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Identifying the effects of business intelligence in business process

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ABSTRACT

The purpose of this research is to identify the effects of business intelligence (BI) on organization's performance through business process in Bank Melli of Iran. The study is a descriptive survey. The study population includes about 2200 peoples of experts, managers, assistant branches of Bank Melli Iran in Tehran, which about 327 persons are selected by randomly sampling using Morgan table. Research instrument was a questionnaire. The questionnaire validity and reliability was approved by using content analysis approach and Cronbach's alpha test, respectively. Data analysis was performed using SPSS 20 and Lisrel 8.5. The results show that the BI has effected on organizational performance and business process. Also business processes has effected on organizational performance and it has a mediator role between BI and organizational performance. In other words data mining and analytic data warehousing and organizational dashboard has affected on both organizational performance and business processes.

1. Introduction

Modern economy, no longer be based on natural resources, and these resources are replaced by resources based on wisdom. The importance of knowledge and information capital which called hidden assets is equally important with physical capital in achieving the organization's objectives (Olszak, 2013). Information should be clean as management systems data and processed. This information is processed and eventually become reliable knowledge that has effective role in decision-making by managers (Amini, 2009). Analysts believe that the competitive advantage of an organization depends on two factors: access to adequate and reliable information and high selectivity in establishment and operation of information. Hence, the search for effective means to create, collect and share knowledge in an organization's has become a key target in management.

In the meantime, one of the main concepts of management systems in the world is the concept of (BI) as one of the most applications for decision support systems. (BI) systems give the special vision to managers and other users through collecting, organizing, analyzing and sharing of important information related to the business; the vision that help them to make better business decisions in less time. These systems are optimized through the use of stored data in the databases of the organization and seek to make information into informed and smart one (Chawsak, 2010). In fact, due to the rapidly changing business environment, organizations need to have a system to give managers the information they need in the shortest possible time and effectively organized and able to integrate the various data, and the disparate scattered in their organizations. Access to the right information, summarized and functional requirements for organization can help it to predict, empirical analysis and decision-making about its activities. Also (BI) In addition to playing this role can allow organizations to use existing information to benefit from the competitive advantage and provide the ability to control and track key processes of the organization for managers.

Such systems provide information that may be used as the basis for creating fundamental changes in the organization and specific companies. Including the establishment of new areas for cooperation, acquiring new customers, identify new markets and offer new products and services to our customers, which all represent valuable new approach to (BI). However, according to Wang, currently the application of BI is still in its early stages, and most enterprises are unable to understand its impact. Therefore, in this study we try to identify the impact of (BI) through business processes of an organization's performance.

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2. Literature review

2.1. Theoretical definition of variables

Business Intelligence: Business Intelligence (BI) included a wide range of business processes, applications and technologies which data is collected, stored and analyzed, and results provided in a good way for relevant user.

Business processes: Business activities consist of a series of related activities which is performed to reach a specific goal and a specific output. It is a production of goods or services (by value). Job processes are the organization's current business which is repeatable (Elbashir et al., 2008).

Organizational Performance: Organizational performance is a process that includes a series of activities and organizational actions which managers can be relied upon to achieve organizational goals effectively (Ang, 2007).

2.2. Structure and the main aspects of business intelligence

A business intelligence system is composed of four levels and a Metadata. The various aspects are contributed together to facilitate the basic tasks of (BI) system. These tasks include, extracting data from operational systems, storing extracted data and retrieving them for analytical using in different organizational applications; So that the level of operational systems, mainly are online processing systems which support the daily operations of the organization.

