitoring and controlling of the project along with various analyses of risk which have attracted the manager's attention at least during the last two decades. An appropriate control system or an accurate index represents the actual difference between the planned and the real performances, transfers a better knowledge of the current performance of the project to the managers and leads to focus on activities which significantly affect the performance of the project management [9, 11].

Based on an assessment of the vital factors of success in the portfolio of the oil and gas projects in Nigeria in a research, they specified thirteen factors of success during a project which lead to success in a project. Fulfillment of the plan, the determined budget of the project and the management strategy of the portfolio are among these factors [9].

Jui-Sheng Chou & Jang-Ghun Yang used the genetic algorithm structure of success in the projects in a research based on the complementary optimization of the model between the project management knowledge and its execution in the management. They considered some areas of knowledge such as the quality, risk and communications as abstract indices and determined the

properties of the structural optimization by using the GA-SEM model. Then they mentioned that the areas of project management knowledge focus on the project management and its integration which are affected by the other areas of knowledge. Considering a structure for the areas of the project management knowledge was one of the items which was proposed by the researchers in the successful management of the projects and the relationship among the areas of knowledge in various industries was presented according to the demand of the society and customers/ stakeholders. Their research methodology consisted of two deductive and structural models which linearly relates the various visual indices. The logical scale was used among the deductive indices. They employed the genetic algorithm for optimization. Multiple viewpoints in the design, modeling, planned performance and the macro scale of the projects and the diversity of the constraints raise the complexity and problems [10].

The effects of project management (PM) on project success are under the parameters of scheduling, cost, and margins. We adopt a contingency approach that evaluates the complexity of the project, according to 4 categories, the effect of industry sector and countries. The methodological approach involved a longitudinal field survey in 3 countries (Argentina, Brazil, and Chile) with business units from 10 different industries over a 3-year period, and data from a total of 1387 projects were analyzed. Structural equation modeling was used to test the research hypotheses. The results show a significant and positive relationship between the response variable schedule with PM enablers and project management efforts in training and capabilities development. Project complexity has a significant effect on 2 aspects of project success: margin and schedule. Both cross-country and cross-industry analyses show a significant explanatory effect [13].

Project Management (PM) 1 in publicly funded interdisciplinary research (IDR) 2 is an emerging practice for academic scholars, one that derives from PM's origins in the industrial sector. The naturalistic paradigm that guided this case study of the third Digging Into Data Challenge (2014–2016) relied upon qualitative methods, a case study reporting mode, purposive sampling, and inductive, grounded data analysis. Fifty-three researchers representing eleven projects were interviewed. Results suggest that the grant's PM requirement provided researchers with a mechanism of information management. Project managers, whether externally hired or internally designated, were instrumental in coordinating project resources in light of governance issues, data handling, and data sharing across international boundaries. In conclusion, optimizing PM documentation from project inception through closure is recommended to facilitate communications among funders, researchers, and stakeholders. PM documentation is a mechanism for ensuring data integrity and its readiness for valuation metrics at project's end. Future research may explore the merits of mandating formally trained project managers versus supporting academic mentoring trends for project-based training, which apply domain-specific expertise to the role and enable IDR teams to exercise autonomy [8].

III. Research Methodology

This research was performed by using related library resources, papers and theses and interviewing the experts. The information collection tools were based on the preparation of a questionnaire adapted from the experts viewpoints and the existing challenges in the construction projects in the oil and gas industry. The distribution of the questionnaire was accomplished in electronic (online) manner on the contractor/ managers/ client websites and in hard copy.

Recitation was performed by the experts/ managers/ adepts in the oil and gas industry. The results obtained from the questionnaires satisfied the hypotheses of the PMBOK areas by considering a limited statistical population (sample) and simple random sampling with the analysis and processing of the data.

The research questionnaire consisted of a section of individual descriptive information such as age, education, organizational position, etc. and another section of the research main questions corresponding to the subject and variables of the research in 10 separate groups. The number of the presented questions in the research was 130 which were designed according to Likert five-point scale which is shown in Table I.

