



Evaluating The Effect of Driving Factors On Success of Business Intelligence in Baking Industry

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Abstract: Nowadays, the world of business intelligence is considered as a very dynamic field and the organizations which have no interest or lack of interest in such issue, will lose their part of flexibility. Due to the failure in providing on-time data to the beneficiaries, these organizations are unaware of the business intelligence and its key factors of success, and also they cannot be synchronized with the growing movement of the world, a movement which requires a planning for the improvement of the intelligence systems of the organization. The main purpose of this research is to identify and prioritize the key factors of the success in business intelligence. So, all the Mellat Bank branches in the city of Tehran in Iran have been studied as a statistical society.

In terms of methodology, the research is a kind of survey-practical research which is based on descriptive-correlation and also exploratory-survey methods. Required data is collected through the questionnaire. To localize these scales, the conceptual literature is considered and the questions and extracted factors are regulated, validated, confirmed and distributed. The validity of the factors is recognized by experts and the validity of the structure is confirmed through the confirmatory factor analysis and KMO index. The Cronbach's alpha method is used to calculate and confirm the reliability. In science statistical package for the social (SPSS) and the linear structural relations (LISREL), the quantitative researches were used to confirm the hypotheses and proposed model of the research, this means that, the relations of all the aspects and business intelligence is approved, therefore, the recognized factors are the appropriate explanatory of business intelligence, and as a result, the assumed relations in the model have significantly been approved. Other results indicate the rank of the presented aspects and indexes as well as suitability and proper approximation degree of the model in studied society.

Key words: business intelligence, key factors of the success, information quality, business planning, system management, system alignment with business strategies

INTRODUCTION

Business intelligence is a broad category of the applications and collected technologies, obtaining and analyzing massive amounts of data for effective business decision making of the organization. A business intelligence technology generally consists of modeling rules, data classification, data warehouse and online analysis processes. So, the background and the fundamental purpose of business intelligence are to profoundly exploit the massive amount of data in order to create a competitive advantage for the organization [1]. According to Rukart, the key factors of the success are a limited number of activity areas which lead to the successful competitive function [2]. Business intelligence refers to the process of converting raw data into the business and management information which helps the decision makers of the organization to make their decisions better and faster and act according to accurate information [3]. In the other words, business intelligence is a set of concepts, methods and processes for improving the business decisions which use multiple sources of information and apply experience and assumptions in order to provide an accurate understanding of business dynamics [4]. The business intelligence indicates the tools,

technologies and processes which are required for converting data into information and information into knowledge and plans that can optimize the businesses. In fact, business intelligence converts the data into knowledge by means of analysis tools and thus, helps the decision-making process [5].

Since the recent studies introduce the business intelligence as a requirement for success, the present study attempts to identify the key factors of the success of business intelligence, and then they would be prioritized according to their importance. In 1958, Hans Peter Lahen, one of the researchers of the IBM Company, used the term "business intelligence" in his article which means, "the ability of mutual comprehension of presented facts in such a way that it can be used to achieve the desired goal". Gartner introduced the business intelligence as a set of concepts, plans and methods to make a business decision through fact-based support systems. But, what we know today as the business intelligence, had begun since the early 1960s about the decision-making support systems and had completed until the mid-1980s. These systems have originated from computer-based models which are created in order to help the organization to make a decision and plan; and like these systems, some tools have been in the spotlight, such as information systems of the managers, linear analysis process and business intelligence that have been started in late 1980s. In 1989, a researcher named Howard Dresner, one the researchers of the Gartner Group, used the term "business intelligence" for the first time and introduced that as a set of concepts and methods to develop the business decision-makings by mean of fact-based support systems which consists of a set of applications and analysis programs that help to make a decision for business intelligence activities through citing the analytical and operational database. Before the start of information age in late 20th century, the companies had to collect their required data from the non-mechanized sources. When companies automated their systems, more information was available for them than the past. In terms of general and conceptual plan, in this research, the effective factors on business intelligence and the relations between the recognized variables and business intelligence are studied. The operational definition, extraction of the concepts, aspects and the components of the variables are considered in order to assess these relations, and the patterns and aspects of each of them are used in research structure, conceptual model, theoretical framework, questionnaires and generally in research plan. Moreover, the SPSS and LISREL software are used to analyze the data and apply the statistical analysis.

