# IMPROVING THE QUALITY OF THE DECISION MAKING BY USING BUSINESS INTELLIGENCE SOLUTIONS

**Maria Dan Ştefan**

*Academy of Economic Studies, Faculty of Accounting and Management Information Systems, Uverturii Street, no. 43, bl. 1, ap. 35, district 6, Bucharest, e-mail: danstefanmaria@gmail.com, Phone: 0722684069*

*On the basis of the decision making stands information, as one of the main elements that determine the evolution of our-days society. As a consequence, data analysis tends to become a priority in the activity of an organization for decision making. The diversity and the dynamic evolution of tools and technologies from Business Intelligence category, represent a positive factor, with a decisive role, in the evolution of decision making systems and implicit in increasing quality of decisions. For an organization, Business Intelligence technologies are strong and complex tools for analysis, reporting and prognosis in which the core is data warehouse. This paper aims to highlight the essential role of Business Intelligence in order to increase the quality of decisions, in the context of using data warehouses, and the main areas where Business Intelligence solutions offered by Microsoft SQL Server 2008 can be applied successfully.*
*Keywords: Business Intelligence, Data Warehouse, decision making, SQL Server.*
*The article's JEL code: M15*

## Introduction

Nowadays, on business market, data analyze is a fundamental request for taking decisions in order to obtain performance. Gross information, which in many cases presumes a large volume of data, is not very useful because of the impossibility to make detailed and efficient analyses. Things can change when we talk about synthesized and grouped information that offer a better support for data analyses and decision, a must condition for performing an efficient management.

Usually, to make decisions, organizations must access at the right moment exact and complete information, from various domains of activity, in the right format for the specific purpose, but the operational systems are not the adequate environment for obtaining all this information. Essentially, this type of support is known as Business Intelligence (BI), and the technologies for this support depend on a complex and powerful entity known as data warehouse.

In accordance with information technologies evolution, advantageous regarding the quality and the price, Microsoft SQL Server 2008 solutions are capable to respond to complex data analyses, including advanced Business Intelligence technologies.

## 1. Business Intelligence

The term of Business Intelligence was introduced by Gartner Group in the middle '90s. As a concept, Business Intelligence existed for a long time before, from the '70s, when it was used in reporting systems using mainframes. In that period, the reporting systems were statically, bi-dimensional and having no analytical capabilities[605].

Development of Business Intelligence systems type was determined by requests of dynamic multidimensional systems able to support the intelligence decisional processes and having predictable abilities. These systems became more and more complex, performing multidimensional analyses of data, having statistical and predictive analyses capabilities in order to serve better for decisions analyses.

Business Intelligence systems have an architecture composed from a collection of applications and integrated operational databases, and from decisions assisting systems that facilitates access to data. Decision assisting systems supports, in a business, several activity sectors, including multidimensional analyses, data mining, prediction capability, business analyze, query facilities, reporting and graphical representation, geospatial analyze knowledge management and more[606].

BI presumes rise of business performances in an organization. Electronically extracting, stocking, transforming and using of data necessary for business represent laborious activities that presumes complex and adapted to business purpose infrastructures and information applications.

Business Intelligence is an iterative process: it starts from the operational medium from where the data are extracted and deposited in data warehouses; then the deciding person uses decision assisting systems to extract data from the data warehouse. Detaining this information, a deciding person can create action plans. The change of the operational information level induces to a new iteration of Business Intelligence cycle. The cycle is represented in the following figure:

---

605 Zaman, M., Business Intelligence: Its Ins and Outs, 2005.
606 Moss, L.T. and Atre, S. Business Intelligence Roadmap: The Complete Project Lifecycle for Decision-Support Applications, Addison Wesley, Boston, 2003.