Table I. Valuation of the Likert five-point scale in this research

Very Low (Strongly Disagree)	Low (Disagree)	Moderate (Neither)	High (Agree)	Very High (Strongly Agree)
1	2	3	4	5

The size of the research sample was obtained equal to 202 individuals by using Cochran formula (formula I) for the finite population of 426 individuals at the error level of 0.05 and the estimation accuracy of 0.95 and considering the value of 0.5 for the success and failure ratio of the sample size but since it was expected that the response rate be less than 100%, thus the number of the distributed questionnaires was increased by 30% compared to the sample size and hence the questionnaires were distributed among 266 individuals in total and eventually 248 individuals were analyzed after checking out the questionnaires and eliminating the questionnaires with missing data.

The formula of the statistical population size with finite N

$$n = \frac{Nz^2pq}{Nd^2+z^2pq}$$ **Formula I: Cochran formula**

Reliability testing of the questionnaire was performed by utilizing Cronbach's alpha coefficient (formula II) for which the results are given in Table II. This method is one of the most important ordinal scales which also specifies the amount of overlapping and alignment of the questions and the amount of accuracy and awareness of the respondents.

$$\alpha = \frac{K}{K-1}\left(1 - \frac{\sum_{i=1}^{K}\sigma_i^2}{\sigma^2}\right)$$

Formula II: Cronbach's alpha coefficient
α : Reliability coefficient
K : Number of the questionnaire questions
σ_i^2 : Variance of each question
σ^2 : Variance of all questions

Table II. Investigation of the reliability of the research variables questionnaire using Cronbach's alpha coefficient

Variable	Question numbers	Number of questions	Cronbach's alpha coefficient
Questionnaire of project scope management	1-13	13	0.967
Questionnaire of project time management	14-26	13	0.982
Questionnaire of project cost management	27-41	15	0.975
Questionnaire of project quality management	42-51	10	0.971
Questionnaire of project manpower management	52-61	10	0.980
Questionnaire of project communication management	62-70	9	0.967
Questionnaire of project risk management	71-88	18	0.983
Questionnaire of project procurement management	89-101	13	0.977
Questionnaire of project stakeholder management	102-110	9	0.972
Questionnaire of project integration management	111-130	20	0.989

Validity testing of the research was accomplished by utilizing the experiences of the respectable supervisor and advisor and the experts in this field.

IV. Results and Discussion

In order to get familiar with the respondents, their demographic variables such as age, education and discipline, organizational position and work experience are presented in detail.
In the present investigation, it can be observed according to Table III and diagram I that 74 individuals (29.8%) of the respondents are women and 174 individuals (70.2%) are men of the total 248 respondents.

Table III. Frequency distribution of the respondents according to gender

Gender	Frequency
Woman	74
Man	174
Total	**248**

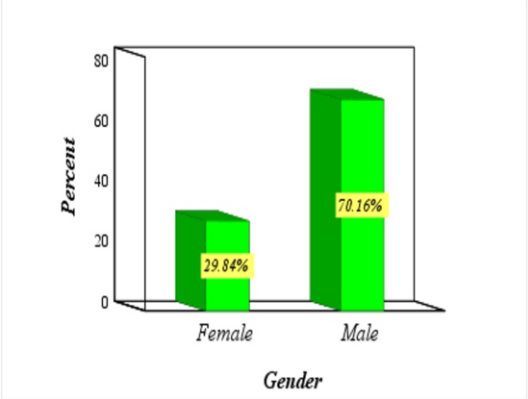

Diagram I. Frequency percentage of the respondents according to gender

As it can also be seen in Table IV, 46 individuals (18.5%) are in the age group of 25 years old and less, 122 individuals (49.2%) of the respondents are in the age group of 26-35 years old, 53 individuals (21.4%) are in the age group of 36-45 years old, 21 individuals (8.5%) are in the age group of 46-55 years old and 6 individuals (2.4%) are in the age group of over 55 years old.

