BI Approach for Business Performance

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Abstract: New low-cost data storage technologies and the vast availability of Internet connection facilitated access at large quantities of data for both individuals and firms. The importance of real time access to important information for the success of a business is crucial. Its importance has continually risen, based on Internet development and growing sources of information. As a result, firms collected huge quantities of data in their effort to understand their business evolution, enhance their performance and create a strong relationship with the employees, clients and partners. Exploiting that storage data is difficult, from transforming it into meaningful data, until its use in order to increase firm’s competitiveness. Usually, in a firm, data are dispersed in a large variety of systems, many companies having difficulties in organizing and interpreting them. These companies own fragmented tools and data, the final image of the business being an incomplete one. Their accessibility promises the opening of many prospects and raises a tempting question: is it possible to convert data in information and knowledge which that decision factor can use in order to help and improve firms and public administrations management? In this paper we present the actual state of business intelligent systems, global and local. Sustaining this argument, we propose a model of business intelligence (BI), building a data warehouse and using some analysis tools, in order to monitor and count the web traffic from both the visitor prospective, as well as from the website’s prospective. We underline the importance of relative new business tools (such as BI), combined with some modern performance management techniques in order to increase a firm’s competitiveness.

Key-Words: Business intelligence, Balanced scorecards, Microsoft SQL Server 2005, Data warehouse, Business performance, Multidimensional analysis

1 Introduction

Multidimensional analysis offers real advantages for the decisional factor, representing an intuitive approach of forecasting in the present context of market economy. In this paper we present some Business Intelligence solutions, which are interconnected with multidimensional analysis.

At the global level, the market of Business Intelligence has an upward trend. International Data Corporation (IDC), at the second part of last year, estimate that between 2009 and 2013 this tendency will continue, the average growth being 7.2% per year, slightly diminished because of the crisis, compared to 2008 and 2007. The entire business intelligence market is estimated by International Data Corporation to 7.8 milliards of dollars, the figures from the beginning of 2009 containing license income and services. Related to 2007, those figures represents a raise with 10.6%, the most dynamical segment being the one of complex tools for advanced analysis, even if they represent only 20% from the entire segment.

The global BI leader is SAP, with income estimated by IDC at 1.59 milliards dollars. The other powers are SAS (879 million dollars income), IBM (800 million dollars income), Oracle (701 million dollars income), and Microsoft (649 million dollars income), the first 5 players controlling 60% of the global BI solutions market.

2009 accentuated this grouping of power, at the 5 main players’ level. In 2010, Gartner report, Magic Quadrant for Business Intelligence Platforms, published at the beginning of this year, states that the first five suppliers of BI solutions own 75% of the market, after Oracle bought Siebel and Hyperion, IBM acquiring in SPSS in 2009 (a company specialized in Business Analytics). This trend to conquer had a negative impact on clients’ satisfaction level, inclining the balance towards the smaller suppliers that provide solutions more flexible.
and easy to use. Another trend we could observe was the interest in pure BI platforms offered by small suppliers that aims to cover the needs uncovered by the big suppliers. For the next period, Gartner previsions are alike with the IDC ones. For 2009-2013 period, the growth remains but is reduced by 8.1%. The market of BI platforms is one with the biggest and quickest development, in spite of the crisis.

