Development prospects of organizational Decision making via empowering Business Intelligence

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Abstract

Rapid innovation means rapid evolution, and with the concurrent development of information and data technologies, many applications have arisen and many technological implementations have to considered in this context, business intelligence is relatively a new interdisciplinary term that helps businesses gain value through exploiting different sources of data, therefore maximizing performance, getting more development in its operational activities, more customer satisfaction and managing to have a more wise decisions based on data in an efficient manner. number of organizations adapting these technologies are increasingly on the rise, due to the raising of awareness of the different capabilities business intelligence can offer. In this paper we will get to identify the need for this technology, describe the data transformation and how it can be extremely valuable at some point, analyze the most critical components of the system, and furthermore, through this essay, there will be a glance of the role of BI systems for strategic organizational decisions and definition of what factors can affect the success of BI system implementation, Lastly the term Game Theory is presented in this essay, to further explore different aspects related to businesses and the proper implementation of BI systems.

Introduction

Our world is evolving quickly with the rapid development and the usage of information and communication technologies, which have widely grown and kept continuously spreading in all paths of life and in almost every single corner. Along with this evolution, more and more methodologies have emerged consequently to accommodate the necessity of speeding up processes, and obtain high quality outcomes in term of products, services and even when it comes to decision making systems for enterprises and administrators, by embracing large streams of data and extracting the usefulness and the gist of these interlaced data' sources.

data management had been implemented and used in the past half century and was defining a value for businesses, Nicholas Enticknap wrote "The 1990s have seen an increasing emphasis on making IT provide competitive business advantage, and this has led to the rise of data mining and data warehousing applications". For the purpose of smartening such systems, several stages have been taken place with the aid of different variables on which these systems rely on, firstly we can define Business Intelligence with reference to (Reinschmidt and Francoise, 2000), a BI system is "an integrated set of tools, technologies and programmed products that are used to collect, integrate, analyze and make data available".

Thus if we look carefully at the definition, we can observe what steps are supposed to be taken, and what is the predicted results out of this integrated methodology. And that leads us to the conclusion that obtaining good decisions is one of the ultimate goals of Business Intelligence, According to Farjami (2015), Decision maker indeed needs good data, to make the right decision at the right time and place. And undoubtedly BI will be very beneficial in the convoluted environments where decisions need extra temporization, but with BI systems it will become a more sourcing guide. As according to Arnott, D., Gibson, M., & Jagielska I. (2004), "A Business Intelligence (BI) system is a technology that provides significant business value by improving the effectiveness of managerial decision making".

Research Issue

Due to the vast growth in data and data availability which has taken place over the past 20 years, huge concerns have arisen regarding the exploitation and utilization of data for enhancing the performance of organizations and gaining business value, through an efficient use of decision-

making platforms, as eventually meaningful and accurate information has a big support for business decisions (Matei, 2010). The problem lies in taking advantages of all informational resources and harnessing these precepts of information to manage organizational operations and activities, reporting and planning, and to boost decision-making effectiveness to the ultimate level during times of great uncertainty. Having exploited such resources is one of the most critical success for organizations (Cody, Spangler, Krishna and Kreulen, 2002).

Research Methodology

Throughout the study, there will be intensive research on previous literature reviews, extracting data from different articles and some other sources, the primary aim of this study is to analyze, and make investigation of different approaches that can be implemented to empower business intelligence for further enhancement in organizations, mainly the business intelligence is to collect, organize and interpret data in a valuable meaning to assist decision makers in organizations. Being in this Theory-Driven hypothesis, deductive reasoning will be used as a result, an empirical approach will be conducted in this study to evaluate the current situation, explore different scenarios and use cases to further analyze and create specific hypothesis.

