Analyzing the required infrastructures in creating the architecture of Business Intelligence in Mellat Bank

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CHRONICLE	ABSTRACT
	The essence of moving the organizations and companies toward the implementation of the Business Intelligence (BI) in the current competitive and complex atmosphere is not unfamiliar for any manager. By online analytic processing, the Business Intelligence analyzes the business data and creates a suitable context for making accurate and smart decisions. Neither as a product nor as a system but as the architecture and a new approach, the Business Intelligence has contained a set of analytic and applied programs. Since the managers have to identify the required infrastructures in creating the mentioned architecture before any applicable measures, the probable failures must be also considered and then solved by the managers. This study has been carried out in the Mellat Bank, meanwhile, the infrastructures for creating the BI has been identified and evaluated and subsequently, the findings has been discussed as well.

1. Introduction

Nowadays, knowledge and information represent precious assets of any organization. Most companies attempt to apply these assets to attain the competitive advantage when their managers intend to make important decisions (Ghazanfari et al., 2011). In fact, the business activities in each firm regardless of its size involve managing a great deal of information from internal and external business environment (Tutunea et al., 2012). During the past few decades, most organizations have realized that the only way to continue the competition in global market is to utilize the power of information (Farrokhi & Pokorádi, 2012). All the information associated with the internal actions, market, customers, suppliers, financial resources, etc., accumulated in the activity phase of a company, can be considered as a basis for some economic and financial analysis in the company as well as assisting the decision-making process for managers (Tutunea et al., 2012). The increase in uncertainty factor due to the effective circumstances on the business environment has created challenges in the trend of managerial decisions (Lauria & Tayi, 2005). Therefore, the continuous development of the companies in a growing competitive environment will need appropriate decisions considering the noticeable information together with the quite accurate predictions (Tutunea et al., 2012). Thus, the quality and suitability of

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business information for an organization in the current world is not associated with profit or loss; but it may be an issue for sustainability or bankruptcy (Farrokhi & Pokorádi, 2012). This is because from the managerial aspect, knowledge will be vital in correct decision-making (Lauria & Tayi, 2005; (Tutunea et al., 2012).

Using Information and Communications Technology (ICT) for supporting and optimizing both the internal processes and optimal decision-making of a company is now a very important issue (Tutunea et al., 2012; Lauria & Tayi, 2005). By developing the Information Technology (IT), the BI has been utilized increasingly in the firms and many companies apply it as an efficient and rapid tool for their businesses (Yan et al., 2012; Farrokhi & Pokorádi, 2012). Hence, the BI systems has been formally recognized as a major priority of information systems by all entrepreneurs and business leaders regardless of the industry they involved in, their company size, or their country of origin (Farrokhi & Pokorádi, 2012; Tutunea et al., 2012).

Noticing the issues concerning the BI by the researchers, the number of papers has had an increase trend in the recent years (Jourdan et al., 2008; Yan et al., 2012). Nowadays, the BI systems are considered as the greatest and the quickest fields of IT for most companies (Farrokhi & Pokorádi, 2012). However, most organizations feel the shortage of BI both in their decision-making process and in the utilization time of their businesses including Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), and Supply Chain Management (SCM). (Ghazanfari et al., 2011). This study aims to present a model for the BI performance evaluation in the organizations.

1.1. Definition of BI

There are many definitions for the BI, but it generally has been declared as a new approach in organizational architecture to help managers make accurate and smart decisions based on rapid analysis of the information in the minimum possible time. BI is an overall framework including the processes, tools, and various technologies which are required for changing the data into information and then information to knowledge. The managers will be able to make better decisions based on the knowledge and to improve the performance of their organizations. By implementing the BI strategies, the existing gap of information between the middle and top managers will be removed; meanwhile, the required information for managers in each organizational level will be available timely and efficiently. In addition, the experts and analysts will be able to improve their activities by using the simple facilities and finding better results as well. The need for a BI system in an organization will be firstly essential for top levels of managers and it will be transferred form top pyramid of organizational structure toward the bottom levels. Attention must be paid that the most important requirement of a manager is decision-making. The decision-making process can be divided in the following three overall sections:

1.   Availability, gathering, and modifying the required data and information,

2.   Process, analysis, and conclusion based on the acquired knowledge,

3.   Applying the results and supervising the consequences after executing the decisions.

Since the traditional organizations do not utilize the BI system, they are faced with some challenges in any of the three aforesaid fields. These challenges are originated form the great deal of data, complexity of analysis and inability to follow-up the decision made. The BI not only solves the mentioned problems but also acts as a creator of new opportunities for the organization.

1.2. The BI implementation Phases

If the BI implementation phases are considered as Fig. 1, the data sources are gathered in the first phase. These sources are able to consider various databases together with the existing software packages.

The gathered information is uploaded in the analytic database named Data Warehouse during the ETL process. The data in the analytic database is located in isolated sections called Mart-Data. In the next step, BI will act and make analysis on the categorized information. Subsequently, the data will be delivered to the upper level tools for distribution.
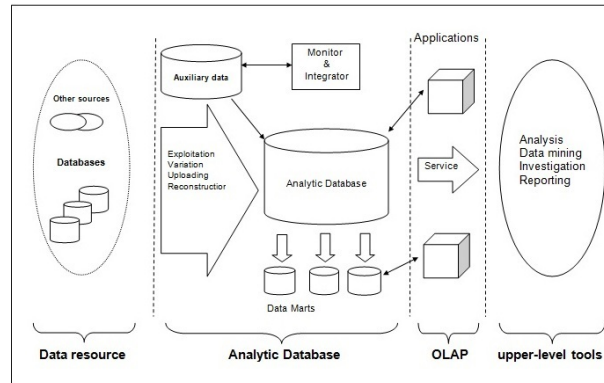

Fig. 1. BI implementation phases

1.3 The capabilities of BI Strategies

The BI strategy is a set of homogenous equipment for facilitating the decision-making process in all organizational levels, which can be implemented simply with minimum cost.

- Homogeneity of data: Generally, the dispersal of information can be observed in the organizations. Using different tools is caused the creation of various information banks with different structures in an organization. The service used for homogeneity of information in BI strategy facilitates creating a concentrated information bank from valuable data for making decisions.

- Repository of data: Since the dispersal of information is a complicated problem, the repository of data provides a possibility to place the necessary data in a concentrated information bank after passing the homogeneity phase.

- Dashboard Reporting: There are different ways to display the information as different reports, but, it is a part of BI strategy. An effective report must build a good relationship with responders and meet their requirement completely.

- OLAP: OLAP is a capability, which provides access to information for preparing both reports and data analysis for non-technical operators.

- Monitoring: By use of monitoring it will be possible to supervise the situation associated with the important objectives and also take their progress status into consideration. As an example, the monthly goal for selling can be compared with the actual selling amount, and then, it is possible to make planning for selling.

- Analysis: Receiving the information and displaying them in various exhibits is the first step in BI strategy. This strategy presents a powerful analysis tool relating to various topics and groups for individuals.

2. Research method

Considering the importance of BI, a case study in Mellat Bank, a public Iranian bank, was carried out to design and determine the required indices for BI especially the evaluation indices. Some studies was first fulfilled about BI and also papers concerning the definition and applications of BI. Then, according to existing literature, which addressed in the research background and tables of indices, and also the

meetings held with the bank managers; the related indices were determined. For overall framework of the model, four dimensions used already by Yan et al. (2012) have been utilized. These dimensions are as follows: Infrastructure and Application of BI, Satisfaction from BI, Internal Effects, and External Effects. Then for any dimension, some components have been determined based upon Yan model.

