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Evaluation of Business Intelligence Systems on Organization Performance with Balanced Scorecard Approach

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ABSTRACT

According to the importance of information systems in Today's world particularly the mangers' need for systems in field of business intelligence and organization performance management, Board information system was designed in 1994 in Switzerland for simultaneously economic and rapid development of performance management and business intelligence. It is used for effectiveness improvement and management decision processing, business intelligence, business traffic analysis and performance management in an integrated environment.This study investigates the effect of Board information system on the organizations` performance taking into account the financial, customer, internal process and learning and growth dimensions. This study is practical research regarding to objective and a descriptive-analytical regarding to methodology. Therefore, the features and capabilities of Board information system are firstly examined by library and document studies approach then the effect of this information system on organizational performance is studied by forming a focal group session and performing meta-analysis. Results show that Board information system leave positive and meaningful impact by means of its effects on organization including human resources empowerment, organization structure and process, risk reduction, flexibility ,communication, time reduction, decision making improvement, knowledge sharing, risk reduction and applicability on organization performance from financial, customer, internal process and learning and growth dimensions.

Introduction

Today information systems have the potential to provide three types of advantages to organizations: first, productivity improvement occurring when more tasks are performed by using the same or less amount of resources. In organizations, productivity improvement occurs in work processes improvement. Second, effectiveness improvement referring to the ability of an individual or organization to perform tasks that are supposed to be done. Information systems provide the information helping managers to evaluate the circumstances better and select the appropriate options so improve effectiveness of an organization. Finally, the competitive advantage giving an organization improving its productivity and effectiveness by using information

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systems, the potential to change an organizational competition strategy. (Yousefi, 2013).

Business intelligence systems like Board information system are systems integrating diverse, dispersed and inhomogeneous data of an organization and providing managers` decision making with analytical and multi-dimensional reports by forming analytical databases and using techniques and applied programs (Avaz Malayeri,2010). So the organizational performance of organizations using business intelligence and performance management can be evaluated by using the balanced scorecard approach and considering its main and fundamental dimensions. These should be objectively and accurately investigated and known to achieve a proper and appropriate result taking into account all the dimensions of the organization. Therefore, considering the importance of information systems in today`s world particularly systems operating in the business intelligence and organizational performance management fields and also meeting the organizations` needs specially managers in making right decisions so providing and descripting a framework to realize these tasks in field of decision making support in the form of information systems and balanced scorecard approach As a whole in all financial**,** customer, internal process and learning and growth dimensions can help organizations to increase productivity and make right decisions within the organization. , this study aims to investigate the effect of information systems particularly Board information system on organizational performance from all organizational aspects and dimensions (financial**,** customer, internal process, learning and growth dimensions) and take a new step toward the development of this concept.

Review of IS:

So far, many information systems have been designed to meet the organizations` needs. From the view of Lauden and Lauden (2012:54), information systems consist of functional perspective including (sale and marketing**,** manufacturing and production**,** financial, accounting, and human resource systems) and organization management perspective including (Transaction processing system (TPS), Business Intelligence Systems for Decision Support, Management Information Systems (MIS), Decision Support Systems (DSS), Executive Support Systems (ESS) and operational perspectives**.)**

Operational information systems were the first type of information systems that were created in business enterprise and placed in certain departments like sales and marketing, manufacturing and production, finance and accounting and human resources. Moreover, knowing how information systems help managers to manage organization is realized by investigating information systems from the organization management perspective.

According to these two perspective of information systems making connection between different types of information systems in a company to work together has proven a major challenge. One solution to this problem is to implement organizational applications (organizational system, supply chain management system, customer relationship management and knowledge management systems). Organizational applications are systems that cover different functional areas **,**focus on executing business processes throughout the organization and include all levels of management. So according to what was explained about the information systems and their organizational applications to make connection between different type of information systems we can consider figure 1 for the Enterprise application architecture and the position of different information systems:

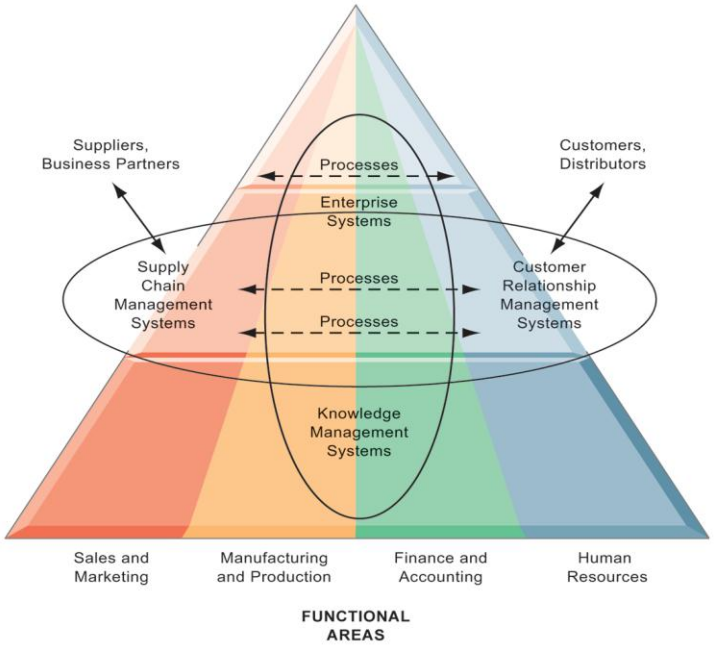

Figure 1: Enterprise Application Architecture (Lauden and Lauden, 2012:54)

Review of Board Information System

As it was mentioned, Board information system was first designed in 1994 in Switzerland for simultaneously economic and rapid development of performance management and business intelligence. until now it has been used in more than 300 companies (from 51 to 200 employees) around the world to improve productivity,

process management decisions, business intelligence, business traffic analysis and performance management in an integrated environment. Moreover, according to Gartner`s annual investigations in 2013 about the examining of the organization performance management, among other companies Board was selected as the first rank in terms of customer satisfaction level.

As a single product, Board offers all required features to build any Business Intelligence Software and Corporate Performance Management application solutions without the use of any specific programming. From simple reports to the most sophisticated performance management applications, any analysis can be easily built by using the drag and drop function, automatically configuration of objects and simultaneously synchronized with data. End-users have full access to its informational environment and has the ability to obtain immediate answers to their questions from informational sources.

Board created a revolution in the toolbox approach as well as provide unique speed in building applied program of organization performance management, BI , customization, maintenance and advanced interactive interface with end-users. This unique capability turns creation of any report or analysis into the simplest possible form. From the beginning, Board was considered as a solution to maximize the efficiency of organizations in decision-making processes by integrating Business Intelligence Software (BI) with Corporate Performance Management tools (CPM). Fifteen years later, Board will lead to unity of business intelligence and Performance Management and provide an integrated solution from both technical and functional point of view. All functions of business intelligence includes data Exploring, reports, multi-dimensional analysis, synthetic dashboards with the ability to manage and monitor all Control processes, Predictive analysis and also Performance management functions including budgeting , planning and forecasting, Consolidated financial statements , Analysis of profitability, score carding and strategy management that is shown in following figure.

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Figure 2: Capabilities of Board Information system (Board Documents, 2014)

Board helps organizations reach a single vision of their performance in a simple and extremely effective manner. To integrate Information originating from various resources they are shared in a virtual database by entire organization so provide a unite vision for business users. So performance management environment and business intelligent is place developing shared vision of enterprise performance throughout organization. Hence, everybody in organization achieve what is correctly right. Board makes it possible for you as end user to achieve your specific analysis by neglecting type of data engine. Data may be stored in the multi-dimensional database (Multi-Dimensional Engine) or directly be accessible in relational databases (Relational or dependent Engine). Both Multi-Dimensional and Relational Engines have been combined for the highest architectural and flexible practical program. In all sections of maintenance and management there is no need for any programming . In The end-user analysis program it is invisible to the end-user what sources of information is used and also whether the data sources are relational, multi-dimensional or combination of both, but the end user use program only to certain analysis and its intended uses (Board Documents, 2014).