Data Transformation Pyramid

For the aim of supporting business decisions, certain transformations are applied to raw data in order to gain valuable information, for the purpose of increasing potential for boosting decision making, with a more meaningful aspects and greater significance, to avoid misconception about data, information, knowledge, and sometimes "wisdom" or in other words "intelligence". However, the following illustrates and distinguishes these terms according to Ackoff (1989)

1) Data: It all begins with data as it is the seed for information, wisdom and knowledge, transactional processing systems are defined in this level, data or raw data are introduced as a random set of things, observations, activities, transactions, facts and so on which has no meaning or value because it is without context and interpretation (Jessup and Valacich, 2003, Groff and Jones, 2003). As according to (Awad and Ghaziri, 2004, Chaffey and Wood, 2005) data are discrete, objective facts or observations, which are unorganized and unprocessed, and do not

convey any specific meaning, whereas Data items are an elementary and recorded description of things, events, activities and transactions (Laudon and Laudon, 2006, Boddy et al., 2005).

2) Information: this higher level of transformation is defined by management information systems which basically identify Information as data which adds value to the understanding of a subject (Chaffey and Wood, 2005, p. 233). Data that have been shaped into a form that is meaningful and useful to human beings (Laudon and Laudon, 2006, p. 13). Or according to (Awad and Ghaziri, 2004, p. 36) Information is an aggregation of data that makes decision making easier.

3) Knowledge: this upper level have a direct effect on decision making and represented by decision support systems, where knowledge is considered to be the combination of data and information, in addition to experts' opinions, skills, and expertise, which eventually result in a valuable asset which can be used to aid decision making (Chaffey and Wood, 2005, p. 223). Some other definitions include Knowledge as data and/or information that have been organized and processed to convey understanding, experience, accumulated learning, and expertise as they implement to a current problem or activity (Turban et al., 2005, p. 38). Lastly, with reference to (Boddy et al., 2005, p. 9) Knowledge is built on information that is extracted from data ... While data is a property of things, knowledge is a property of people that predisposes them to act in a particular way. However, Strong et al. (1997) pointed out that the process of converting unprocessed data, organizing them and transforming them into information, which can be utilized and analyzed by a data consumer that eventually will shape the term knowledge, this whole process is called "data manufacturing system".

4) Wisdom: the making of intelligent decisions by expert systems is the ultimate goal of business intelligence, in this context wisdom or intelligence is defined as accumulated knowledge, which allows you to understand how to apply concepts from one domain to new situations or problems (Jessup and Valacich, 2003). Or is considered the highest level of abstraction, with vision foresight and the ability to see beyond the horizon (Awad and Ghaziri, 2004, p. 40). As according to (Jashapara, 2005, pp. 17-18) wisdom is the ability to act critically or practically in any given situation. It is based on ethical judgement related to an individual's belief system. Wisdom is achieved after too much processing of data, information and knowledge and the whole process starts with data.

Main Components of Business Intelligence Systems

Given the diversity of business sectors, related performance factors associated with each sector, or to the overall all performance of companies and organizations, there is an increasing reliance on data as vast amount of data are usually produced by businesses and supposed to be considered to other businesses whether they are in the same field or in different fields.

Therefore harnessing the power of business intelligence should be one of the top priorities to become more effective in its operations, increasing profits, and help supporting strategic plans for organizations, and that can be done mainly by using and leveraging BI methodologies in all aspects, BI has been one of the top technology priorities for many worldwide organizations (Luftman and Ben-Zvi, 2010), however, Business Intelligence can be categorized into 4 major components:

1) ETL Tools: a set of tools which are used to obtain, adjust and load data from both operational databases (CRM, ERP, HRMS,…) and dispersed data sources (News, Social Media, Videos,…) allowing for the collection of such volumes of data, which then will be forwarded to data warehouse (Schink, 2009) and mainly ETL is to manipulate and process data into information which afterwards used for managerial decision making (Arnott et al., 2004). ETL mainly extract data by getting access to different heterogeneous sources, converting data to the same schema of the warehouse, as it became more difficult to match data types because of the distributed and dispersed information systems, and finally pushing these bunches of data towards the warehouse after the data have been aggregated and filtered, and the latter are done in order to identify what is needed and to which data warehouse these information have to be deposited (Olszak & Ziemba, 2007) (Shi et al., 2006). Taking into account that quality of data loaded to data warehouse is associated with the refinement of the ETL tool (Schink, 2009).

