BUSINESS INTELLIGENCE AND ITS ROLE IN DECISION-MAKING

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Abstract

Increasingly commercial, nonprofit and public-sector companies' decisions tend to be based on data. The information available to these companies is the most critical component for their success. Guided by the increased competitiveness due to changing business models and the growth of the demand for new applications, many companies are adopting Business Intelligence (BI) technologies, data warehouse (DW) and systems that help the decision making process. Companies have realized the importance of implementing BI strategies in achieving their business goals. Many of them are making BI functionality more useful for all decision makers, officers and employees who deal with clients. Product quality specialists can now use the appropriate data in Data Warehouse to analyze the quality of the product. After a successful analysis of data on products they can find rules and patterns that lie behind and consequently help the quality analysts and managers to make better decisions regarding quality management. This paper focuses on the importance and advantages offered by BI in the decision-making process by analyzing the factors, technologies and best techniques for the implementation of BI.

Keywords: *Business Intelligence (BI), OLAP cube, Data Mining and Data Warehousing*

1. Introduction

Nowdays, many organizations are developing and implementing Business Intelligence, or BI systems. However, BI is not a new technology. It was first developed and used in 1960s and was known as Management Information Systems (MIS). MIS were designed to support managerial decision-making. Those systems have evolved over the years: in late 1960s they were known as Decision Support Systems; in the 1970s as Executive Information Systems; in the 1990s as Data Warehouse systems and Knowledge Mangement Systems. It was in the 1990s that the term Business Intelligence became widely used (Shollo, 2013). BI was used to cover the idea that the data in IT system can be exploited by the business itself (Dekkers, 2007).

In literature review we find two major types of definitions for BI:

1. BI is a set of technologies, that is a set of tools and methods that supports the gathering, analysis and transformation of data into information (Watson and Wixoxm, 2006).

2. BI is a process in which internal and external data are gathered, integrated, analyzed and transformed into informacin wich is than turned into knowledge used in decision-making (Petrini and Pozzeban, 2009).

According to the first definition, BI combines data warehouse technology with data mining and on-line analytical processing (OLAP), and it gathers information from KMS, DSS and other information systems used in the business (Negash 2004). In gathering and storage technologies, the main idea about BI is that it is a system that gethers and stores data. Figure 1 shows the categorization of data according to Negash first in respect to dimension and second in respect to souce and type.
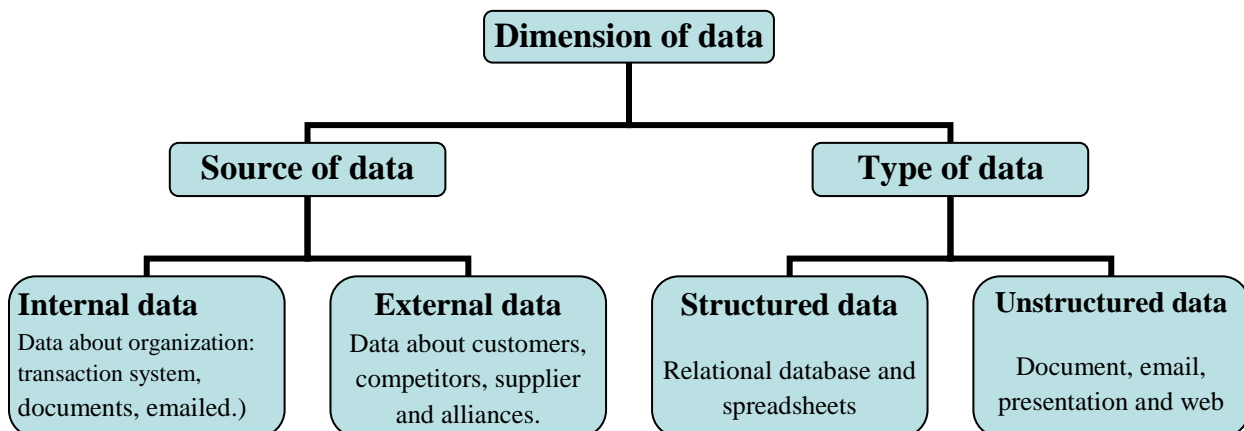

Figure 1. Type of data in a organization

Traditionally, BI technologies are developed and implemented for the gathering and storing of strucured data (Baars and Kemper, 2008). But only the combination of structured and unstructued data will provide decision-making with actionable information. Around 85 % of all business information exists as unstructured data, and 60 % of CIOs and CTOs consider unstructured data as vital for improving procedures and creating new business opportunities (Negash, 2004).