The On-Line Transaction Processing (OLTP) systems include processing systems of customer requests, financial systems, and human resource management systems. Therefore organizations have different OLTP systems which produce a lot of data. These data extracted by Extraction- Transformation-Load (ETL) process from OLTP systems, and then a conversion takes place in them in accordance with a set of conversion rules; In fact the raw data transformed into a form that can be analyzed. Finally, data can be loaded after cleansing and integrating in the data warehouse. ETL is an essential component of a BI system, because ETL process relies primarily on the quality of all other aspects. On the other hand, according to the structure, the main aspects of (BI) systems are as follows: 1. Data warehouse 2. Organizational analytics tools such as OLAP, data mining, data visualization technologies like the dashboard.

2.3. Objectives and (BI) applications in banking

Customer profitability analysis: (BI) systems can determine each customer's profitability in the present and long-term periods and offer a basis for their more lucrative sales.

Credit Management: (BI) systems find the development patterns to credit problems based on category and type of customer, and warn in this way to avoid credit problems and manage customer credit remaining.

Branches sale: (BI) systems improve customer service process. In addition, (BI) makes the “Cross Selling” operations possible to customers and furthermore improves the customer support process that will ultimately lead to increased customer loyalty (Hassanpour, 2012).

2.4. Business processes

In this study, business process has measured in the form of seven dimension includes:

Competency and skills of staffs: These terms related to the presentation or behavior of staffs as well as staff skills and competence in delivery service points.

Cost-benefit analysis (payments): Cost-benefit analysis is as one of the key variables in the bank activities which include the decision for interest rates and the cost of banking services.

Maintain the customer: Loyalty referred to the continuous support from an organization by customer. The bank customer loyalty can be measured by a comparing way and considering the four key aspects of satisfaction, continuation, migration and attachment. The first two aspects i.e. satisfaction and continuation (repetition of banking transactions) is based on customer rational behavior about investing in a bank through logical judgment.

Measuring customer satisfaction: Satisfaction is a positive feeling that a person gets created by using product or service. This feeling comes from the contrast between customer expectations and supplier performance. If the level of service and product was higher than the level of customer expectations lead to satisfaction and a lower level of service and product than customer expectations make the customer dissatisfaction.

Customer recognition: Customer recognition includes; customer perception from competing products, purchase criteria and decision-making of reference groups and the role of others.

Analysis of customer gradual reduction (customer erosion): customer erosion analysis, identify customers who are leaving the organization and have driven to the use of competitors services and products. After identifying these customers we can prevent them from erosion by preventing activities.

Market share: Part of the market that the bank accounts it to itself and prepares and implements its marketing plans in order to meet the needs (Faryabi and Mahmoudi, 2013).

2.5. The performance of financial institutions or banks

Banks and financial institutions should consider some cases such as:

1. Introducing the new banking tools in order to equip better resources and provide efficient financing of the economy
2. Improving the payment systems in order to facilitate exchanges
3. Creating local interbank market in order to improve the relationship between banks and non-use of banks to central bank sources
4. Increasing the share of private sector in banking activities through privatization, sale of shares of state-owned banks to increase public and private banks and providing for the licensing of foreign bank activity
5. E-banking to facilitate exchanges while reducing the workload of branches.

3. Literature review

Azma (2012) has done a study titled (BI) as a key strategy for development of organizations. The study suggests that organizations can use (BI) analysis to obtain (BI) system. The use of (BI) systems can act quickly and flexibly with the ability to create change in the organization. In fact, the (BI) is a key strategy for any organization's to achieve competitive advantages.

Lioyd (2011) introduced an article titled "Understanding the key dimensions of (BI) and its role in managerial decision". This research suggests that (BI) systems can be used to improve decision-making at all levels of the organization. At the strategic level, (BI) systems can create information which is used to predict future results based on past performance. At the tactical level, they provide the basis for decision making to optimize business performance measures, and at the operational level, these systems create timely analysis of the sections performance.

Elbashir et al. (2008) have done a study entitled "Measuring the impact of (BI): the relationship between business process and organizational performance". In this study, a model is provided for measuring the performance of (BI) systems. The four factors are measured: the interests of the efficiency of internal processes, customer perceived benefits, interests of relationship with partners / participants providing business, and organizational interests. The results suggested that the important relationship exists between the use of (BI) systems and business process performance in organizational performance for both service and non-services organizations.

