Original Article

Investigating Relationship between Technology Competency and Quality Management in Bank Branches

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ABSTRACT

The purpose of this article was to investigate the relationship between IT competence and quality management in Melli Bank branches in Behshahr. The research method was applied according to the purpose and descriptive and survey type according to the data collection. The statistical population of the study included all official, contract, and contract employees of Melli Bank branches in Behshahr. A total of 134 people were reported, 98 of whom were randomly selected as a research sample according to Krejcie Morgan's table. The data collection instrument in this study was a researcher-made questionnaire. In this paper, structural equation modelling was used to analyze the data. The results showed that there was a relationship between IT competence and total quality management. Further, there was a positive and significant relationship between IT competence and leadership, strategic planning, customer attention, information analysis, human resource management, supplier management, and process management.

Introduction

The drilling industry is one of the most important and costly upstream oil industries, which always faces several risks for investment. These risks increase in drilling exploratory wells due to the unknown field. Since conventional contracts in this industry are daily and in-depth, due to the high risk of drilling

exploratory wells, drilling contractors are less inclined to conclude in-depth contracts in exploratory wells, so the highest risks are borne by the employer and he will encounter the resulting costs. Therefore, the employer tends to transfer some of these risks to the other party or parties by designing Design, Supply and Drilling Contracts (EPD) [1-3].

EPD 1, known in the downstream industry as turnkey contracts, are new contracts in the drilling industry that can be attractive to both employer and contractor. In this type of contract, the design, supply of equipment and goods, as well as drilling wells are the responsibility of the drilling contractor [4].

Therefore, all risks in all three stages are the responsibility of the contractor; therefore, these contracts are attractive to employers. In exploration wells, these contracts are less attractive to drilling contractors due to their

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multiple risks. Therefore, by managing and allocating new risk by placing conditions and clauses, these contracts can be replaced by the format of previous contracts [5-7].

Considering what was stated above, we sought to examine the contractual and technical risks of exploration wells in the form of design contracts, supply of goods and drilling. Also, we aimed at including conditions in design contracts, supply of goods and drilling in order to optimize costs, as well as achieving the desired exploration goals in exploration wells. At the same time, we showed that these conditions should not diminish the attractiveness of this type of contract.

The need for Further Research

Due to Article 44 of the Constitution and the outsourcing policy for the Ministry of Oil and the National Oil Company as one of the main companies of this ministry and the Oil Exploration Management as the representative of the National Oil Company in exploration projects, there has been a recent trend in the field of study. These contracts have been made in that management. By conducting this research, for the first time in the country, we are trying to take a positive and effective step towards the realization of this policy.

Literature Review

Research has addressed the field of EPD contracts in the world and the field of production wells in Iran, also projects in this feld have been done in South Pars field. However, a comprehensive and complete research on this issue has not been done yet. In drilling exploratory wells in the world and in Iran, research on contractual risks of this type of contract and how to allocate these risks has not been done yet [8].

Research Method

This is basically a Structural Equation Modelling (SEM) study. First, using related articles and books, we defined the types of oil wells and explain the difference and importance of exploratory wells, then we examined the common contracts in the drilling industry. In the next step, according to the experiences of experts and related people in the exploration well drilling industry and its contracts in exploration management and guidance, the esteemed supervisor has applied design, supply and drilling contracts and its risks in drilling exploratory wells. Let us give a brief overview [9-11]. Finally, using all these resources and new methods of allocation and risk management, we propose conditions for balancing and attractiveness of this type of contracts.

Data Collection

In the course of this research, we relied on a variety of books, related articles, which are given in the references section. Also, to better carry out the study, we consulted expert and experienced industrial consultants in this field. We first defined oil wells and types of wells, then in the third chapter we examined the types of common contracts in the drilling industry, followed by examining contractual risks and new methods for managing and their allocation. After that, a comparison was made between the risks of EPD contracts with other contracts in the drilling industry and in particular the drilling of exploratory wells [12-14].