Table IV. Frequency distribution of the respondents according to age group

Age (Years)	Frequency
25 years old and less	46
26-35 years old	122
36-45 years old	53
46-55 years old	21
Over 55 years old	6
Total	**248**

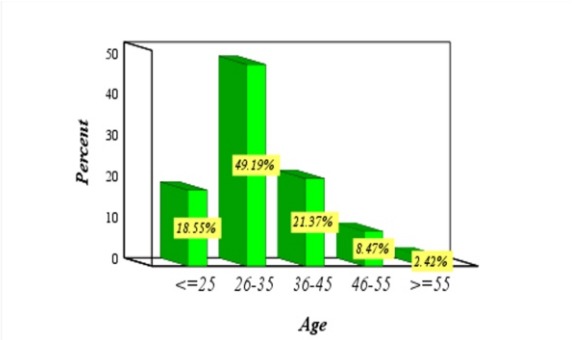

Diagram II. Frequency percentage of the respondents according to age group

As Table V and diagram III imply, 13 individuals (5.2%) have associate's degree, 137 individuals (55.2%) have bachelor's degree, 78 individuals

(31.5%) have master's degree and 20 individuals (8.1%) have doctorate's degree among the 248 respondents in this research.

Table V. Frequency distribution of the respondents according to education level

Education level	Frequency
Diploma and lower	0
Associate	13
Bachelor	137
Master	78
Doctorate	20
Total	**248**

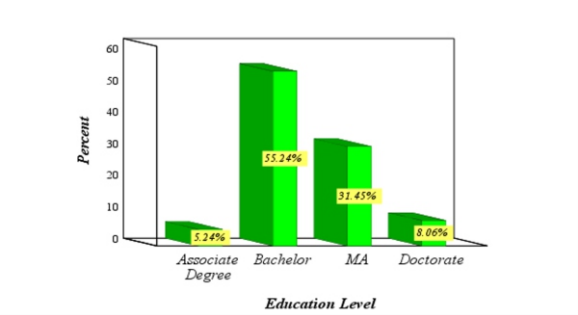

Diagram III. Frequency percentage of the respondents according to education level

As Table VI and diagram IV indicate, 40 individuals (16.1%) are in civil discipline, 47 individuals (19%) are in industrial discipline, 56 (22.6%) are in the project management/ construction field, 58 individuals (23.4%) are in oil discipline and its areas of interest (subdisciplines) and 47 individuals (19%) are in other disciplines among the 248 respondents in this research.

Table VI. Frequency distribution of the respondents according to the field of study

Field of study	Frequency
Civil	40
Industrial	47
Project management/ Construction	56
Oil and its subdisciplines	58
Others	47
Total	**248**

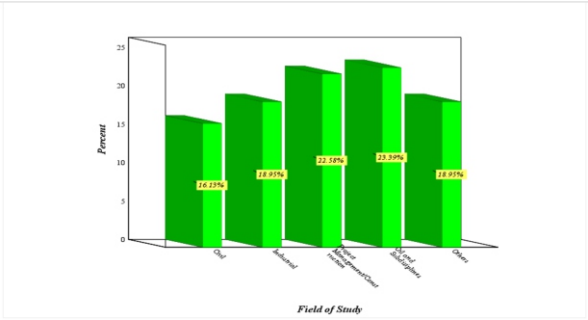

Diagram IV. Frequency percentage of the respondents according to the field of study

As it can be observed in Table VII and diagram V, 27 individuals (10.9%) are in the project manager position, 56 individuals (22.6%) are in the unit manager position, 35 individuals (14.1%) are in the engineering manager position, 48 individuals (19.4%) are in the supervisor position and 82 individuals (23.1%) are in the expert position among the 248 respondents in this research.

Table VII. Frequency distribution of the respondents according to organizational position

Organizational position	Frequency
Project manager	27
Unit manager	56
Engineering manager	35
Supervisor	48
Expert	82
Total	**248**

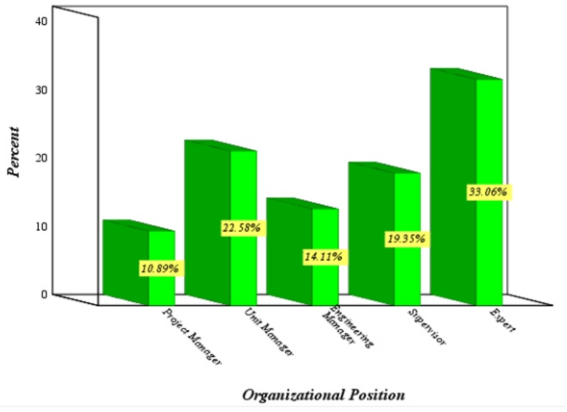

Diagram V. Frequency percentage of the respondents according to organizational position

As it can be seen in Table VIII and diagram VI, 46 individuals (18.5%) have a work experience of 10 years and less, 39 individuals (15.7%) have a work

experience of 11 to 15 years, 93 individuals (37.5%) have a work experience of 16 to 20 years, 53 individuals (21.4%) have a work experience of 21 to 25 years and 17 individuals (6.9%) have a work experience of 26 years and more among the 248 respondents in this research.