Olszak (2013) has provided an article entitled "approach to construction and implementation of (BI)". This paper describes the processes involved in the construction and implementation of (BI). As a result, authors have suggested special methodology for the creation and deployment of these systems by reviews the features of (BI) systems. This review focuses on the purpose and function of the (BI) in organizations. In this paper, the two-step approaches are considered which they are the core of a contrast to each other, i.e. the (BI) system creation and the use of (BI) systems. Much of this article is concerned to create and implement goals and tasks of the (BI).

4. Research methodology

In this research in order to determine the final model, Table1 were obtained after determining loading factor variables through factor analysis of the variables. The chi-square values with degrees of freedom, approximation square mean root, comparative fitting, fitting index, the increased fitting index for each variables are expressed in Table1. LISREL calculates an indicator of fitting goodness. The index is similar to the correlation coefficient in utility. Both of these criteria are variable between -1 to +1 ($-1 \leq R \leq +1$). The index of approximation square mean root is defined as the difference size for each degree of freedom. The estimated value of the root square of the variance of approximation error which is the test of deviation of any degrees of freedom is less than 0.05 for models that have good fitting. The higher values up to 0.08 indicate a reasonable error of approximation in the community. Models which their square of variance in the approximation error index is 0.1 or more have poor fitting.

Fig. 1 shows that the impact intensity of (BI) variable on organizational performance with 0.79 has the most severity on the relationships between variables. The impact severity of (BI) on business activity with 0.66 is in the 2nd, and the relationship between business activities and organizational performance with 0.46 is in the 3rd rank. The confidence interval of relationships between variables is as follows.

Other values of the final model can be seen in the Table 2.

Estimated standard loading factors are calculated by maximum likelihood method. These values which are called lambda (λ) were used to estimate the standard scores of latent variables in the analysis of structural equation modeling and these values are comparable. Also the estimated value of the standard error indicate the error in the crude estimated of loading factors which the smaller amounts show more detailed estimations.

For example, in the relationship between business process and organizational performance can be seen that the standard error is calculated equal with 0.088 and it can be located at a suitable level, because it is smaller than 0.1.

The confidence interval which is the result of dividing in loading factors on standard error show the significance of loading factors estimation (significant deference of loading factors with zero). The confidence interval between -1.96 and 1.96 show that non-significant effect between latent variables. The confidence interval between 1.96 and 3 shows the significant effect between latent variables with more than 95% confidence interval. The confidence interval equal to or greater than 3 indicates a significant effect between latent variables with more than 99% confidence interval. Therefore

the effect of variables is confirmed together with more than 99% confidence interval. The variance column in the above table represents the amount of variance which is explained by the relationship between latent variables.

Table 1: Confirmatory factor analysis of variables

Variables	Loading factor	Confidence Interval	variables	Loading factor	Confidence Interval
Business activities					
Competence and skills of staffs	0.72	14.53	Customer recognition	0.72	14.6
Cost-benefit analysis	0.7	13.98	Gradual reduction of customer analysis	0.36	6.44
Customer retention	0.76	15.71	Market share	0.55	10.33
Measuring customer satisfaction	0.78	16.18			
Business Intelligence (BI)					
Data mining	0.70	15.44	Dashboard	0.62	11.46
Analytical data warehouse	0.64	11.82			
Organizational performance					
Resources	0.7	13.77	service delivery Improvement	0.84	17.3