2- Methodology

Briefly, the present research is a kind of survey-descriptive research in terms of method and the way of data gathering; is functional research in terms of purpose; is cross-sectional research in terms of the time of the collecting data and from the aspect of the type of the relations between variables, it is done through correlation method and has an important feature of survey researches. Research statistical society comprises of all the managers, official and contractual employees in the Bank Mellat branches in the city of Tehran. Two methods of field and library are used to collect the required data. The main instrument for data collection is questionnaire, and the obtained data from the questionnaires are analyzed in two parts of descriptive statistics and inferential statistics.

2-1- Research Conceptual Model

The issue would flow logically by studying the research records, the presented definition, the research title and the theoretical foundations presented in the field. In the synthetic model of this research, the success of the business intelligence is considered as a dependent variable and the information quality variables, technical and technological aspects, business planning, system alignment with business strategy, user competency, system methodology and system management are considered as dependent and predictive structures. The below model is presented to determine the key factors of success in business intelligence and prioritize them:

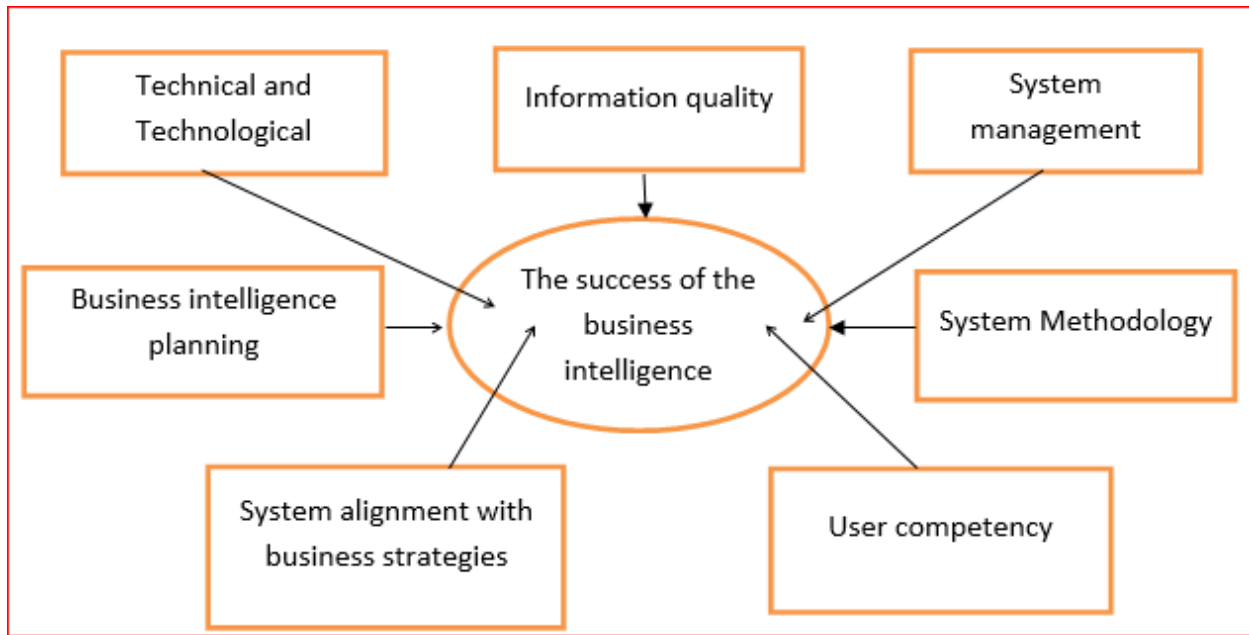


Figure1- Research Conceptual model [2]

Minor indices in the business intelligence bank is as follow:

Table1- Indexand sub-index

Subsidiary Code	Subsidiary Index	Index Code	Main Index
MA1 MA2 MA3 MA4	<ul style="list-style-type: none"> • Management of Change (6) • Project Management (7) • Management Support (8) • Sponsorship (6) 	MA	Management system
ME1 ME2 ME3 ME4 ME5	<ul style="list-style-type: none"> • Provide platform development and use of technology (8) • appropriate database (9) • the cost-effectiveness of technology (10) • provide rapid development (10) • Flexibility Technology(10) 	ME	Technical and technology aspects
IN1 IN2 IN3	<ul style="list-style-type: none"> • Business Vision (6) • Business model (11) • Business processes(12) 	IN	Business Planning
QU1 QU2 QU3 QU4 QU5	<ul style="list-style-type: none"> • data quality (9) • identify users' needs (13) • clean of data (14) • Accuracy of data (14) • The availability of data(14) 	QU	Quality of information
PR1 PR2 PR3	<ul style="list-style-type: none"> • Training of end users (15) • Users involvement (16) • Identifying key requirements of users(16) 	PR	Competency of user
MI1 MI2	<ul style="list-style-type: none"> • Select appropriate tools and methodologies (17) • proper organizational architecture (12) 	MI	Systems Methodology

MI3	<ul style="list-style-type: none"> • comfort changes in the systems (16) 		
MI4	<ul style="list-style-type: none"> • Using the national and international way(18) 		
ST1	<ul style="list-style-type: none"> • Appropriate IT strategies (9) • The good information technology plan (19) • appropriate defined business strategy (17) • the application of consulting experience(13) 	ST	Systems to align with business strategy
ST2			
ST3			
ST4			

2-2- Descriptive findings of the research

The statistical society of this research is 124 employees of Mellat Bank branches in the city of Tehran in Iran who have been working in Bank in this period. The descriptive findings of the study are in the field of demographic variables. 92 participants (74.11%) out of 124 were male and 32 participants (25.88%) were female which indicate a relatively higher frequently of men. 25 of the respondents (25.9%) were 41-45 years old and 12 of them (9.4%) were 26-30 years old that show a significant frequency of higher age group in the statistical society. The numbers of employees who have diploma were 51 people (41.1%) and just 1 person (1.2%) has under diploma degree, and this rate is noteworthy. In field of experience, 61 employees (49.4%) have more than 15 years of experience which show the role of the experience in the field of banking services.

2-3- Questionnaire

In the applied questionnaires in this research, the Likert’s Seven-item spectrum is used, since the questions were based on relative scales (items include a range of very little to very high) and so, quantitative information and non-parametric were interpreted in quantitative and numeric value and applied as practice criteria in calculations. Likert spectrum is an interval scale which consists of response options. Response options in this scale usually indicate the rate of agreement and disagreement of the respondent to a particular topic or concept, either positive or negative. Table1 shows the way of valuation of Likert’s spectrum which is used in research questionnaires.

Table2- The way of valuation in Likert’s spectrum (20)

Response options	Numeric value of the response
Very low	1
Low	2
Relatively low	3
Somewhat	4
Relatively high	5
High	6
Very high	7

3- Findings

The explanation and interpretation of research variables are studied in inferential analysis. Because the data volume was 124 and according to the central limit theorem, the statistical society distribution is normal. Considering the normality of the distribution, the single-sample T-test is used to explain and interpret the research variables: based on the test results: “sig” for all the variables (questions indexes) is less than 0.05 and these variables strongly exist in the statistical society.

- The T-test was used to compare the mean score of the dependent and independent variables between male and female employees and concluded that the mean score of the research variables between male and female respondents were equal and had no significant differences.
- Unidirectional variance analysis was used to compare the mean score of the research variables among different age categories, education level and work experience. According to the Tables, the “sig” of the research for all variables in all of the above cases were higher than 0.05. Therefore, the mean score of the research variables was equal in various age categories and had no significant differences.