Figure 1. **Business Intelligence Cycle** *(Source:* Giovinazzo, 2002: 6)
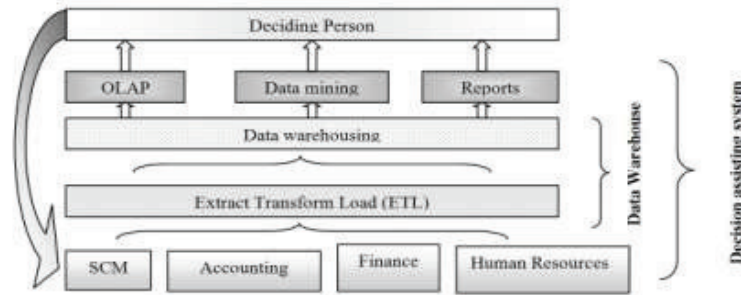


Collecting data and analyzing them were and still are considered by companies as a fundamental activity for long term strategic planning. Before the information technology era, making decision process was based mainly on estimation and on empirical approximation practices. But companies turn their attention towards information administration systems for detailed data analyses trying to obtain a considerable advantage on market, compare with the competition. The structure of an information system dedicated to Business Intelligence is presented in the following figure:

Figure 2. **Basic components of a BI dedicated information systems**
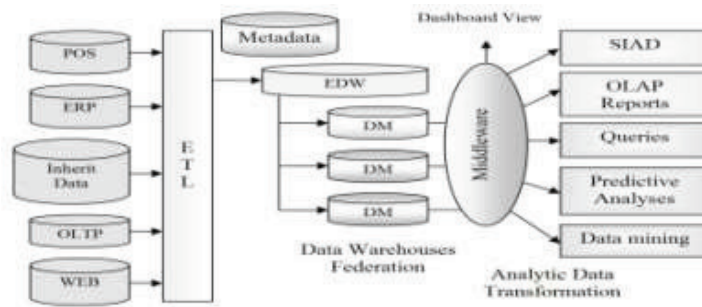


Business Intelligence data sources are formed from operational data bases, including inherited (OLTP), external Web documents, sale point - POS (Point Of Sale), data from the supply chain from the enterprise resources planning – ERP. Data from these sources are loaded in data warehouses by an ETL application (extracting, transforming and loading).

Data warehouses federation is made of data warehouses of enterprise type EDW (Enterprise Data Warehouse), metadata, data shields – DM (Data Marts) for various administrative domains of the organization (marketing, management, finance, accounting, and so on).

The final component of a BI process is design for business performance management (BPM), to corporate performance management (CPM). This component is based on score methodology of type "balanced scorecard" that represent a work frame destined to define, implement and management business strategy for an organization thought binding objectives to practical measures. So, there are connected top level indicators like financial information with actual performance indicators regarding the low-levels of the economic organization.

The main objective of BPM is to optimize the global performance of the economic organization. BPM works usually with dashboard that insure a global view of company performances with suggestive graphic presentations. The dashboard presents the economic organization performances, trends, exceptions and integrates information from various business domains.

## 2. Data Warehouses

The data warehouse is considered the "hart" of the Business Intelligence and is based on combining data from several or even all business systems. Data warehouses are a product of a more competitive, globalised, dynamic and complex economic medium in which the organization is activating and that has needs for relevant, actual information in a consistent and very flexible manner for the decision fundament process.

From methodological perspective, data warehouses represent a branch of information systems applied in the domain of decision assistance information systems, as SIAD or DSS, which insure: complex management of business and access from outside, in an efficient and opportune mode, of information and knowledge needed for businesses.

Data warehouse is a conglomerate of data special produced to support management decision making for business performance. Data warehouse contains historical and current data with potential interest for managers inside de

organization. Usually, data are structured to be available any time for online analytic transformation activities (OLAP), Data Mining, queries, reports, other applications that allows obtaining results for decision making[607].

Data warehouses are a unification of operational data, special structured for queries and analyses and represent the "vertical bone structure" of decision assisting systems based on data synthesize and analyses, or in other words, data warehouses contain the "raw materials" for decision assisting systems based on data synthesize and analyses allowing managers to take correct fundament decisions[608].