RMSEA = 0.001 ; X^2/df^3 = 2.79 ; GFI = 0.92 ; AGFI = 0.85 ; CFI = 0.92 , IFI = 0.92

Source: research findings

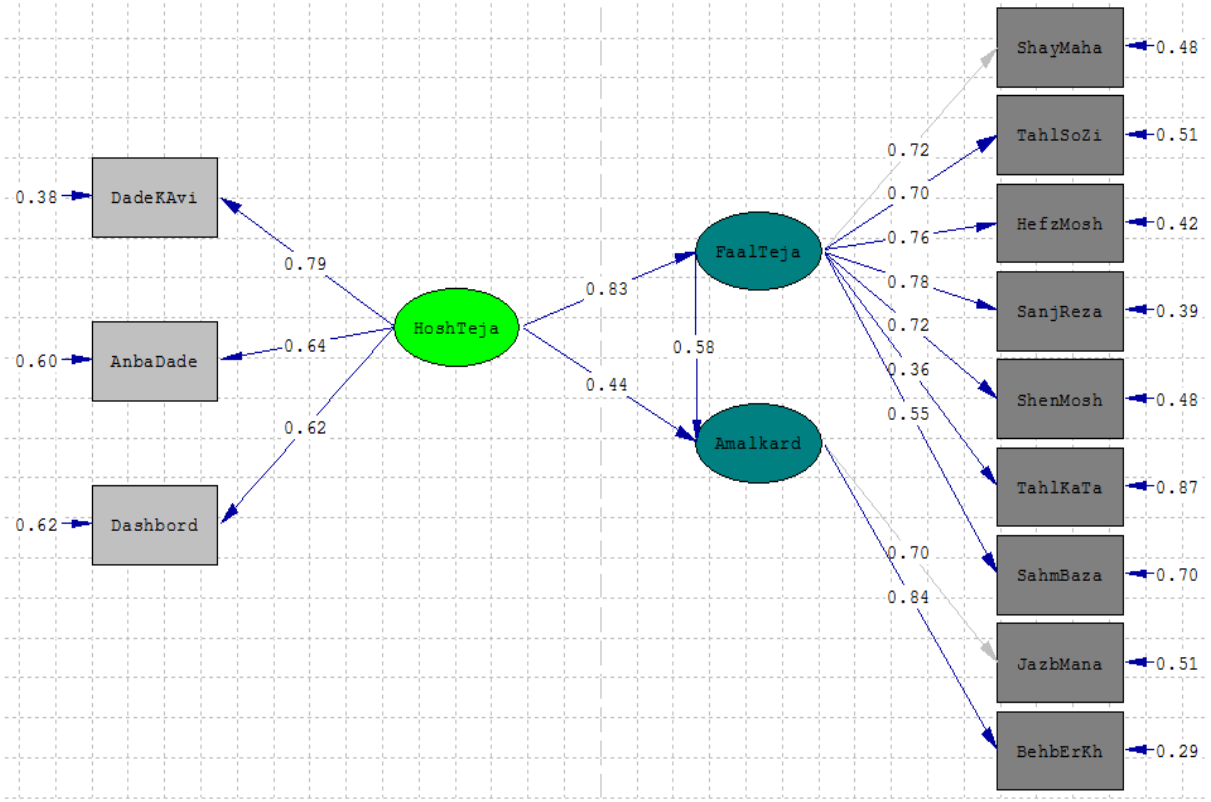

Fig. 1: Factor analysis of variables, estimated by the final model (Source: research findings)

Table 2: Values of the models

Concepts relations with the indicators in the model	The standardized	Standard error	T-value	R^2	confidence interval	Result
The impact of (BI) on organizational performance	0.44	0.11	4.00	0.95	P < 0.01	Hypothesis confirmation
The impact of (BI) on business process	0.83	0.071	11.67	0.69	P < 0.01	Hypothesis confirmation
The impact of Business process on organizational performance	0.58	0.11	5.11	0.95	P < 0.01	Hypothesis confirmation
The mediating role of Business processes between (BI) and organizational performance	0.48	-----	59.63	-----	P < 0.01	Hypothesis confirmation