3-1- The research hypotheses test

According to the data normality, the Pearson’s parametric correlation coefficient test was used to test the research hypotheses. A correlation coefficient shows the intensity of the relation and also the kind of relation (direct or reverse). This coefficient is between 1 and -1 and in case of absence of the relation between two variables is zero. Since the relation in the presented hypotheses is considered as direct relation, therefore, the one-tailed test is performed.

- The way of judgment of the presence and absence of the relation is based on the obtained meaningful level. So, if the “sig” of the test is lower than 0.05, the H_0 will be rejected and there will be a meaningful relation between two variables.

Table3- summary results of the research sub- hypotheses

Hypothesis	Hypothesis description	Correlation coefficient	Meaningful level	result
First sub-	There is a positive and meaningful relation between the system management and the success of business intelligence in bank.	0.593	0.000	confirmed
Second sub-	There is a positive and meaningful relation between the technical aspects and the success of business intelligence in bank.	0.708	0.000	confirmed
Third sub-	There is a positive and meaningful relation between the business planning and the success of business intelligence in bank.	0.828	0.000	confirmed
Fourth sub-	There is a positive and meaningful relation between the information quality and the success of business intelligence in bank.	0.793	0.000	confirmed
Fifth sub-	There is a positive and meaningful relation between the user competency and the success of business intelligence in bank.	0.701	0.000	confirmed
Sixth sub-	There is a positive and meaningful relation between the system methodology and the success of business intelligence in bank.	0.807	0.000	confirmed
Seventh sub-	There is a positive and meaningful relation between the system alignment with business strategies and the success of business intelligence in bank.	0.746	0.000	confirmed

Level of confidence: 99%

According to Table 2 the KMO index value is equal to 0.930 (more than 0.6), So the number of samples (the number of respondents) are sufficient to factor analysis. Also, the “sig” of the Bartlet test is lower than 0.05 which shows the factor analysis is appropriate to identify the model structure and the assumption of the known correlation matrix will be rejected.

3-2- Evaluation of the competence of the assessment part of the conceptual model of the research

The relations between latent variables (endogenous and exogenous) and explicit variables (measures) are studied in evaluation of the measurement model. Here, the purpose is to determine the validity or justifiability, reliability or stability of the used indexes. The meaningful rate and level (t-value) of the routes between each of the latent variables with its related indicators are studied in order to study the justifiability and the validity of the model. It should be noted that, since the main variable of the research is multi-dimensional (multi-component), the structures of each of the variables are determined in two stages. First: by use of confirmatory factor analysis of first order, the internal correlation of the aspects and also the related aspects are studied to assure the meaningfulness of these correlations, then, by use of confirmatory analysis of second order, the meaningful relation between main variables of the research (business intelligence) and their aspects are studied.

3-3- The confirmatory factor analysis of first order variable of the business intelligence

Diagram 1 shows the meaningful numbers of confirmatory factor analysis of the first order variable of business intelligence. Considering the diagram, all the routes are in the meaningful level (the rate of all the estimated parameters are more than 1.96), so the internal correlation between aspects is meaningful and also the correlation between questions and aspects reach the meaningful level. The competent indexes of the confirmatory factor analysis of the first order variable of business intelligence are presented in the Table. According to this table, data and the model have the acceptable competence.