Organizational performance measurement with balanced scorecard approach

In the view of balanced scorecard, in addition to financial aspect, organizations also consider their other three aspects for performance evaluation so performance of organization should be examined by four financial, customer, internal process, learning and growth

aspects.(Shahin, Zairi , 2005:756). Kaplan and Norton have identified four aspects. Each of them represents one of the most important aspects of the organization. These four dimensions include financial, external customers, internal processes and learning dimensions. They believed that these four aspects create a balanced view in each organization and by creating metrics based on each of these four aspects no important work scope is neglected. It is important to remember that the scorecard is only a framework and gives no information about what certain metrics of each organization should be. Therefore, the people in the organization are responsible for this decision and each organization (or even different internal sections of an organization) has a different set of metrics. A major part of the scorecard`s success is how to reach an agreement about the metrics, how to implement them and how to react accordingly. Therefore, the scorecard designing process is just as important as the scorecard itself. (Bourne, 2002). As what mentioned above, the organizational performance evaluation measures have presented by Kaplan and Norton that detailed below in figure 3.

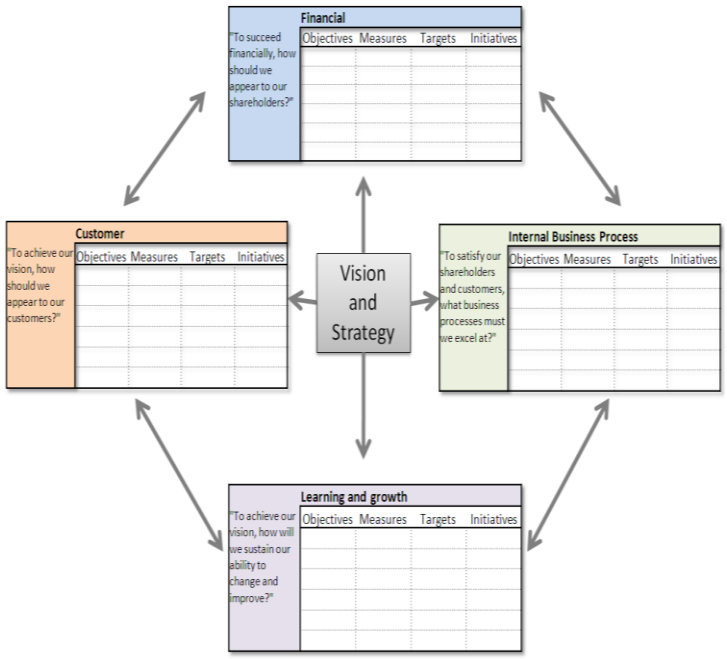

Figure 3: Four Perspectives of Balanced scorecard by Kaplan & Norton(1996:76)

Background theory card

Based on a search performed on foreign information databases, as the most important relevant scientific resources, including ProQuest, EBSCO, Emerald, Springer, Elsevier and internal information databases like Jihad Daneshgahi scientific information databases, national journals database, knowledge reference (Civilica)and etc. no direct study regarding Board information system was found. The information related to information systems and their effect on performance is presented as the following table to create a meta-analytical approach to the previous works:

Table 1:

NO.	Author	Title	Year	Dimensions
1	Naranjo-Gil	Management information systems and strategic performances: The role of top team composition	2009	1. Cost reduction, 2. Flexibility,
2	Trivellas and etal	Antecedents of Task Innovation: The role of Management Information Systems	2013	1. Human relationships, 2. Open system, 3. Internal process,
3	Munirat and etal	The Impact of Management Information System (MIS) on the Performance of Business Organization in Nigeria.	2014	1. Flexibility in the nature or Pattern and structure of MIS, 2. Communication , 3. Searching information,