2) Data warehouse: which is a collection of relevant business data organized and validated (Cody et al. 2002). In fact, data warehouse is considered to be the core component of a business intelligence system (Negash, 2004), and these bulk of data in within are used fundamentally to support the management decision making process (Hevner & March, 2005). Usually there are different characteristics that defines the efficiency of a warehouse, including easiness to use, ability for quick information recovery, information capacity, all factors contribute in allowing better decisions, thus increasing the organization's competitive advantage (Hwang & Xu, 2007).

3) OLAP techniques: due to the difficulties that can emerge when conducting data analysis on the content of databases, which continuously have updates through various transactional data, the OLAP showed up to solve this issues by attempting to make a real-time analysis on such complex variable data (Airinei and Homocianu, 2009). With reference to Achor (2002), OLAP has been defined as online techniques which represents a computer-enhanced multidimensional analysis that is operating with relational databases in an efficient manner. Furthermore, this kind of optimization is done through automatic generation of database queries to further support searching of huge bulks of data (Olszak & Ziemba, 2006). According to (Matei, 2010), this multi-dimensional tool will boost the efficiency and accuracy of strategic decision making, as of its readable and fast interactive report generating, by summarizing data and use historical data that resides in the warehouse for forecasting, that mainly uses data mining techniques for its multi-perspective analysis to provide the management with a more wide vision.

4) Data mining: the manipulation of the interrelated data to define what relationships and commonalities are there, by discovering different hidden existing patterns, regularities and rules, and subsequently be clarified with a detailed and illustrated report (Hevner & March, 2005). However the responsibility of the Data Analyst is to make predictions for the outcome of a situation using the data mining, whereas the Business Analyst have to use the existing data to make real measures with graphing, tabling and creating formulas (Olszak & Ziemba, 2007). On the other hand, data mining techniques can represent a key role in refining extracted rules, regardless of the sample size (Hilage & Kulkarni, 2012)

Critical success factors for Business Intelligence systems

Due to the development of different technologies, and the enormous increase of data collection, that is accommodated properly with everyday's' greater storage capacity, BI is coming up with its solutions, which its success might vary according to enterprises' sizes, applications, and requirements (Hawking and Sellitto, 2010). Organizations have an extensive amounts of data, either internally from the different departments which are operating inside, or externally from other entities in the business environment, at the same time, organizations indeed need a lot of data, to be processed and fast delivered on time in order to get more modernized in their operations and decision-makings (Turban et al, 2010)

Implementation of BI solution is of a high risk, and there are various factors that can affect the implementation process of BI in organizations, literature has defined different frameworks for categorizing Critical success factors, in this essay however, the (Hawking and Sellitto) framework will be introduced, which states that there are three dimensions which affect the implementation of Business Intelligence in organizations

1) Organizational Dimension

This dimension is mainly about the organization itself of what business strategy does it possess, the overall goals and objectives of the organizations have to be clearly identified, as well as the business vision. the commitment of support and sponsorship from the management is very important at this point as BI may require a lot of investment and further support especially from the top management, and that support is linked to the factor of understanding the benefits of the business intelligence system in the organization, and empower the use of informational decision-making in the organization to further encourage staff to work with information systems, to additionally obtain information and knowledge sharing within the organization (Gopalakrishna et al., 2005), thus enriching transparency and strengthening cooperation.

2) Process Dimension

The process dimension consists of factors related to the team, project management, and change management (Koronios and Yeoh, 2010). the structure of the project, assigning appropriate staff for tasks is crucial for a project (Gopalakrishna et al., 2005) as with assigning adequate resources and skilled team, more productivity will be gained throughout the project, also there are many factors that influence the quality of the system including management support, Appropriate team skills, and user participation according to (Hawking and Sellitto, 2010). Wixom and Watson as well agree in their study (2001) that team skills has a major influence on the project outcome. Another major factor is the employees' reluctance to change, and might cause an unsuccessful experience (Hsieh et al., 2010). Furthermore, Koronios and Yeoh (2010) added that the more participation of users, the more clarification of their needs and the better installation of the system. In accordance to (Iahad and Sangar, 2013), training supports for users as well, is a main contributor to the continuity of accepting new systems and its related features.