In Romania, the growth potential for BI market is very high, with lot of opportunities and interest determined by the crisis itself, even if IT budgets suffered many corrections. Few figures are public, one of the most important and relevant by Pierre Audoin Consultants (IT research and consultancy). They estimated that the level of BI solutions at 11.6 million euro at the end of 2009, with 8.6% higher than in 2008. TotalSoft sustains that difficult economic conditions demand efficiency and adapting at the new challenges the market imposes. In 2009, the company recorded a raise in demand for their Charisma Analyzer solution, a platform implemented in more than 50 companies by now. In 2008, the demand for BI solutions was relative low, but crisis imposed an accelerating maturity, so in 2009 the manager from SAS stated that the interest appears, but without the money to sustain it. From IBM point of view, the implementation of few BI solutions is finalized, the market level remaining constant; with distributed interest (both big firms and small ones show interest). IDC conducted a research for Microsoft in 2009, stating that from the firms with more than 500 PCs, almost half intended to implement BI solutions. Less than half are finalized. In Romania, less than 10% from the eligible firms acquired a BI solution. The local business culture related to BI is not that developed, because few managers are capable and opened to take educated decisions, based on available data. Most of the decisions are taken based on personal experiences, intuition and entrepreneurial style, BI solutions being difficult to understand and be adopted by companies – IBM specialists say. A good understanding of BI solutions and implementation needs a management based on decentralization of the decision process. Decentralization provides a mixture of speed and flexibility in management, allowing the individual progress and giving the people the incentive to develop their competences, on their business segment – highlights Microsoft. The greatest restriction that limits the adoption of a BI solution is the existence of a limited organizational culture. The most powerful argument when implementing a BI solution is the substantial growth of visibility over business performance. Microsoft draws attention to the lack of business consultants. They are not just specialists who understand well IT and technologies, but people who understand business and managerial thinking, and can translate them into technologies. Microsoft states that within a BI project, 80-90% represent the client demands analysis, and only 10-20% translating them in BI tools. Microsoft has a project running, contacting a firm from abroad which has 150 business consultants and activates in 20 European countries. By this they speed the transfer of know-how from those specialists to Romanian firms, so they would be able to implement the next BI solution without their help. Those specialists only take over when there are difficulties, but they double the cost of the project. Medium-size firms have demands for a BI solution, needing systems that take into account users involved in operational actions, not only top management, using scorecards, key performance indicators (KPI), analytical grid, dashboard analysis. The main fields of applicability for BI solutions are financial-banking field, telecommunication and utilities – more advanced technological and early adopters of BI.

For this year, the head of SAS Romania estimates a raise of 10-15% of local BI solution market. For TotalSoft, 2010 brings expectations of a 30% growth of BI projects. The company launched a new solution of Charisma Analyzer based on Microsoft’s Performance Point. Microsoft offers a BI engine together with SQL Server database and Performance Point with Share Point. Other than the first 5 competitors, Gartner report underlines QlikView, a company with the biggest growth in the last three years. In Romania, ne of the most important companies that offer their solution is Crescendo, with implementations in energy, production, distribution and financial-banking. Last year with a slight decrease in sailings, and this year a constant trend, it is estimated the market will develop in the third trimester.

2 Business Intelligence systems

After implementing an Enterprise Resource Planning system (ERP), the next natural step is acquiring a BI solution, the necessary historical data needed for BI being already available. The need for a solution comes only after at least 6 weeks of an ERP system implementation. BI systems combine data collecting and storage processes, knowledge management and analysis tools in order to obtain complex and competitive information for the decisional factor.

The term business Intelligence was introduced by Gartner Group in the middle of the 90’s. As a concept, it existed before, since the ’70 [Zaman, 2005], being used in reporting systems using mainframes. Reporting systems were static, at that point, bi-dimensional, without analytical capabilities. The demand of multidimensional dynamical systems, which can support
intelligent decisional processes, with predictive abilities, determined the development of business intelligence-type systems. Business Intelligence can be defined as a set of mathematical models and analysis methodologies which exploit available data in order to generate useful and complex information capable of supporting the decision making process.

BI gives the ability to gain insight into the business or organization by understanding: the company’s information assets: information about customer; supply chain information; personnel data; manufacturing, sales and marketing activity date as well as any other source of critical information (after [Negash, S., Gray, P., 2003]).

2.1 Performance Management

Business Performance Management is a business solution oriented to supply a result that includes information about firms’ activities, from operational managers to top management. It is a set of specific processes designed to help firms to optimize their business performance.

Key decision makers are empowered with powerful yet simple-to-use analytic tools for exploring large volume of corporate data, in a way that provides rapid insight into trends, patterns, opportunities and challenging.