According to the second definition, BI process consists of three phases:
1. Data gethernig and storing phases,
2. Data processing and analyses,
3. Actual application of the BI output.

To capture the real value of BI, the organization should find ways to integrate BI into mamagement processes in order to use it in decision-making (Williams 2004).

2. Business Intelligence

Given that business and organizations receive a vast amount of information from diferent recouses, the main problem in taking the operational decision is to focus on the right information. In today's rapidly changing business environment, organizational resourcefulness depends on operational monitoring of how the business is performing and mostly on the prediction of the future outcomes which are critical for a sustainable competitive position. Intelligence becomes an asset only if it is used (Flud, 2003).

Implementing a BI system can help to identify the causes and reasons of certain occurrences thus, helping the business to make predictions, calculations and analyses; so that the needed knowledge is successfully extracted from the data and that the proper decisions are made (Zekic and Susac, 2008). BI consists of a wide range of analytical softwares that provide the informatinon of taking better decision by every user of the business, such as analyzers, managers and operators. The information is in real-time and supports reporting on every organizational level.

According to Blomme, traditionally, BI systems provide a retrosceptive view of the business by querying data warehouse which contain historical data. On the contrary, contemporary BI-systems analyze real-time event streams in memory (Blomme, 2013).

BI is implemented to give users access to information in their systems in an automatic and efficient way. The users need not to have any technical knowledge of the underlying system because all data gathering are performed automatically by the BI systems (Ritacco, 2003).

3. BI component

Efficient Business Intelligence connects business with information technology (IT) so that the available resources can be allocated with respect to their own capabilities, as well as provides intelligent problem solutions (Ranjan, 2008). Figure 2 describes the BI envirnment, which integrates many of the business processes (ERP, CRM, etc.) into multiple applications that serve the primary source of data. Once the data are gathered and stored in e DW can be easily ananlayses with the help of BI tools, such as reports, OLAP, and data mining. These analytic tools have the potential to provide actionable information that can be turned into valuable information on which the companies base their decisions.

ETL refers to three separate functions. The *Extract* function extracts desired subset of data from data sources, such as orders, invoices, shipping, web clicks, external data, etc. (Howson, 2008). The *Transform* function is used to transform acquired data into a desired state, using rules or lookup tables, or creating combinations with other data. Finally, the *Load* function is used to write the resulting data to a target database. The most time consuming of the ETL process is the transform function, especially when the source databases are heterogeneous and distributed/decentralized. Inconsistent codes, handling incomplete data and changing codes to meaningful terms are all part of the transform process.
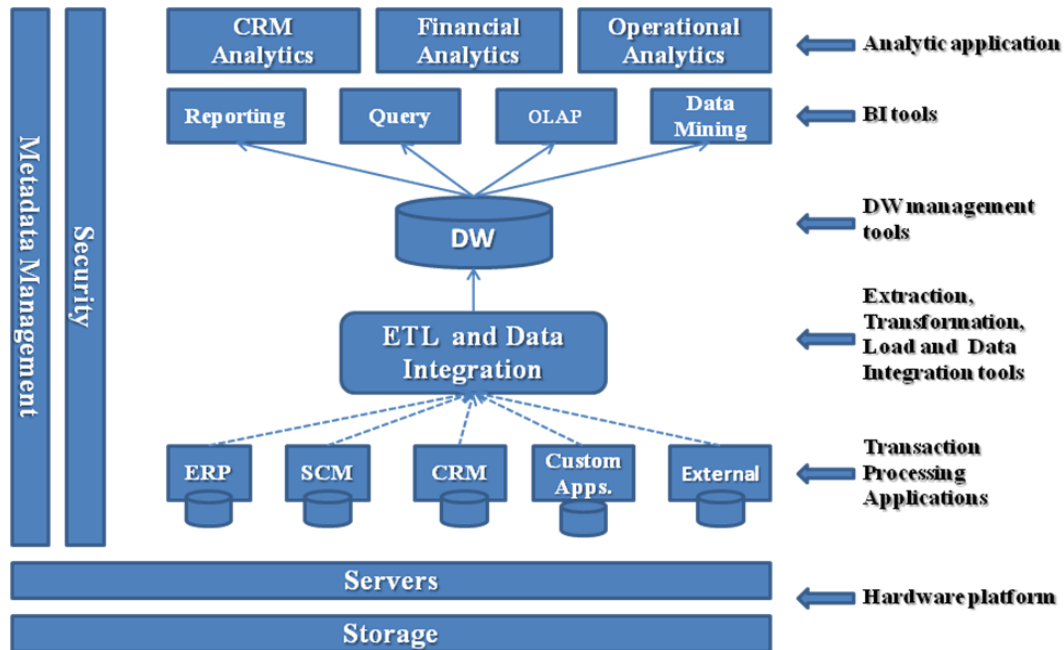
Figure 2. BI environment