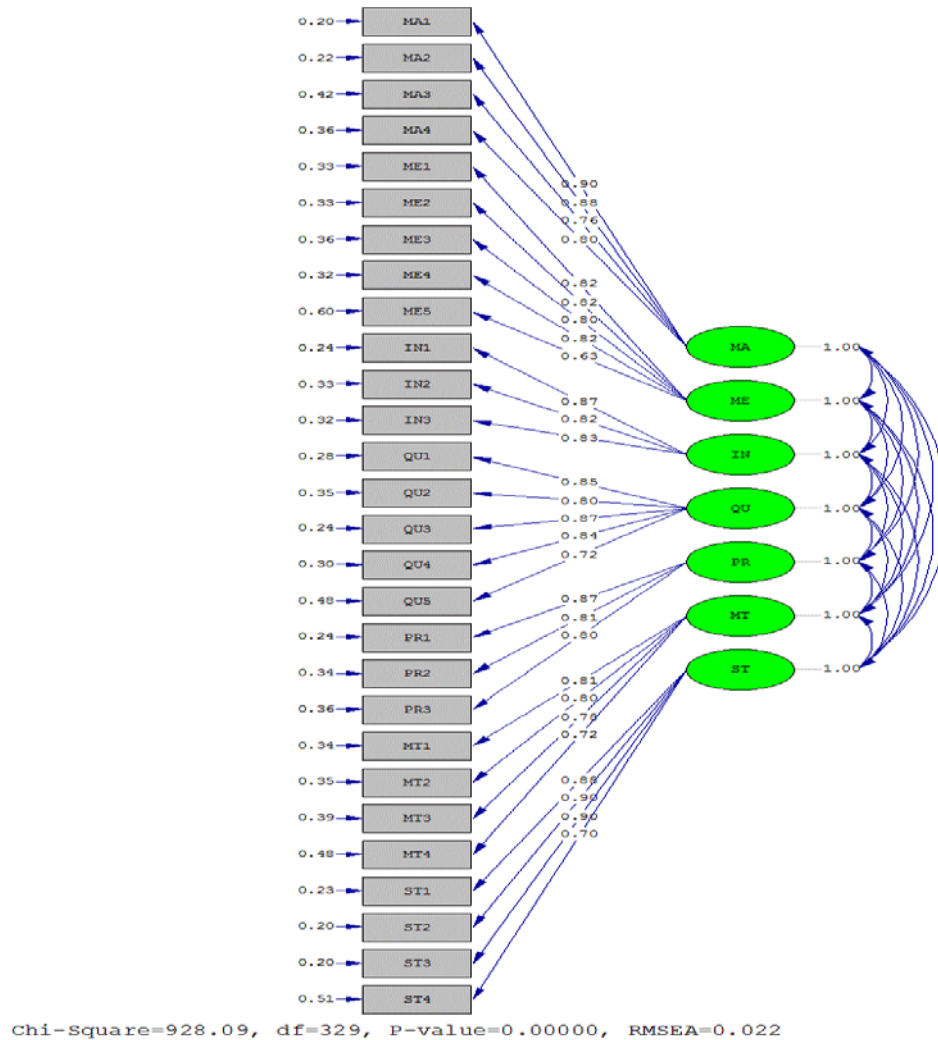


Diagram1- The standard estimated coefficient of first order the confirmatory factor analysis of first order variable of business intelligence