Data Analysis

In this paper, data analysis was performed using descriptive and inferential statistics. Thus, first, descriptive statistics were used to describe the results obtained from the statistical population. In descriptive statistics, to organize, summarize, classify and describe the sample sizes, frequency distribution table, percentage, graph, and average were used. Hypotheses were analyzed and tested with the help of inferential statistics [12-14].To test the hypotheses, the structural equation test has been used to analyze the data and measure the correlation and using the statistics of t, F, and the probabilities related to the hypothesis test at a confidence level of ninety-five percent. In addition, all steps of description, composition, and testing of hypotheses were performed using SPSS 18 and LISREL [15-17].

Data Description

In this research, descriptive statistics including frequency tables and bar charts were used to analyze the research data and the research hypotheses were investigated using various statistical tests. In the descriptive analysis, the researcher first gives the data were first presented, and then the collected data were summarized by showing the frequency distribution table accompanied by graphs. Here, the researcher dealt with the demographic data collected from the statistical sample using frequency distribution tables, statistical graphs, and appropriate descriptive analysis tools. The results of the analysis are as follows

Table 1 Frequency distribution of sample size by level of education

Degree of education	Associate Degree	Master degree and higher	Bachelor	Total
Number	9	69	20	**98**
Percentage	9.2	70.4	0.4	**100**

Table 2 Frequency distribution of sample size by respondents' working experience

Work experience	Under 5 years	15 years and up	10 to 15 years	5 to 10 years	Total
Number	8	17	49	24	**98**
Percentage	8.2	17.3	50	24.5	**100**

Table 3 Calculation of descriptive indicators of IT competency components

Statistical index	The highest score	The lowest score	Standard deviation	Variance	Average responses
IT integration	5	3.75	0.26	0.07	**4.47**
IT Management knowledge	5	3.33	0.43	0.18	**4.60**
IT technical knowledge	5	3.25	0.33	0.11	**4.44**
Flexible IT infrastructure	4.8	3.80	0.24	0.06	**4.27**
IT competencies	4.95	3.77	0.24	0.06	**4.45**

Exploratory Factor Analysis of IT Integration Variable

In order to analyze the data more accurately and achieve the results of the research, a solution to reduce the number of variables and identify their internal structure can be effective. Exploratory factor analysis is a method that tries to explore the basic variables or factors in order to explain the correlation pattern between the observed variables. What we seek to achieve in this section was to examine the correlation relationships between the apparent variables and the exogenous ones that formed the instrument for measuring the main variables of the research. Using heuristic factor analysis, we will be able to identify the latent variables that play a major role in explaining the changes of obvious variables and define their relationships with each other and other variables in the form of hypotheses [18-20]. Exploratory factor analysis was performed on all variables using SPSS software. The first variable is IT integration, which consists of 4 questions. The results of the KMO–Bartlett test of the IT integration variable are shown in Table 5 below. A value of more than 0.5 KMO statistics confirms the adequacy of sampling and the confidence level of 0.002 for the Bartlett test also indicates the appropriateness of the factor model cited. The calculated KMO is equal to 0.57 (above 0.5). Therefore, the calculations indicate the adequacy of sampling. In the next step, we must identify the number of hidden factors. For this purpose, in Table 5 below, the results of determining the number of current factors in terms of specific values are presented [21-23]. The column of initial eigenvalues indicates the number of latent factors of the research and the number of total eigenvalues above 1 indicates the latent factors. Therefore, the eigenvalue column of the IT integration variable introduces two factors with an eigenvalue greater than 1, so the proposed factor structure will have two factors. In order to investigate the appropriateness of the extracted factors up to this stage, the reproduced correlation matrix can be used. This matrix calculates the correlation between the factors using their load on the extracted factors and compares them with the original correlation between the variables. The small amounts of residues indicate the appropriateness of the identified operating structure. Differences greater than 0.05 are considered undesirable, which is not observed in this table. Therefore, the appropriateness of the factor structure explored from this criterion is also confirmed. As can be seen in Table 6, heuristic factor analysis was able to identify and extract the latent factor. After identifying the most related factor of IT integration, it is necessary to test the validity of the relationship between this factor and the obvious variables. This is done by confirming the relationships between the variables in the form of a measurement model and through Lisrel software.