Effective performance management helps ensure that employees at all levels are focused on objectives that align with overall business goals. Implementing performance management requires the involvement of the entire firm. People are the key to a successful deployment; however, success depends on more than having the right people.

One of the technological challenges of implementing a performance management program is the limitation of traditional BI systems.

Traditional BI systems are designed for trained analysts Microsoft solutions enable a comprehensive performance management approach designed to provide critical business information to the broadest number of users through the familiar and easy-to-use Microsoft environment.

These solutions are built using the robust Microsoft Business Intelligence (BI) platform, which can provide data integration capabilities that transform data from disparate enterprise systems into powerful insights.

Business Intelligence is a concept that groups under its umbrella business, management and information tools, used in order to transform data into information, information in decisions and decisions into actions. These tools help a manager or an administrator visualize information about general function of an activity like productivity, sales performance, etc. From these applications that can be integrated in a BI system we will present Balanced Scorecard.

The Balanced Scorecard is a management system that maps an organization's strategic objectives into performance metrics in four perspectives: financial, internal processes, customers, and learning and growth. These perspectives provide relevant feedback as to how
well the strategic plan is executing so that adjustments can be made as necessary.

2.2 Balanced Scorecard

This concept was introduced in 1992 by Robert Kaplan and David Norton, continuing the research of the people from General Electric (1950). It is a powerful and innovative tool to measure performance, to measure if a firm’s activities help it achieve its objectives related to its vision and strategies. It is a management system and strategic planning tool, offering a global image of a firm, transforming the strategy and firm mission into tangible and measurable objectives.

The term "scorecard" signifies quantified performance measures and "balanced" signifies that the system is balanced between: short-term objectives and long-term objectives; financial measures and non-financial measures; lagging indicators and leading indicators; internal performance and external performance perspectives.

The balanced scorecard framework (Fig. 3 – The balanced scorecard framework (source: http://www.valuebasedmanagement.net/methods_balancedscorecard.html))

For each of the 4 key parameters: Financial Performance (from the investors and shareholders point of view), Internal Business Processes (measuring the potential growth, the focusing being on quality and efficiency), Customers (indicators that measure the clients satisfaction) and Learning & Growing (the framework includes educational components to facilitate a scorecard development and implementation process), we have objectives, measures, targets and initiatives.

Balanced Scorecard (BSC) measures the link between the strategic direction and its day-to-day putting into practice, with the help of some selective measures known as KPI (Key Performance Indicators). KPI are representative for customer service department, transport and distribution, production and storage. They can be used by themselves or connected with other measurements criteria.

A key benefit of using a disciplined framework is that it gives organizations a way to ‘connect the dots’ between the various components of strategic planning and management, meaning that there will be a visible connection between the projects and programs that people are working on, the measurements being used to track success, the strategic objectives the organization is trying to accomplish and the mission, vision and strategy of the organization.

In practice, BSC recognize that global performance of a firm can’t be measured by just one function, but with the help of combined independent measures.

2.3 Data Warehouses

Data warehouses appeared at the beginning of 1990, and IBM is quickly protecting the term Information Warehouse, referring more to a global interoperability of diverse data sources, being a generalized middleware, based on DRDA architecture (Distributed Relational Architecture). But the vice-president of Prism Solution, William Inmon owns the trademark for Data Warehouse. Another important name is Earl Hadden, which successfully set forth and tested a rigorous methodology for quick development for Data Warehouses.

Even though BI solutions infiltrate more profoundly the market economy, their usage level is pretty low. There are more steps in BI: simple reporting, ad-hoc reporting (the user pikes the necessary information by himself, defines the reports and does the analysis, sometimes multidimensional, when all the information from different systems is consolidated into a central database called Data Warehousing). The next step is predictive analysis, through data mining algorithms, that detect models of historical data, or determine the parameters needed for the final goal [Muntean, 2007].