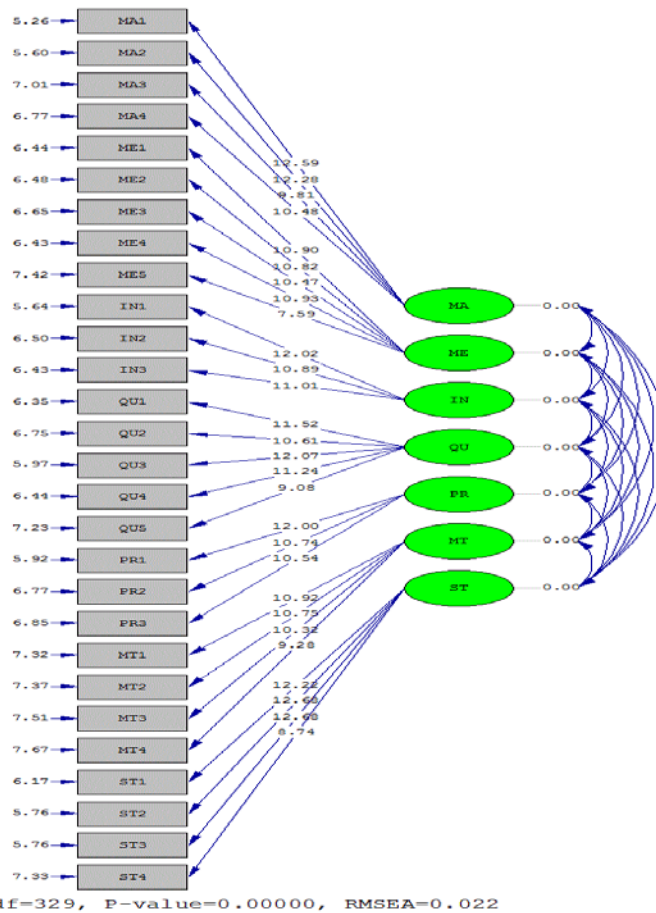


Diagram2- The meaningful numbers of coefficient of the confirmatory factor analysis of variable of business intelligence

Table 4- The competent indexes of the confirmatory factor analysis of the first order variable of business intelligence

Competence index	Optimal value	Result
χ^2/df	<3/00	2/820
GFI(goodness of fit index)	>0/90	0/97
RMSEA(Root Mean Square)	<0/08	0/022
RMR(root mean square)	<0/05	0/037
NFI (Normed Fit Index)	>0/90	0/97
NNFI (Non-Normed Fit Index)	>0/90	0/97
CFI (Comparative Fit Index)	>0/90	0/97

3-4- The confirmatory factor analysis of the second order variable of business intelligence

Due to: The confirmatory factor analysis of first order variable of business intelligence confirm the internal correlation between aspects as well as between aspects and questions, the factor analysis of second order is used in order to study the meaningfulness of the variable relation of the business intelligence. The diagram 2 presents the meaningful numbers of second order factor analysis. According to this diagram, the estimated parameters for all the routes are placed in a meaningful level and show that the business intelligence structure has enough justifiability. The competence indexes of second order factor analysis of this exogenous

variable are also shown in Table 3. The collected data have sufficient competence to measure the business intelligence.

Table 5- The competence indexes of second order factor analysis of business intelligence.

Competence index	Optimal value	Result
χ^2/df	<3/00	2/552
GFI(goodness of fit index)	>0/90	0/99
RMSEA(Root Mean Square Error of Approximation)	<0/08	0/029
RMR(root mean square residual)	<0/05	0/037
NFI (Normed Fit Index)	>0/90	0/96
NNFI (Non-Normed Fit Index)	>0/90	0/99
CFI (Comparative Fit Index)	>0/90	0/96

Based on these coefficients, the last combined calculation of structure and prioritizing of the effects of each aspect on business intelligence variable are studied. In order to easily interpret the results of second order variable of factor analysis of the business intelligence, the estimated parameters are summarized in two diagrams in Table 4.

Table 6- The results of the second order variable of the factor analysis of business intelligence

Variable	Aspect	t- value	Route coefficient (β)	Rank	Multi-correlation square (R ²)
Business Intelligence	System management	8.25	0.75	7	0.56
	Technical and technological aspect	9.01	0.85	4	0.72
	Business planning	10.88	0.93	2	0.86
	Information quality	9.29	0.84	5	0.71
	User competency	9.72	0.89	3	0.79
	System methodology	10.90	0.97	1	0.94
	System alignment with business strategy	8.93	0.79	6	0.62

Source: Research data

4- Results

In today’s rapidly changing business environment, the beneficial business information for organizations is required not only for success, but also for their survival. Recently, due to the inability of the management information systems to meet the needs of the organizational decision-makers in competition, the artistic technologies, such as business intelligence is changed to a one of the important concepts in information system management and is associated with the culture of the pioneer organizations and is placed at the forefront of information technology to support the decisions of the management. The results of the hypothesis test, i.e. the use of correlation analysis to examine the relations between proposed variables and the user satisfaction is proposed and after the evaluation of all the results, the specified interpretations and reasons are given for the scientific explanation of these findings. According to the approved confirmatory factor analysis in both cases, meaningful and standard, for conceptual model of the research, the main hypothesis of the research has been properly competent, therefore, the main hypothesis would be approved and the model is sufficiently competent. There are some findings about the sub-hypotheses which are respectively given as follows.