Most of the projects dedicated for assisting the managerial decision are based on the new technologies Data Warehouse. OLAP technologies imposed themselves as frequently utilized solutions for data analyze, and the multidimensional analyze concept, together with the new methods of exploring data (data mining) gained step by step more terrain in assisting businessmen decisions.

**Online Analytical Processing** (**OLAP**) is a technology for aggregate the data stocked in data warehouses in a multidimensional manner with facilities regarding information access for managers in an interactive and facile way. The link between OLAP and data warehouses is that OLAP transforms the huge volume of data stocked and managed in the data warehouses in information useful for the decisional process.

Applications that uses these technologies are based on rapid analyze of multidimensional data dispersed in multiple locations but with access for a large number of users. For using these facilities, OLAP rely on the efficiency of multidimensional data bases and on the possibility of building alternatives for diverse decisional problems. OLAP solutions are based on the principal of data restructuration in a multidimensional format known as a hypercube. Basic notions of the hypercube are: dimension, attribute, hierarchy, facts tables, and dimension tables.

**Data Mining** technologies have various applicability domains. So, in risk analyses, it can be establish profiles adapted to the organization in difficulty, while in commercial domain is possible to put in evidence characteristics of a certain type of costumers or of existing trends on a market segment in a specific situation.

Through the data mining technology there are transformed data that refer to previous periods (historical data), that are examined and are already known, based on which is build a model or a template that can be applied to the new situations of the same type with the already known ones. The specialists in the field of data warehouses consider the data mining instruments as a evaluate form of OLAP instruments.

The Data Mining concept define the process of discovery the knowledge models and / or utile information from a large quantity of data, which are collected and stocked in various types of data warehouses, in order to use them as fundament for managerial decision on all the competence levels inside an organization. As a fundamental difference from the OLAP instruments, it must be said that while the usage of those is based on initiative or intuition of the decision factor to establish the aspects subject to analyze, data mining technologies have the role to realize automated observation over data without an explicit intervention from user.

### 2.1. Data warehouse characteristics

Data warehouse is an integrated, timeless, historical and persistent, subject oriented data collection for supporting the process of fundament a managerial decision, from where result the main characteristics of a data warehouse, which are: ***Subject oriented, Integration, Non-volatility and Time orientation***[609].

### 2.2. Data warehouse objectives

The main objectives that must by follow in order to make a data warehouse are as follows:

- *support in decision assistance:* data warehouse must contain data that will assist management of any level in the decisional process;

- *fast and facile access to information:* the access must be realized in the shortest time possible, to any request and to be a performing one;

- *data consistency:* data warehouse must offer the certainty that data are correct;

- *flexibility and adaptability:* data warehouse must be built so to be capable to answer quickly and correct to the always changing informational needs of the users;

- *confidentiality*: data warehouses stock information critical for enterprise activity, information that must be available only to the right persons;

- *acceptance:* users of data warehouses must trust the information received from exploitation of data warehouse.

## 3. Business Intelligence solutions offered by Microsoft SQL Server 2008

The Business Intelligence solutions can be used with success in:

---

607 Turban, E., Aronson, J.E., Liang, T.P. and Sharda, R., Decision Support and Business Intelligence Systems, 8th edition, Prentice Hall, New Jersey, 2007.

608 Kimball, R., The Data Warehouse Toolkit: Practical Techniques for Building Dimensional Data Warehouses, Wiley & Sons, New York, 1996.

609 Inmon, W.H., Building the Data Warehouse, 4th Edition, Wiley & Sons, New York, 2005.

- *marketing analysis* – demographical analysis using information regarding clients and sales data, price sensibility, preferences regarding the products. Using this information the marketing campaigns can be better planed and their effect can be measured;

- *sales analysis* – identify the tendencies, seasonal analysis, and links between the products. Using this information, sales objectives can be set and it can be measured the progress regarding these objectives;

- *analysis for distribution chain (retail)* – data analysis regarding the orders in the distribution networks, delivery analysis, stocks analysis. As a result, it will be possible to plan better the stocks, the price promotions for certain products and the delivery calendar;

- *balanced scorecard* – there are defined performances indicators, calculated using the information in the existing systems. This way, it can be watched the company performance on its whole or the performances of some groups relative to others that are similar;

- *financial analysis* – profitability analysis on departments, category of products, geographical locations, seasons. A particular case is represented by the financial institutions – banks, insurance companies – where the financial analysis plays a key role in the activity progress: define the services packages, portfolios analysis, and so on;

- *budget planning* – variances analysis, planning the following fiscal year.