Table 4 Calculation of descriptive indicators of TQM components

Statistical index	The highest score	The lowest score	Standard deviation	Variance	Average responses
Attention to the customer	5	3.40	0.37	0.13	**4.63**
Human resources management	5	3.50	0.30	0.09	**4.27**
Leadership	5	3.25	0.28	0.8	**4.61**
Process management	5	3.25	0.42	0.18	**4.53**
Strategic planning	4.25	3.5	0.22	0.05	**4.29**
Supplier management	5.4	3.5	0.23	0.05	**4.08**
Data analysis	5	3.5	0.41	0.17	**4.55**
Total Quality Management	4.86	3.83	0.22	0.50	**4.42**

Table 5 KMO-Bartlett test results

KMO sampling adequacy criterion	0.57
Coefficient of Barlett test	**21.01**
Degrees of freedom	**6**
Significance level	**0.002**

Table 6 Total explained variance of the hidden factor of IT integration

Factor	Initial eigenvalues		
	The cumulative percentage	Percentage of variance	Total
1	36.26	36.28	**1.45**
2	62.60	26.22	**1.05**

Table 7 Reproduced correlation matrix based on factor loads

Criterion	Agent 2	Agent 1	Question
Having IT allows you to read and interpret a spreadsheet software in the company	-0.72	-0.13	**S1**
Having IT allows you to create and use a spreadsheet software in the company	0.57	-0.56	**S2**
Having IT allows you to use the Internet search engine in the company	0.44	0.63	**S3**
Having IT allows you to use a URL to locate a page	-0.06	0.84	**S4**

Inferential Statistics (Testing Research Hypotheses)

As the main hypothesis, there is a positive and significant relationship between IT competence and TQM.

Table 8 Calculating the relationship between IT competence and TQM

Variable statistical index	Test result	T-Value	Impact coefficient β	Significance level	Number of respondents
IT competency and total quality management	Reject H_0	21.23	0.90	0.00	**98**

According to the reliability coefficient of 0.99 and the significance level of the structural equation test (0.00) which is less than the default value (0.01) and the calculated T-value (21.23) which is more than 1.96., the null hypothesis, i.e. no relationship between IT competency and TQM, is rejected and the opposite hypothesis, i.e. the relationship between IT competency and TQM, is accepted. In other words, it can be concluded that there is a significant relationship between IT competency and management Total quality. Also, the value of impact factor indicates that IT competence of 0.90 affects total quality management. The results of this test can also be generalized to the statistical population with 99% confidence.

Hypothesis 1: There is a positive and significant relationship between IT competence and leadership.

Table 9 Calculating the relationship between IT competence and leadership

Variable statistical index	Test result	T-Value	Impact coefficient β	Significance level	Number of respondents
IT competence and leadership	Reject H_0	5.96	0.56	0.00	**98**

According to the reliability coefficient of 0.99 and the significance level of the structural equation test (0.00) which is less than the default value (0.01) and the calculated T-value (5.96) which is more than 1.96, assumption zero, i.e. no relationship between IT competence and leadership, is rejected and the opposite assumption, i.e. no relationship between IT competence and leadership, is accepted. In other words, it can be concluded that there is a significant relationship between IT competence and leadership. Also, the value of the impact factor indicates that IT competency has an effect of 0.56 on leadership. The results of this test can also be generalized to the statistical population with 99% confidence.

Hypothesis 2: There is a positive and significant relationship between IT competence and strategic planning

Table 10 Calculating the relationship between IT competence and strategic planning

Variable statistical index	Test result	T-Value	Impact coefficient β	Significance level	Number of respondents
IT competence and strategic planning	Reject H_0	4.60	0.43	0.00	**98**

According to the reliability coefficient of 0.99 and the significance level of the structural equation test (0.00) which is less than the default value (0.01) and the calculated T-value (4.60) which is more than 1.96, the null hypothesis, i.e. no relationship between IT competency and strategic planning, is rejected and the opposite hypothesis, i.e. no relationship between IT competence and strategic planning, is accepted. In other words, it can be concluded that there is a significant relationship between IT competence and program strategic planning. Also, the value of the impact factor indicates that IT competency of 0.43 affects strategic planning. The results of this test can also be generalized to the statistical population with 99% confidence [13-15].