4-1- Findings of the first sub-hypothesis of the research:

As it was considered, the “sig” of the research is 0.00 which is less than (0.05), thus, statistical zero assumption (H_0) which is based on the lack of correlation between two variables of system management and business intelligence success is rejected. Therefore, there is a meaningful correlation with correlation coefficient of (0.593) between two variables of system management and business intelligence success. So, the first sub-hypothesis is confirmed with 99% certainty.

4-2- Findings of the second sub-hypothesis of the research:

As it was considered, the “sig” of the research is 0.00 which is less than (0.05), thus, statistical zero assumption (H_0) which is based on the lack of correlation between two variables of technical-technological aspects and business intelligence success is rejected. Therefore, there is a meaningful correlation with correlation coefficient of (0.708) between two variables of system management and business intelligence success. So, the first sub-hypothesis is confirmed with 99% certainty.

4-3- Findings of the third sub-hypothesis of the research:

As it was considered, the “sig” of the research is 0.00 which is less than (0.05); thus, statistical zero assumption (H_0) which is based on the lack of correlation between two variables of business planning and business intelligence success is rejected. Therefore, there is a meaningful correlation with correlation coefficient of (0.828) between two variables of business planning and business intelligence success. So, the first sub-hypothesis is confirmed with 99% certainty.

4-4- Findings of the results of the fourth hypothesis of the research

As it was considered, the “sig” of the research is 0.00 which is less than (0.05), thus, statistical zero assumption (H_0) which is based on the lack of correlation between two variables of information quality and business intelligence success is rejected. Therefore, there is a meaningful correlation with correlation coefficient of (0.793) between two variables of information quality and business intelligence success. So, the fourth sub-hypothesis is confirmed with 99% certainty.

4-5- Findings of the results of the fifth hypothesis of the research

As it was considered, the “sig” of the research is 0.00 which is less than (0.05), thus, statistical zero assumption (H_0) which is based on the lack of correlation between two variables of user competence and business intelligence success is rejected. Therefore, there is a meaningful correlation with correlation coefficient of (0.701) between two variables of user competence and business intelligence success. So, the fifth sub-hypothesis is confirmed with 99% certainty.

4-6- Findings of the results of the sixth hypothesis of the research

As it was seen, the “sig” of the research is 0.00 which is less than (0.05), thus, statistical zero assumption (H_0) which is based on the lack of correlation between two variables of system methodology and business intelligence success is rejected. So, there is a meaningful correlation with correlation coefficient of (0.807) between two variables of system methodology and business intelligence success. So, the sixth sub-hypothesis is confirmed with 99% certainty.

4-7- Findings of the results of the seventh hypothesis of the research

As it was seen, the “sig” of the research is 0.00 which is less than (0.05), thus, statistical zero assumption (H_0) which is based on the lack of correlation between two variables of system alignment with business strategy and business intelligence success is rejected. So, there is a meaningful correlation with correlation coefficient of (0.746) between two variables of system alignment with business strategy and business intelligence success. So, the seventh sub-hypothesis is confirmed with 99% certainty.

4-8- Other results of statistical analysis

According to the route coefficient of factor analysis, prioritizing of the effective factors on business intelligence in Mellat Bank is done and the amount of effect of various aspects on business intelligence variable in Mellat Bank is compared. Based on this, the coefficient of routes between proposed aspects (system management, technical-technological aspect, business planning, information quality, user competence, system methodology, system alignment with business strategies) and business intelligence are respectively (0.75), (0.85), (0.93), (0.84), (0.89), (0.97) and (0.79). So, in order of importance, the ranks of the above aspects are respectively seventh, fourth, second, fifth, third, first and sixth. Finally, the results of the first and second orders of factor analysis and their related competent indexes confirm the data competence

with the assumed model of the research. Therefore, the main hypothesis of the research in which it was claimed that “the pattern of key factors of success is appropriate for business intelligence in Mellat Bank” is confirmed and its degree of the proper reinforcement with statistical society data is approved.

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