Data from the ETL are loaded into the **data warehouse**, or DW. Bill INMO, the father of DW, defines it as "A data warehouse is a set of data of subject-oriented, integrated, consistent, and varies according to the time in support of management decisions". BI applications can extract data from the data warehouse on which they produce information and show it into reports. DW are extracted from various sources and transformed into a single consistent type and loaded for analysis (Figure 3).
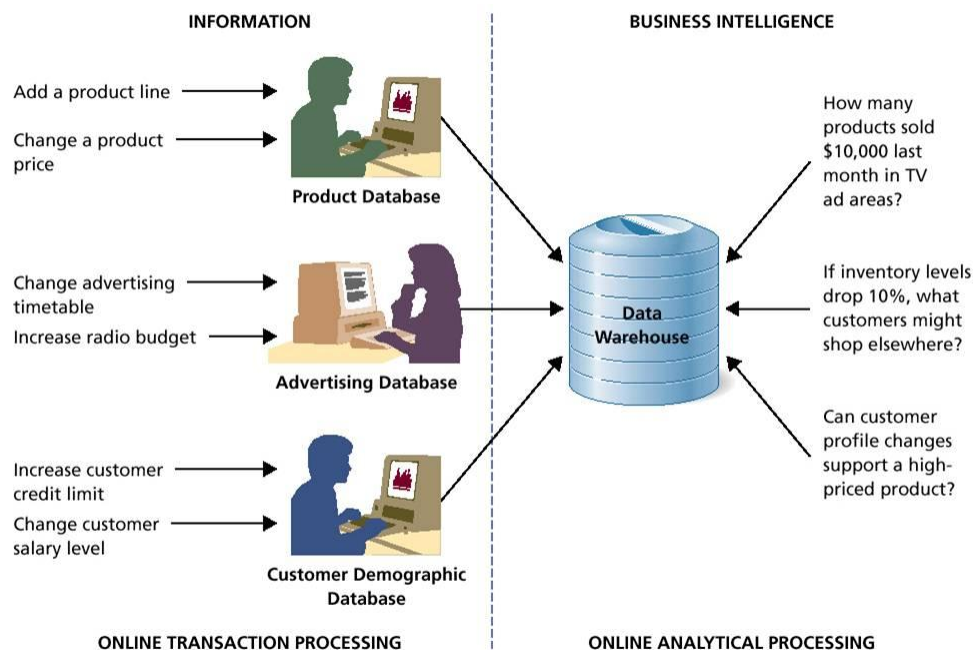

Figure 3. One BI example (HEMPHILL, 2004)

OLAP is a technology designed to provide high performance for query-business case. OLAP is designed to operate efficiently with the data organized according to common dimensional model used in the data warehouse. A data warehouse provides a multidimensional view of data in an intuitive model designed to suit the requirements raised by analysts and decision makers. OLAP organizes data warehouse in multidimensional cubes based on this dimensional model, and then processes these cubes to provide maximum performance for query-that multiply the data in different ways.

Data Mining (DM) is the analysis knowledge which discovers new patterns from large data sets and involves statistical and artificial intelligence methods.

4. Benefits provided by implementing BI

BI can offer different benefits to a bissness inluding improvement on ROI, effective decisions, better plans for the future and an improvement in the customer sadisfaction. BI, when well-conceived and properly implemented, allows all users to make informed choices and decisions every time and in every situation. Additionally, information gleaned from a competent BI installation makes employees more productive, suppliers more efficient, and customers more loyal (Miller, 2011). Within the BI tools market, the end-user query, reporting, and analysis segment accounts for 81.9% of the revenue.