5. Conclusions and recommendations

5.1. Conclusions

It can be concluded that due to the confidence interval of P <0.01, a significant relationship exists between BI and organizational performance. On the other hand, according to the coefficient of determination, only 95 percent of BI is influenced by changes in organizational performance. Therefore the main hypothesis of the research is confirmed. According to standard estimation of BI variable and business process which is equal to 0.83 and the amount of T = 11.67 and R^2 = 0.69 in the confidence interval of P <0.01, it can be concluded that a significant relationship exists between BI and business process and due to the coefficient of determination, only 69 percent of changes in business activity is influenced by organizational performance. According to standard estimation, the business process variable has mediating role between (BI) and organizational performance. Thus, there is a significant relationship between data mining and organizational performance. So it can be concluded that the increase in data mining component increases the organizational performance. Results indicate that the coefficient of determination is low and data mining variable predicts only 3.7 percent of the dependent variable (organizational performance). According to the P-value that is lower than 0.05, it can be assumed that the relationship between two variables is significant. So there is a significant positive relationship between the analytical data warehouse and organizational performance. It can be concluded that the performance increases by increasing in the analytical data warehouse components.

Then, the regression test is used to determine the severity of impact between variables according to the relationship between them. The relationship between two variables, i.e. organizational performance and data warehouse is approved. Beta factor equal to 0.397 indicates that the organizational performance increases by increasing the analytical data warehouse. Also data warehouse variable predicts only 15.8 of the dependent variable (organizational performance). So there is a significant positive relationship between the organizational dashboard and the performance of organization. So it can be concluded that the performance increases by increasing in organizational dashboard.

On the other hand, there is a significant relationship between organizational performance and organization's corporate dashboard. Beta factor equal to 0.224 indicates that performance also increases by increasing in corporate dashboards. Results indicate that the amount of determination coefficient is low and thus the corporate dashboard only predicts 5.00 percent of the dependent variable (organizational performance) changes.

Similarly the data mining variable is effective on business processes. Beta factor equal to 0.451 shows that business processes also increases by increasing data mining. Results indicate that the coefficient of determination is low and thus the data mining variable only predicts 20.3 percent of the dependent variable (business processes) changes. The data warehouse variable is effective on business processes. Beta factor equal to 0.525 shows that business processes also increases by increasing data warehouse. Results indicate that the coefficient of determination is low and thus the data warehouse variable only predicts 27.6 percent of the dependent variable (business processes) changes.

Finally, the organizational dashboard variable is effective on business processes. Beta factor equal to 0.529 shows that business processes also increases by increasing organizational dashboard. Results indicate that the coefficient of determination is low and thus the data mining variable only predicts 28.0 percent of the dependent variable (business processes) changes.

5.2. Recommendations

In turbulent world today, having in-depth knowledge of all factors such as customers, competitors, the economic environment, operations and organizational processes that contribute to making the right decisions, quickly and on time by the senior managers is vital for surviving the organization. Using all kind of intelligence, especially (BI) can be an important factor to achieve this matter.

Bank managers can improve operational performance of the system and promote it in their organization by using BI tools and techniques such as data mining, data warehouse, analytic and organizational dashboard in order to respond to the needs of decision-making. Bank can anticipate customers' needs, market conditions and devise strategic objectives by improved BI system. In fact the (BI) is a powerful tool that managers make the organizations more efficient and effective in their decision-making with creativity and innovation in this system and it has more and more profitable for the organization. (BI) can help organizations increase revenue by speed up the work and reduce duplication and waste in the organization to reduce costs and innovation in products and services.

The Melli Bank in Islamic Republic of Iran should design (BI) solutions that help improve the decision-making. Improve the quality of decision is the most important thing that (BI) is expected. Also the Melli Bank in Iran must integrate data quality tools, data mining and OLAP tools to see as the most important functional requirements to improve the (BI) system. Based on the conducted analyses, it is recommended to the managers that use integrated tools to improve data quality for (BI) system improvement.

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