Table 1
Performance Evaluation Indices for BI

Objective	Index	Reference
Infrastructure and Application of BI	Information Infrastructure	Yan et al., 2012
	Management Support	Yan et al., 2012
	Ability to Maintain	Yan et al., 2012
	Safety and System Reliability	Yan et al., 2012
	Full Involvement (the degree of Democracy)	Rouhani et al., 2012; Udo & Guimaraes,1994
	Financial Analysis Tools	Rouhani et al., 2012
	Data Repository	Rouhani et al., 2012
	The increase in Validity and Reliability of processes and decision output	Holsapple & Senab, 2005; Rouhani et al., 2012
	Utilizing the resources	Yan et al., 2012
Satisfaction from BI	Actual Time (on-time use of data)	Yan et al., 2012
	Decrease in decision-making time	Udo & Guimaraes, 1994
	Applicable (actual use of system)	Yan et al., 2012
	A friendly relation of human and machine	Yan et al., 2012
	Economy	Yan et al., 2012
	Optimization Techniques	Rouhani et al., 2012; Holsapple &WHinston, 1996
Internal Effects	Decision making (using a system of data processing for decision-making and also decrease in cost and decision-making time)	Yan et al.,2012 ; Udo & Guimaraes, 1994; Holsapple &WHinston,1996; Rouhani et al., 2012
	Identifying the customers	Yan et al., 2012
	Cost Value	Yan et al.,2012 ; Holsapple &WHinston,1996
	Innovative Business Model	Yan et al., 2012
	Group Decision-making	Rouhani et al., 2012
	Data-mining Techniques	Rouhani et al., 2012 ; Udo & Guimaraes,1994
External Effects	Sharing	Yan et al., 2012
	Environment Awareness	Rouhani et al., 2012
	Satisfaction of Stakeholders	Rouhani et al., 2012
	Economic Justification	Yan et al., 2012
	The quality of information	Yan et al., 2012
	Maintaining the competitive advantages of the organization	Udo & Guimaraes,1994

Research methodology of this paper is survey study and the statistical population includes all IT managers in whole branches of Mellat bank in Tehran and the sample size includes 85 people selected deliberately (not randomly). Data gathering tool in this study was a research-made questionnaire. For evaluating BI in the aforesaid population (Mellat bank), the related indices were distributed among the statistical population by questionnaire. Based on the variables of the research, 85 questionnaires were gathered. The questions in the questionnaires were actually the evaluation indices, and the people's viewpoints about the BI level in Mellat Bank were measured by Likert Scale (1=minimum and 5=maximum). Subsequently, the descriptive statistics was utilized for data analysis and one dimensional Kolmogorov–Smirnov (K-S) test was also used for analyzing the normalizations; meanwhile, for analyzing the difference between the studied society and a constant amount (a sample of T-Test), the inferential statistics with SPSS software has been used.

3. The results

To be confident about the validity and reliability of the questionnaire, the Cronbach's Alpha Coefficient has been used. The coefficient indicates the dispersal of the questions in a stage so that the minimal amount of dispersal shows that the concepts of a dimension were very close together. In addition, the results of validation test using the Cronbach's Alpha have been presented.

Table 2
The Cronbach's Alpha Coefficient for dimensions of the research

Variable	Cronbach's Alpha Coefficient
1. A system for construction actions	0.74
2. Satisfaction of Users	0.77
3. Internal Effects	0.82
4. External Effects	0.86

Attention must be paid that the calculated coefficients have been considered for each dimension. According to Nunnally et al. (1967), if the amount of Cronbach's Alpha is more than 0.7, the measurement tool has the required validity and reliability. For analyzing the normalization of the distribution, one dimensional Kolmogorov–Smirnov test has been utilized. The results of this test for the main variables of the research based on the gathering data from questionnaires have been shown in the following table.