4	Pérez-Méndez and etal	Relationship between management information systems and corporate performance	2015	1. Improving profitability, 2. New Management Tools (NMTs), 3. Strategy,
5	Martinez-Simarro and etal	How information systems strategy moderates the relationship between business strategy and performance	2015	1. Strategy, 2. Cost reduction,
6	Hossain and etal	Impact of psychological traits on user performance in information systems delivering customer service: IS management perspective	2012	1. Psychological traits,
7	Nikolaos and etal	The Leadership's information system of new performance management practices after Mergers & Acquisitions	2013	1. The fulfillment of employees expectations,
8	Xiao	The Impact Of dynamic IT capability and organizational culture on firm performance	2008	1. Prediction performance,
9	Khatib	A Phenomenological study on the potential impact of implementing information systems in Midsize corporations	2010	1. Healthy working environment, 2. Effective communication, 3. Alleviate resistance to change, 4. Assimilation, 5. Minimizing stress, 6. Knowledge sharing, 7. Effective leadership, 8. Empowerment, 9. Risks taking, 10. Means of communications and collaborations,
10	Jones	An Analysis of the Impact of Information Systems on the Level of Trust in the Construction Industry	2009	1. Trust , 2. Improve communication between contractors and their clients,
11	Mohammadi NajafAbadi and etal	The Role of management information systems to improve performance managers (case study: managers of government agencies in Isfahan)	2013	1. Improving the performance of managers, 2. To Improve planning, 3. Improving organization, 4. Improving Communication, 5. To Improve monitoring and control,
12	Tabarsa and etal	Explain relation between information systems and decision-making process of middle managers of private banking	2011	1. Improving Decision-making, 2. Timely response to the environmental opportunities and threats,

				3. Accelerating processes of Providing services, 4. Accelerating organization processes, 5. To reduce organization cost,
13	Yousefi	Assess the impact of usage of the information system on integration of departments, the response to domestic issues and accelerate response to environmental changes in the tax agency (Case Study: Asset Department of Mazandaran)	2013	1. Internal flexibility, 2. Interaction between the different parts of the organization, 3. Integration of different parts of the organization,
14	Daneshfard and etal	The Role of the implementation of the Balanced Scorecard to improve organizational performance	2010	1. Improving Organization performance from financial perspective, 2. Improving Organization performance from customer perspective, 3. Improving Organization performance from learning and growth perspective, 4. Improving Organization performance from internal process perspective,
15	Moradi and etal	The Role of hospital information system to improve the performance of the hospital Doctor Sheikh Mashhad	2007	1. Cost reduction, 2. Reducing the time, 3. Employee satisfaction,
16	Eslamian and etal	Assess the impact of accounting information system integrated with the balanced scorecard approach and fuzzy multi-criteria decision-making techniques	2014	1. Improving Organization performance from financial perspective, 2. To reduce organization cost, 3. Improving Organization performance from learning and growth perspective, 4. creating information in organization, 5. Employee satisfaction, 6. Improving Organization performance from internal process perspective, 7. Improve purchasing process of 8. Improving the delivery of goods, 9. Improving Organization performance from customer perspective, 10. Customers loyalty ,

				11. Reduce of cost of goods sold,
17	Haji Jabari and etal	Impact of processing capabilities of accounting information systems on organizational performance on Shahin Bonab steel complex	2012	1. Improving Organization performance from financial perspective, 2. Customers subjective impression, 3. Customers loyalty,
18	Rizvandi and etal	Office automation system and financial organizations on performance decision making of managers in Qazvin municipal council	2014	1. Quality of decision-making, 2. Being timely, 3. Being Economy,
19	Mohammadian	The role of information systems in the effectiveness and efficiency (and performance) of the public sector, Case Study: the Governor of Tehran	2014	1. Support of strategies, 2. Support of users, 3. Optimization of costs,
20	Ebrahimi	Relationship between Strategic management of information systems alignment with Balanced scorecard and information systems performance	2005	1. Alignment Strategies,
21	Khadem Hosseini	Assess the performance of information systems through the balanced scorecard	2011	1. Improving Organization performance from financial perspective, 2. Improving Organization performance from customer perspective, 3. Improving Organization performance from learning and growth perspective, 4. Improving Organization performance from internal process perspective,

Towards the proposed model

Before proposing the conceptual model of the research, the mediator variables of the information systems` effect are presented in the following table that according to the provided categorization derived from the existing indicators in the previous research

Table 2:

Dimensions	Khadem Husseini	Ebrahimi	Mohammadian	Rizvandi and etal	Haji Jabbari and etal	Eslamian and etal	Moradi and etal	Daneshfard and etal	Yousefi	Tabarsa and etal	Mohammadi NajafAbadi and etal	Jones	Khatib	Xiao	Nikolaos and etal	Hossain and etal	Martinez-Simarro and etal	Pérez-Méndez and etal	Munirat and etal	Trivellas and etal	Naranjo-Gil	**Σ**
cost reduction			●	●		●	●			●							●	●			●	8
Flexibility									●	●			●						●		●	5
human resource empowerment						●	●				●	●	●	●	●	●				●		9
Structure and Process Organization		●	●			●			●		●		●				●	●		●		9
Communication					●	●						●	●						●			5
Risk Reduction													●									1
Improve Decision-Making				●						●												2
Time reduction				●			●			●												3

knowledge sharing						●							●									2
usability																		●				1
organizational performance improvement from financial perspective	●				●	●		●														4
organizational performance improvement from customerperspective	●				●	●		●														4
organizational performance improvement from learning and growth perspective	●					●		●														3
organizational performance improvement from internal process perspective	●					●		●												●		4

In this table, from total references to the extracted dimensions of the previous research we can conclude that human resources empowerment ,organization structure and process dimensions include the highest number of references in the set of previous works; moreover, applicability and risk reduction include the least number of reference in the previous research.

Furthermore, we must mention that in order to propose the conceptual model, the last four variables of the above table (organizational performance improvement from financial, learning and growth, customer and internal process dimensions) are the dependent variables of this conceptual model therefore they are removed from the list of mediator variables of the information systems` effects on the organizational performance.

According to the investigated measures, in this research a conceptual model is proposed as follow. The conceptual model represents the relationship of the information systems (considering the dimensions of information systems) on the organizational performance. In this model the evaluation measures of the organizational performance is derived from "the Kaplan and Norton`s balanced scorecard" research that its main factors includes the balanced scorecard dimensions, i.e. financial, customer, internal process, learning and growth.

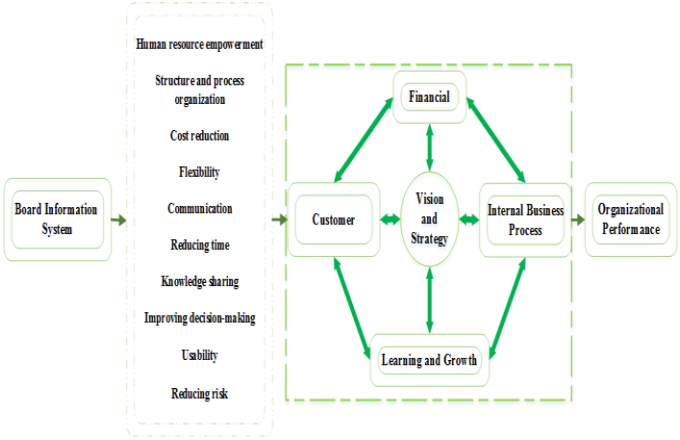

Figure 4: Conceptual Model of This Research

Conclusion

According to what mentioned above, this study proposed a pattern for the influence of Board information system on organizational performance based on the balanced scorecard approach. This study evaluates the effect of Board information system` measures i.e. human resources empowerment, organization process and structure, cost reduction, flexibility, communications, time reduction, decision making improvement, knowledge sharing, risk reduction and applicability on all organizational performance dimensions including financial, customer, learning and growth and internal process); the results indicate the positive and significant relationship between these measures and all dimensions of the organizational performance. In sum we can conclude that by using Board information system in its financial aspect as a system in the business intelligence and performance management domain, It Can provide an organization depth analysis of market and market forecast as the most important element in gaining market share. Moreover, while performing with this information system and dividing and identifying loyal customers for an organization we can say that increasing customer satisfaction levels can play a key role from the customer dimension. In addition determining business trend of organization without wasting time, costs, and additional energy, increasing the organization`s performance, clarifying the organization`s processes and flexibility in internal processes dimension of an organization is important. Finally, facilitating the managers` decision-making, training the people involved in this information system to extract essential and fundamental information and creating structured reports can be institutionalized from the learning and growth dimension to eventually fulfill organizational perspective and strategy and finally make improvement in organization performance.

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