- Reducing costs
  Once in place, the BI make posible for regular employees to create reports and also to be able to discover answers to their own questions. It besomes possible to reduces the human resource costs for the organization, and the labor costs (Henrichsen, 2010).

  BI systems reduce labor costs for generating reports by:
    o automating the data collection and aggregation process,
    o automating report generation,
    o providing report design tools that make programming of new reports much simpler, and
    o reducing training needed for developing and maintaining report.

  BI minimizes manual and repetitive work. The BI toolkit and the synchronistic nature of the BI environment help to facilitate a very different orientation to the everyday tasks of data accumulation and processing.

- Make data actionable
  BI make data actionalbe in a unified view offering the right information to the right people in the organization. This data quality prevents conflictual definitons and incoparable report data. Data are consolidated from different data sources.

- Better and faster decision to business trends
  Whether tracking customer buying habits, inventory turns, or other sales and/or operational parameters, any and all of these areas are more readily evaluated and employed in the business decision-making process whenever coherent and consistent BI

tools are available. As it turns out, the graphical nature of most BI toolkits consistently and dramatically provide easy access and demand attention to the most useful trends. Indeed, the very nature of the BI toolkit gives rise to a dynamic and readily identified representation of the most pertinent trend data (Miller, 2011).

5. Implemention of BI

Many businesses have or are implementing Business Intelligence because it is the top CIO technology whose priorities and trends are driving information revolution and inovation (Hostman, 2013) .

Accorning to Rayner: *"Through 2015, predictive and prescriptive analytics will be incorporated into less than 25% of business analytics projects, but will deliver at least 50% of the business value."* (Rayner, 2013).

However, as far as Albania is concerned, we conclude that we are at the very beginning of the process: at the point where the business and technological advances promised by BI are still being developed, explored, and enhanced.

Some of the most important softwares for implementing BI solutions are: Congnos (IBM), Microstrategy, Inforamtion Builders, BusinessObjects (SAP), Board, Oracle, SAS Institute, Tableau, QlikView, etc.

BI solutions are implemeted in:

- In industry - In retail industries, managers use advanced information technology to provide performance and achieve their objectives in the broad field of applications. The use of BI improves commercialization decisions, provides faster response to the requested information, increases employee productivity and provides a better service to customers.

- In insurance - The use of BI for insurance systems enables a comprehensive view of business, better service to customers and executes operations in the most efficient manner. Typical questions that requires the insurance industry in respect to BI solutions are mainly related to risk analysis for new customers.

- In banks - BI enables an encrease in the number of users (to a high number of users) and offers a superior capacity for generating reports, which are easy to use and contain well-detailed analysis of the level of granularity of the data. It provides:
  - Analysis of the benefit of the client,
  - Management of credit,
  - Branches of sales.

- Telecommunications industry - BI allows business satisfying requirements of end-user community fully extended. Telecommunications industry requires information such as:
  - portrayal and customer segmentation.
  - Demand planning clients.

- Industine manufacturing and the use of large - In manufacturing industry, management is using advanced information technology to improve performance and achieve their objectives in the broad field of applications. BI provides a single source for critical information throughout the organization, so it will be less time for data review and more for taking critical decisions. The following are some of the requirements of this industry:
  - Sales / Marketing.
  - Forecast.
  - Ordering and fulfillment.
  - Analysis of purchases / sales.
  - Distribution and logistics.
  - Management of transportation.

Recently BI applications are implemented on mobile for data analysis and discovery. This is not only ecause of the increasing use (for the encrease use) of the mobiles but also (although) because of the request to have (in haveing) the right information at any time, everywhere.

6. Conclusions

Nowdays, business and organizations are receiving a vast amount of information from different recouses, but are they making better decisions? Deescriptive analysis which is used to identfive what happens in the business reports that business are more interested in optimizing their decisons and predicting the future. Business Intelligence, with provides the opportunity to make a better decision, is becoming more and more prevalent and important.
Business intelligence efficency would be achived, only if in BI system are implemented all structured/unstructured data of the business. The implemantation of the data should be done by the high specializd of different sectors employers always supervised by the technical bisness intelligence staff.

By implementing the Business Intelligence organization can gather large return on investment with a lower cost, make faster and better decisions, and use more effectively the information assets of the organization.

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