Hypothesis 3: There is a positive and significant relationship between IT competence and customer attention.

According to the reliability coefficient of 0.99 and the significance level of the structural equation test (0.00) which is less than the default value (0.01) and the calculated T-value (9.13) which is more than 1.96, assumption zero, i.e. no relationship between IT competence and customer attention, is rejected and the opposite assumption, i.e. no relationship between IT competence and customer attention, is accepted. In other words, it can be concluded that there is a significant relationship to the customer between IT competence and customer attention. Also, the value of the impact factor indicates that the competence of information technology 0.76 has an effect on customer attention. The results of this test can also be generalized to the statistical population with 99% confidence.

Hypothesis 4: There is a positive and significant relationship between IT competence and information analysis.

Table 11 Calculating the relationship between information technology competence and customer attention

Variable statistical index	Test result	T-Value	Impact coefficient β	Significance level	Number of respondents
IT competence and customer attention	Reject H_0	9.13	0.76	0.00	**98**

Table 12 Calculating the relationship between IT competence and information analysis

Variable statistical index	Test result	T-Value	Impact coefficient β	Significance level	Number of respondents
IT competence and information analysis	Reject H_0	14.38	0.84	0.00	**98**

According to the reliability coefficient of 0.99 and the significance level of the structural equation test (0.00) which is less than the default value (0.01) and the calculated T-value (14.38) which is more than 1.96, the null hypothesis, i.e. no relationship between IT competence and information analysis, is rejected and the opposite assumption, i.e. no relationship between information technology competence and information analysis, is accepted. In other words, it can be concluded as follows that there is a significant relationship between information analysis and information technology competence. Also, the value of the impact factor indicates that IT competency of 0.84 affects information analysis. The results of this test can also be generalized to the statistical population with 99% confidence.

Hypothesis 5: There is a positive and significant relationship between IT competence and human resource management.

Table 13 Calculating the relationship between IT competence and human resource management

Variable statistical index	Test result	T-Value	Impact coefficient β	Significance level	Number of respondents
IT competence and human resource management	Reject H_0	7.34	0.52	0.00	**98**

According to the reliability coefficient of 0.99 and the significance level of the structural equation test (0.00) which is less than the default value (0.01) and the calculated T-value (7.34) which is more than 1.96, assumption zero, i.e. no relationship between IT competence and human resource management, is rejected and the opposite assumption, i.e. no relationship between IT competence and human resource management, is accepted. In other words, it can be concluded that there is a significant relationship between IT competence and human resources management. Also, the value of impact factor indicates that IT competency has an effect on human resource management of 0.52. The results of this test can also be generalized to the statistical population with 99% confidence.

Hypothesis 6: There is a positive and significant relationship between IT competence and process management.

Table 14 Calculating the relationship between IT competence and process management

Variable statistical index	Test result	T-Value	Impact coefficient β	Significance level	Number of respondents
IT competence and process management	Reject H_0	9.6	0.77	0.00	**98**

According to the reliability coefficient of 0.99 and the significance level of the structural equation test (0.00) which is less than the default value (0.01) and the calculated T-value (9.6) which is more than 1.96, assumption zero, i.e. no relationship between IT competence and process management, is rejected and the opposite assumption, i.e. no relationship between IT competence and process management, is accepted. In other words, it can be concluded that there is a significant relationship between IT competence and process management. Also, the value of the impact factor indicates that IT competency of 0.77 has an effect on process management. The results of this test can also be generalized to the statistical population with 99% confidence.

Hypothesis 7: There is a positive and significant relationship between IT competence and supplier management.

Table 15 Calculating the relationship between IT competence and supplier management

Variable statistical index	Test result	T-Value	Impact coefficient β	Significance level	Number of respondents
IT competence and supplier management	Reject H_0	5.04	0.30	0.00	**98**

According to the reliability coefficient of 0.99 and the significance level of the structural equation test (0.00) which is less than the default value (0.01) and the calculated T-value (5.04) which is more than 1.96, the null hypothesis, i.e. no relationship between IT competence and supplier management, is rejected and the opposite assumption, i.e. no relationship between IT competence and supplier management, is accepted. In other words, it can be concluded that there is a significant relationship between IT competence supplier management. Also, the value of the impact factor indicates that IT competency of 0.30 has an effect on supplier management. The results of this test can also be generalized to the statistical population with 99% confidence.