Table VIII. Frequency distribution of the respondents according to work experience

Work experience	Frequency
10 years and less	46
11 to 15 years	39
16 to 20 years	93
21 to 25 years	53
26 years and more	17
Total	**248**

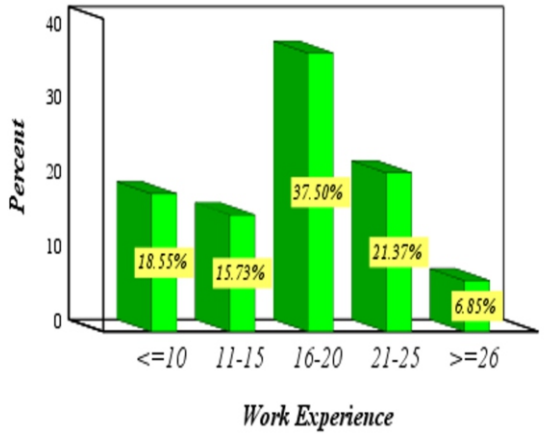

Diagram VI. Frequency percentage of the respondents according to work experience

Data description indices are divided into three groups of central indices, dispersion indices and distribution indices. The distribution manner of the research variables is studied based on the most important central indices (mean and median), dispersion indices (variance and standard deviation) and distribution indices (skewness coefficient and kurtosis coefficient) [15, 16]. Table IX shows the central, dispersion and distribution indices of the research variables.

Table IX. Central, dispersion and distribution indices of the research variables

Index		Variable				
		Project scope management	Project time management	Project cost management	Project quality management	Project manpower management
Central	Mean	3.34	3.28	3.36	3.28	3.35
	Median	3.50	3.46	3.53	3.40	3.50
Dispersion	Standard deviation	0.90	0.98	0.95	0.93	0.99
	Variance	0.81	0.95	0.91	0.87	0.98
Distribution	Skewness	-0.49	-0.26	-0.42	-0.24	-0.43
	Kurtosis	-0.59	-0.81	-0.64	-0.64	-0.71
Sample size		248	248	248	248	248

Index		Variable				
		Project communication management	Project risk management	Project procurement management	Project stakeholder management	Project integration management
Central	Mean	3.31	3.29	3.30	3.35	3.36
	Median	3.44	3.44	3.50	3.50	3.55
Dispersion	Standard deviation	0.97	0.97	0.97	0.95	1.06
	Variance	0.94	0.94	0.94	0.90	1.11
Distribution	Skewness	-0.24	-0.38	-0.43	-0.44	-0.34
	Kurtosis	-0.77	-0.65	-0.68	-0.60	-0.91
Sample size		248	248	248	248	248

According to Table IX and the analysis of the central, dispersion and distribution indices of the research variables, 4 main variables of the project management are as follows and the other items are described according to the information in the table and the following patterns:

1) Project scope management variable; has a mean of 3.34, median of 3.50, a standard deviation of 0.9 and variance of 0.81. The skewness coefficient of this variable is equal to -0.49 which implies that this variable has a skew to the left and regarding that the absolute value of this coefficient is less than unity, thus it does not have much difference with the normal distribution from symmetry aspect. Furthermore, the kurtosis coefficient of this variable is equal to -0.59 which shows that the distribution of the project scope management variable is more dispersed and shorter than the normal distribution and since the absolute value of the kurtosis coefficient is less than unity, hence the distribution kurtosis does not have much difference with the normal distribution.
2) Project time management variable; has a mean of 3.28, median of 3.46, standard deviation of 0.98 and a variance of 0.95. The skewness coefficient of this variable is equal to -0.26 which shows that this variable has a skew to the left and regarding that the absolute value of this coefficient is less than unity, thus it does not have much difference with the normal distribution from symmetry aspect. Moreover, the kurtosis coefficient of this variable is equal to -0.81 which shows that the distribution of the project time management variable is more dispersed and shorter than the normal distribution. In case of that, the absolute value of the kurtosis

coefficient is less than unity so the distribution kurtosis does not have much difference with the normal distribution.