As a first step, it is necessary to obtain and integrate the storage data from different primary or secondary, heterogeneous as origin and type sources. These sources consist on data that belongs to operational systems, but can include some unstructured documents, such as e-mails and data from external suppliers. A huge unification effort is needed in order to integrate them. Using ETL process (extract, transform and loading process), data from different sources are stock in databases destined to support business intelligent analysis. Those databases are called Data Warehouse or Data Marts. Data are extracted and used to supply...
mathematical models and analysis methodologies designed to support the decision factors. Many decision support applications can be used in a BI system, such as: analysis of multidimensional cubes, data exploration, time series analysis, learning inductive models for data mining, optimizing models.

On the third level on the pyramid we find tools needed for a passive BI, queries and reports, as well as statistic methods. On the fourth level we have active BI methodologies, whose aim is to extract information and knowledge about data. These methodologies don’t require decisional factors to formulate every hypothesis, like on the lower level. Some data presentation tools are required to present the information or knowledge in an easy to understand form. On top of the pyramid we find the specific decision making. Even when intelligent BI methodologies are available and successful, choosing a decision is a manager’s privilege – using maybe even unofficial or unstructured extra data, adapting and changing the conclusions obtained from mathematical models.

Going vertical on the pyramid in figure 4, BI systems offer more and more advance tools of active support, even changing the roles and competences. On the lower part, necessary needed competencies are supplied by database administrators (IT specialists within the organization). Analysts and experts in mathematical models are responsible for the intermediate parts. Finally, the responsible decision factor’s activities are on top of the pyramid.

3 Application for monitoring web traffic

We developed a BI system capable to monitor and count the web traffic from both the visitor prospective, as well as from the website prospective.

The application has the following functionalities: monitoring the visitors of a website; monitoring the websites accessed by a visitor; geographical distribution of the visitors; total number of display and visits, for any interval; medium duration of a visit on a website; the average duration of a user on websites; visitors distribution related to the browser used, the operating system, and referrer that lead to accessing that website; websites distribution related to the search engine used, as well as the hosting company that hosts the website.

For a better visibility of the web traffic, we propose the following data warehouse containing nine dimensional tables and two facts tables, all together forming a snowflake (star) schema architecture.

In order to display the counted number of visitors, we can obtain many types of representing the information, depending on the decisional factor’s demand. Using drill-up and drill-down operations, we can display a detailed view of the hierarchies, obtaining a real valuable knowledge (figure 6).

1 The data warehouse for the BI system was created in Microsoft SQL Server 2005 Developer Edition and the modeling in SQL Server Business Intelligence Development Studio.

2 Number of visitors – an important indicator for any e-business initiative.
Reporting takes often the form of different diagrams (figure 7). Counting and monitoring the webpages accessed by visitors, including measuring the visit’s duration, will ground any success analysis.

Fig. 7 – Displaying the visitors traffic

4 Conclusions

Business Intelligence (BI) represents the capability to look inside a business and the environment in which it operates to fundament the most productive and profitable decisions.

In an economical post-crisis context, it is vital to have a business analysis comparative tool. Only optimizing performance we can survive and remain an important competitor in a changing market, constantly taking advantage of the raisin opportunities, risking and being flexible at new multiple demands. Having as a main goal productivity and profitability, BI initiative has some invisible advantages, such as: reduction of destructive influence of power games; the disposal of ungrounded, subjective and supra-dimensional fervor, and decisional enthusiasm; limiting over-exposure of ego in managerial community; avoiding of decisional jams.

Business performance is a new generation tool that helps if BI system is designed to support the firm in an efficient use of financial, human, physical and other type of resources. For monitoring and counting the visitors of a website and their traffic, we created Web statistics, following the theory presented in this paper. The final results of this application are: monitoring the visitors of a website; monitoring the websites accessed by a visitor; geographic distribution of visitors; total number of displays and visits for a website, for any time interval; average duration of visits for a website; average duration spend by a visitor on a website; visitors distribution related to the used browser and the operating system, as well as the referrer that lead to website access and websites distribution related to the used search engine and hosting company.

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