Confirmatory Factor Analysis of the Model

According to the obtained values, and the calculated x2 value is equal to 4.18, which is more than 3, and the RMSEA value is equal to 0.00, which is less than the allowable limit of 0.1, and the values of GFI, CFI, NFI, AGFIs greater than 0.9. Based on the values in Table 16, it can be concluded that the suitability of the model is approved.

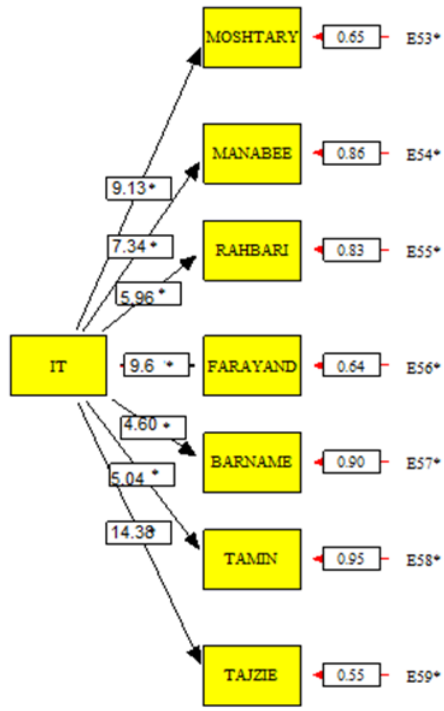

Figure 1 Final measurement model of the model with respect to T-Value values

Table 16 Fit indicators of the final model

	Index title	**Amount**	**Acceptable domain**	**Result**
Squared	$\frac{x^2}{df}$	4.18	$\frac{x^2}{df}$	**very well**
The root of the error of the mean squared approximation	RMSEA	0.00	RMSEA < 0.1	**very well**
The root of the mean of the remaining squares	RMR	0.009	RMR ≥ 0	**very well**
Goodness of fit	GFI	0.99	GFI > 0. 9	**very well**
Modified fit goodness index	AGFI	0.99	AGFI > 0.85	**very well**
Normalized Fit Index (Bentler-Bount)	NFI	0.99	NNFI > 0.90	**very well**
Adaptive Fit Index	CFI	1	CFI > 0. 90	**very well**
Incremental fit index	IFI	1.40	IFI > 0. 90	**very well**

Conclusion

The present study investigated the relationship between IT competence and quality management in Melli Bank branches in Behshahr. In this regard, the relationships between information analysis, human resource management, leadership, process management, strategic planning, supplier management, customer attention with IT competence in the branches of Melli Bank in Behshahr were considered. It has often been debated whether IT is the most important factor in increasing productivity, improving organizational performance, and reducing costs. The result of investing in IT can be found in this research. However, the results of other studies show that IT has no special effect on quality management, productivity, and the competitive advantage of organizations. Don and Kramer (2020) also used national data and reported that investing in IT has a significant positive impact on GDP in developed countries rather than developing countries. Various ways to improve quality, reduce costs and increase productivity have been explored by manufacturers, service providers, and researchers to achieve continuous performance improvement. These methods include total quality management, comprehensive maintenance, re-engineering of business processes, production resource planning, JIT, and more. Weston (2019) also claims that all of these methods, which are somehow related to information technology, act as a feedback mechanism for users interested in measuring performance and productivity, as well as faster and more accurate access to information, improving communication links and simplify the implementation and implementation of advanced tools, systems, and modeling techniques for us. IT has received much attention in different countries. So, most countries have made huge investments in this field. The use of information technology changes the work skills of individuals; therefore, in this case, staff training is more important. On the other hand, information technology should be used in a way that maximizes efficiency, creativity, job satisfaction, and flexibility. In general, the development of the use of information technology affects various aspects of TQM and is used as strong support for quality management. Finally, the use of information technology in total quality management leads to increased productivity.

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