3) Project cost management variable; has a mean of 3.36, a median of 3.53, a standard deviation of 0.95 and a variance of 0.91. The skewness coefficient of this variable is equal to -0.42 which shows that this variable has a skew to the left and regarding that the absolute value of this coefficient is less than unity, thus it does not have much difference with the normal distribution from symmetry aspect. In addition, the kurtosis coefficient of this variable is equal to -0.64 which shows that the distribution of the project cost management variable is more dispersed and shorter than the normal distribution and considering that the absolute value of the kurtosis coefficient is less than unity, thus the distribution kurtosis does not have much difference with the normal distribution.
4) Project integration management variable; has a mean of 3.36, a median of 3.55, a standard deviation of 1.06 and a variance of 1.11. The skewness coefficient of this variable is equal to -0.34 which shows that this variable has a skew to the left and regarding that the absolute value of this coefficient is less than unity, thus it does not have much difference with the normal distribution from symmetry aspect. In addition, the kurtosis coefficient of this variable is equal to -0.91 which shows that the distribution of the project integration management variable is more dispersed and shorter than the normal distribution and considering that the absolute value of the kurtosis coefficient is less than unity, thus the distribution kurtosis does not have much difference with the normal distribution.

Now, the inferential statistics and the normality of the variables is investigated. In order to perform the statistical methods and calculate an appropriate test statistic and logically infer the research hypotheses, the most important action prior to any other proceeding is to select an appropriate statistical method for the research. In this order, awareness about the distribution of data has an essential priority. Therefore, Kolmogorov-Smirnov credible test is employed in this research in order to investigate the hypothesis of normality of the research data. This test assesses the normality of the data based on the following hypotheses [15, 16].

H0: The data have a normal distribution.

H1: The data do not have a normal distribution.

The judgment procedure according to the table of Kolmogorov-Smirnov test is such that if the significance level (sig) for all variables is greater than the test level (0.05) then the data distribution is normal [xvii, xviii]. The results of this test are given in Table X.

Table X. Results of Kolmogorov-Smirnov test for the research variables

Variable		Project scope management	Project time management	Project cost management	Project quality management	Project manpower management
Sample size		248	248	248	248	248
Normal distribution parameters	Mean	3.34	3.28	3.36	3.28	3.35
	Standard deviation	0.90	0.98	0.95	0.93	0.99
Kolmogorov-Smirnov test statistic		0.58	0.58	0.58	0.57	0.61
Test significance level		0.77	0.83	0.85	0.91	0.52
Test result		**Normal**	**Normal**	**Normal**	**Normal**	**Normal**

Variable		Project communication management	Project risk management	Project procurement management	Project stakeholder management	Project integration management
Sample size		248	248	248	248	248
Normal distribution parameters	Mean	3.31	3.29	3.30	3.35	3.36
	Standard deviation	0.97	0.97	0.97	0.95	1.06
Kolmogorov-Smirnov test statistic		0.58	0.57	0.60	0.61	0.59
Test significance level		0.84	0.98	0.64	0.54	0.72
Test result		**Normal**	**Normal**	**Normal**	**Normal**	**Normal**

Analysis of Table X. The results of Kolmogorov-Smirnov test for the 4 main variables of the project management are described below according to the research data and the other variables are described according to the information given in the table and the following patterns:

- Project scope management variable has a normal distribution according to the result of the Kolmogorov-Smirnov test because the significance level obtained from this test is equal to 0.077 and this value is greater than 0.05.
- Project time management variable has a normal distribution according to the result of the Kolmogorov-Smirnov test because the significance level obtained from this test is equal to 0.083 and this value is greater than 0.05.
- Project cost management variable has a normal distribution according to the result of the Kolmogorov-Smirnov test because the significance level obtained from this test is equal to 0.085 and this value is greater than 0.05.
- Project integration management variable has a normal distribution according to the result of the Kolmogorov-Smirnov test because the significance level obtained from this test is equal to 0.072 and this value is greater than 0.05.