- *support centers and client relations* – analyze the incidents with the clients, analyze the success rate for the telemarketing companies;

- *geospatial analysis* – combines the geographical and demographical information to identify the tendencies;

- *analyze in the projects management* – analyze the resources allocation, analyze the project portfolios.

A Business Intelligence solution, optimal from the quality-price point of view, used in decision making is Microsoft SQL Server 2008, due to its performances in managing a large volume of data and to the facilities for reporting and multidimensional analyze, available using its components. Microsoft SQL Server 2008 offers to the users an extended set of tools that can be classified in the following categories, according to their functions:

- support for client-server environment;
- specific facilities for data storage in warehouses and multidimensional databases;
- tools for OLAP and Data Mining multidimensional analysis;
- tools to transform and import/export data;
- integrated security, configurable and easy to use;
- tools for data advanced presentation and reporting.

For the development of application for decision making, Microsoft offers Business Intelligence Development Studio, a development environment built on the productive framework of the development system Microsoft Visual Studio, which incorporates debugging facilities, together with a favorable environment for building cubs, reports, extracts, transformation and package load (ETL).

**Conclusions**

Considering the present evolution of information technologies and of the tools related to them, as well as the importance of information, which represents one of the most important resources of an organization, I underlined the essential role of Business Intelligence solutions, in the context of using data warehouses, in increasing the quality of the decision making in order to obtain business performance.

At the end of the paper I emphasized the main areas in which Business Intelligence solutions offered by Microsoft SQL Server 2008 are successfully used.

More and more organizations use Business Intelligence solutions and are aware of the utility of information, knowledge and models that can be obtained from data warehouses and used in the decision making process to increase the business performance. In the future, these Business Intelligence solutions will represent a common, and in the same time vital, resource for business continuity.

It remains to see how it will be assured the access to data, given that the organizations that will have important information on the business market will make opportune decisions and will obtain business success.

**References**
1. Airinei, D., Depozite de date, Polirom, Iaşi, 2002
2. Franco, J.M., Piloter l'entreprise grace au data warehouse, Eyrolles, Paris, 2001
3. Giovinazzo, W.A., Internet - Enabled Business Intelligence, Prentice Hall, New Jersey, 2002
4. Hand,D., Mannila,H., Smyth, P., Principles of Data Mining, MA:MIT Press, Cambridge, 2001
5. Hanson, E.N. et al., An introduction to New Data Warehouse Scalability Features in SQL
 Server 2008, available on line at http://www.microsoft.com/sqlserver/2008
6. Inmon, W.H., Building the Data Warehouse, 4th Edition, Wiley & Sons, New York, 2005
7. Kimball, R., The Data Warehouse Toolkit: Practical Techniques for Building   Dimensional
Data Warehouses, Wiley & Sons, New York, 1996

8. Moss, L.T., Atre, S., Business Intelligence Roadmap: The Complete Project Lifecycle for Decision-Support Applications, Addison Wesley, Boston, 2003
9. Perry, M., Data Warehouse essentials for business people, available on-line at www.montage.co.nz/aboutbi/data_warehouse_essentials_for_business_people.asp
10. Turban, E., Aronson, J.E., Liang, T.P. and Sharda, R., Decision Support and Business Intelligence Systems, 8th edition, Prentice Hall, New Jersey, 2007
11. Zaharie, D., Albescu, F., Bojan, I., Ivancenco, V., Vasilescu, C. Sisteme informatice pentru asistarea deciziei, Dual Tech, Bucureşti, 2001
12. Zaman, M., Business Intelligence: Its Ins and Out, available on-line at www.technologyevaluation.com