Table 3
The statistical information relating to the one dimensional Kolmogorov–Smirnov test

Variable	Meaningfulness level
1. Infrastructure and application of BI	0.28
2. Satisfaction of Users	0.39
3. Internal Effects	0.39
4. External Effects	0.80
5. The effectiveness of implementation of BI (overall)	0.84

We can generally conclude that if the meaningfulness level in the K-S test divided by two is more than 0.025, the statistical distribution will be normal. As shown in Table 3, the distribution of all variables is normal. The results of t-test relating to the research variables have been presented in Table 4.

Table 4
The results of T-Test for the research variables

Variable	Meaningfulness Level	Difference between the upper and lower limit	Confidence Level	
			Lower Limit	Upper Limit
1. Infrastructure and application of BI	0.471	0.05936	-0.1038	0.2225
2. Satisfaction of Users	0.023	-0.12806	-0.2379	-0.0182
3. Internal Effects	0.001	-0.25085	-0.3997	-0.1020
4. External Effects	0.974	-0.00220	-0.1321	0.1365
5. The effectiveness of implementation of BI (overall)	0.194	-0.07735	-0.1947	0.0400

As shown in Table 4, except the variables of "Satisfaction of Users" and "Internal Effects", which have less amount, the meaningfulness level is less than 5 percent and their upper and lower limits are negative, other variables have average amounts. In general case and based on the t-test, one can conclude that the effectiveness of implementation of BI in Mellat Bank is average where inferential mean is about 3. Based on the Friedman test, the meaningfulness level has been calculated as 0.00 and it means that the rankings of variables in affecting the implementation of BI are different.

Table 5
The average ranking for levels of variables

Variable	Average ranking
1. Infrastructure and application of BI	2.90
2. Satisfaction of Users	2.39
3. Internal Effects	2.04
4. External Effects	2.68

As specified in Table 5, the dimensions of "Infrastructure and application of BI" and "Internal Effects" have the maximum and minimum average rankings in Mellat Bank, respectively.

4. Discussion and conclusion

Due to the importance of BI and the essence of applying it in the companies, the issue of BI evaluation has attracted the attention of many researches. In the case of any failure in the projects concerning the BI, the companies will lose a great deal of financial resources (Farrokhi & Pokoradi, 2012). Since the final goal in each evaluation plan is to find the problems and identify how the evaluation system meet

the evaluation needs (Farrokhi & Pokoradi, 2012), we have decided to analyze the effectiveness level in implementing BI in Mellat Bank as an Iranian business corporation. Thus, four dimensions relating to evaluation of BI including Infrastructure and application of BI, Satisfaction of Users, Internal Effects, and External Effects were selected. The results of the research for Mellat bank have indicated that the dimensions "Satisfaction of Users" and "Internal Effects" were in a level lower than average, but the dimensions "Infrastructure and application of BI" and "External Effects" were in average amounts.

As a matter of fact, the results indicate that Mellat Bank has applied the infrastructures in an average and acceptable amount for implementing BI, but the users' satisfaction in utilizing BI system is less than average and it implies that Mellat Bank has not been able to use its resources sufficiently in order to attain the satisfaction of users. On the other hand, based on the results, the "Infrastructure and application of BI" has revealed the most effect on effectiveness of implementing BI and since the amount of this index after evaluation is in average range, one can conclude that the effectiveness of BI in Mellat Bank is generally average. Since Mellat Bank is a great bank in Iranian banking system, we expect that serious measures are required by top managers for enhancing the indices of "Satisfaction of Users" and "Internal Effects" in order to justify the expenditures spent for implementing BI in the aforesaid bank.

5. Recommendations

Due to the lower amount of the dimensions "Satisfaction of Users" and "Internal Effects", we suggest the following recommendations for improvement and promoting the BI model(s),

1. Using a rapid analyzer's software to be replaced by human analysis,
2. Holding educational courses on "working with smart systems" for users,
3. Creating a new decision-making system based on business smart systems,
4. Using BI tools in identifying potential customers and changing them to active customers,
5. Creating appropriate situation for entering data and applying data-mining techniques and using these techniques in decision-making process for managers.

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