Before testing the hypotheses, the research variables should be explained and interpreted first in order to specify the status of the variables in the studied sample. According to the normality of the data distribution; the one-sample t test with a test value of 3 and a confidence interval (error of 5%) is used (Table XI). The hypotheses presented for the test are as follows:

H0 (Proposition negation): The variable exists in a moderate and weak status in the statistical population.

$$H_0 = \mu \leq 3$$

H1 (Proposition): The variable exists in a strong status in the statistical population.

$$H_1 = \mu > 3$$

The procedure of judgment about the status of the variables is such that if the significance level (sig) is greater than 0.05, then the null hypothesis is accepted and the studied variable does not have a significant difference with the test value of 3 and hence the studied factor exists in the moderate status in the statistical population. Also, if the sig value is less than 0.05 and the lower and upper limits are both negative, then the studied variable has a significant difference with the test value of 3 and the mean of the studied variable is less than the test value of 3. Therefore, the null hypothesis is accepted and the studied variable exists at a weak level in the statistical population; but if the sig value is less than 0.05 and the lower and upper limits are both positive, then the studied variable has a significant difference with the test value and the mean of the studied variable is greater than the test value of 3. Thus, the statistical null-hypothesis is rejected and the studied factor exists in a strong status in the statistical population [15, 16]. The results of the means test of a statistical population are presented in Table XI.

Table XI. Results of a means test of a statistical population

Variable	Mean	Standard deviation	t value	Sig	Lower limit	Upper limit	Variable status
Project scope management	3.34	0.90	5.89	0.00**	0.22	0.45	**Appropriate**
Project time management	3.28	0.98	4.59	0.00**	0.16	0.41	**Appropriate**
Project cost management	3.36	0.95	5.88	0.00**	0.24	0.48	**Appropriate**
Project quality management	3.28	0.93	4.78	0.00**	0.17	0.40	**Appropriate**
Project manpower management	3.35	0.99	5.63	0.00**	0.23	0.48	**Appropriate**
Project communication management	3.31	0.97	4.96	0.00**	0.18	0.43	**Appropriate**
Project risk management	3.29	0.97	4.70	0.00**	0.17	0.41	**Appropriate**
Project procurement management	3.30	0.97	4.83	0.00**	0.18	0.42	**Appropriate**
Project stakeholder management	3.35	0.95	5.89	0.00**	0.24	0.47	**Appropriate**
Project integration management	3.36	1.06	5.32	0.00**	0.22	0.49	**Appropriate**

**= Confidence level of 99% (P<0.01)

According to the results given in Table XI, the test sig is less than 0.05 for all variables which proves the significant difference between the mean of these variables and the test value of 3 but according to the table, the upper and lower limits of all the variables except the variable of lack of integrity, security and privacy are positive; thus, their mean is greater than 3. Therefore, the null hypothesis is accepted and it is deduced that with the confidence level of 99%, this variable exists in the statistical population in a weak status. The investigation of the hypothesis is performed in this stage after accomplishing the previous steps confidently.

Hypothesis description: It seems that ranking of knowledge management in projects have an essential influence on the management of the civil projects in the oil and gas industry.

Hypothesis analysis: This hypothesis includes 9 tests which investigate those items in the integration and management of the project. The results of this investigation are adapted from Table XII. The multiple regression output. In the following, 3 tests of the main variables of the project management are explained and their effect on the project integration is mentioned. The other hypotheses are also explained according to the table data and the following patterns.

Table XII. Multiple regression output

Variable	Nonstandard coefficients (*B*)	Standard error	Standard coefficients (β)	Significance (*t*-) value (*value*)	Significance (*sig*) level	Rank	*Tolerance*	Variance Inflation Factor (*VIF*)	Result in model
Constant value	-1.01	0.10	--	-9.90	0.00**	--	--	--	--
Project scope management	0.23	0.04	0.20	6.27	0.00**	1	0.39	2.59	**Effective**
Project time management	0.17	0.03	0.16	4.99	0.00**	3	0.38	2.61	**Effective**
Project cost management	0.21	0.04	0.19	5.78	0.00**	2	0.36	2.79	**Effective**
Project quality management	0.18	0.04	0.16	4.92	0.00**	4	0.37	2.68	**Effective**
Project manpower	0.10	0.03	0.09	3.37	0.00**	7	0.53	1.89	**Effective**
Project communication	0.08	0.03	0.07	2.72	0.00**	9	0.55	1.83	**Effective**
Project risk management	0.14	0.04	0.13	3.70	0.00**	5	0.29	3.40	**Effective**
Project procurement	0.12	0.04	0.11	3.40	0.00**	6	0.36	2.78	**Effective**
Project stakeholder	0.09	0.02	0.08	3.74	0.00**	8	0.78	1.28	**Effective**
Watson–Durbin statistic	1.815	Errors are not interdependent in the model.							
Adjusted coefficient of determination	0.906	90.6% of the changes in the project integration management is explained by these nine variables applied in the model.							
Fisher I significance level	0.00	The linear relationship of the model is accepted.							