3) Technological Dimension

As the name implies, this dimension refers to data and infrastructure related factors (Koronios and Yeoh, 2010), mostly the main terms included in this dimension are data quality, accuracy and integrity, in addition to some other factors, also have stated that the technical framework of BI systems should be elastic and able to be upgraded at any time, due to the new business needs that may rise at some point, in order to be more scalable and making any kind of alignment when needed. It is worth to mention that some factors in this dimension and the other two dimensions can actually relate to each other, Nevertheless, understanding firms needs and the right alignment of technology resources with the organizations' objectives, can basically avoid the failure of BI systems (Alaskar and Poulis, 2015). On the other hand, realizing the high benefits which can be obtained through BI systems is very crucial according to the study of (Jones et al, 2012) as data consistency and quality are a major cause of BI initiative’s success or failure.

Discussion on Game theory's Role in Business Intelligence

Along with the constant development in companies and organizations, extra reliance on data has to be taken into account, and that is due to the persistent dependence of organizations on information technologies tools in both internal and external operations. In addition, the necessity to make good decisions on different levels of strategic, tactical, or operational, for its role of improving business performance, avoiding money loss, and making a good return on investment accordingly, and for providing justifications for top management in case of a wrong decision for instance, all that boosts the need for wise solutions that can save data in a meaningful state, for helping businesses in their strategies and their daily operations, especially when decisions are interrelated and might affect one another.

Deciding what a strategy the business has to conduct nowadays is a big challenge, as this concurrent business environment is very complex along with the existence of high level of competition, globalization and alliances. Game theory come forward, to adapt and embrace businesses to let them gain competitive advantage amongst their competitors with quick and proper decisions, game theory is based on analyzing the surrounding environment of other organizations and entities, studying the interactive decision-making, where the result of a decision-maker can affect or depend on others, either competitors, suppliers, or even customers, and investigating different possibilities and approaches of competing or cooperation with others to survive in the market.

Businesses do not necessarily have the same strategy to remain in the market, thus it is not always about winning and losing, there are many cases where the best choice for a business is to make an alliance with the competitor, and we can argue that the way to succeed does not necessarily require others to fail. In fact, identifying the right game for a business, right time and the right place are the judges, usually it is not how well the business is operating when it is not playing the right game. therefore game theory focuses directly on finding the proper strategy and making right strategic decisions accordingly. No effective decision can be made in isolation with other decisions, for that, game theory comes into play to break down the game into manageable components that helps identify what is happening around and what actions to perform accordingly.

Taking a step further, we can easily predict that there will be huge increase in data volumes which will not be useful until its properly processed, as if look backward in the 19th century we can notice how much data are available today comparatively. However many technologies and new trends are spreading around and started to reserve a portion of the market substantially. The extraordinary use of Internet, and the enormous usage of its applications, in addition to new trends and Smart technologies including IoT, Intelligent homes and businesses, transportation and many others which include integrated sensors that keeps creating data regularly, all these technologies are leading us to the fact that Data is of a big concern, and it will absolutely transform our thinking into the higher realms of brilliance.

Conclusion

Despite the fact that Business Intelligence has not been a trend that was implemented since quite long time, there is an obvious concern and interest in BI technologies in so many fields nowadays, and BI became one of the most critical requirements for organizations, and got to be placed on the top priorities due to the enormous evolution of data, and the need to align companies' operations with the concurrent conditions. Many techniques which have been used widely in enterprises are getting to evaporate, because of the existence of this newly handy smart technologies, which in turn, are taking place of those relatively obsolete trends. Adoption of BI systems is not as easy as it might seems, as there are many failure implementations of BI systems, due to the lack of awareness of the tangible value of sophisticated data and analytical tools, through which various benefits can be derived for the development of businesses, knowledge and expertise is another factor that blocks the initiatives to start implementing such systems, and that is in addition to some other factors both technical and organizational to which we have been exposed throughout this study, which indeed affects the integration process of these systems and are considered to be the critical success factors of implementing BI systems, a more thorough search will be conducted on these factors in order to define the lanes through which more development can be obtained, and to reveal more information and possible approaches of enhancement and development in this field. BI is an interdisciplinary concept that has many technical and organizational aspects to be further examined and explored, besides researching of future trends that will come to the surface as well as key developments, which in turn will influence business intelligence and analytics.

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