** Confidence level of 99% (P<0.01)

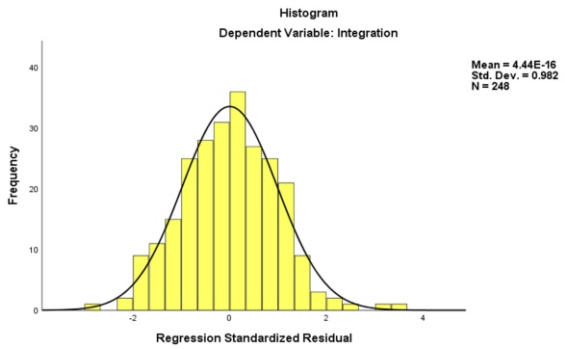

Diagram VII. Frequency distribution of the multiple regression errors

First hypothesis testing

<<Project scope management has a significant effect on the project integration management of the civil projects in the oil and gas industry>>.

H0: Project scope management does not have a significant effect on the project integration management of the civil projects in the oil and gas industry.

H1: Project scope management has a significant effect on the project integration management of the civil projects in the oil and gas industry.

According to Table XII, the significance level of the regression model between the project scope management and the project integration management is equal to 0.00 which is less than 0.05. The significance level of the effect of the project scope management on the project integration management is equal to 6.27 which is greater than 1.96 and shows that the project scope management variable is effective in the project integration management. The effectiveness level of the project scope management of the project integration management is equal to 0.20 according to the standard path coefficient which indicates that the project integration management will increase in the same direction and by 0.20 units along with a unit increase in the project scope management. Also, the project scope management has the highest importance of effectiveness on the project integration management compared to the effects of the other independent variables on the project integration management. Therefore, the first hypothesis of the research is approved with a confidence level of 99% and the project scope management is effective in the project integration management in the civil projects in the oil and gas industry.

According to the analysis of the data in Table XII. Multiple regression output, all hypothesis of the research such as the first one shows that confidence level is 99% and the project management is effective in the oil and gas industry construction project management.

V. Conclusion

The results obtained from the research showed that there has been a significant relationship between the 9 areas of the project management knowledge and the project integration knowledge with the most influence from other areas and all process groups in the oil and gas industry. This research mainly investigated the challenges of the project management knowledge in the civil projects in the oil and gas industry and indicated that the observation of each of these areas increases the tendency to enhance the success of these projects. Possessing organizational knowledge, culture building, formation of PMO in organizations and control and proceeding in this area are among the approaches to success. In Iran, considering periodic researches in this field in all of the company projects and especially effective projects such as the national projects is crucial and important and reflecting their results in the form of operational procedures for the commitment of both parties in the project contracts can significantly lead to success in the projects. The results obtained from this research were adopted as a recommended procedure in the contract documents which should be observed in the future projects due to the relationship with the industry and finding these challenges in the similar projects during the recent years. It is hoped that the results of this research and the similar researches can enhance the success and improvement of the projects and the researchers focus more than ever on researches related to the industry and university.

At the end, Compared with similar research in these recent years this study has lots of strengths and one weakness, which are mentioned below:

Strengths

- Survey all ranges of project management knowledge from the beginning phases until the end in oil & gas construction projects
- Survey all influences of knowledge area & project success in one of the hypothesis & generalize it
- The research was carried out in sprit of cooperation with the experts & practitioners in this field & who are familiar with project management knowledge in industry
- All the questions were posed based on the projects conditions and our country problems
- The result of the executive instruction entered the industry to reduce the upcoming projects failure and active more successes in this industry

Weakness

- Since the number of the comprehensive questions were too much and also several domains, at first the respondents were not interested in completing the questionnaires

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