

# Pervasive Business Intelligence: a Marketing Intelligence Framework Proposal

Teresa Guarda<sup>1</sup>, Manuel Filipe Santos<sup>2</sup>, Filipe Pinto<sup>3</sup>, Carlos Silva<sup>4</sup> and João Lourenço<sup>1</sup>

<sup>1</sup>Isla - Superior Institute of Languages and Administration of Leiria, Portugal

<sup>2</sup>Universidade do Minho, of Guimarães, Portugal

<sup>3</sup>Polytechnic Institute of Leiria, Portugal

<sup>4</sup>Isla - Superior Institute of Languages and Administration of Leiria and CIEO - Centre for Spatial and Organizational Dynamics, Portugal

**Abstract.** Nowadays, customers demand faster customer service, and expect that organizations know them and provide appropriate services and recommendations for products quickly. Many organizations are reacting to these market needs by driving toward pervasive business intelligence, augmenting traditional business intelligence (BI) with the ability to capture, interpret and act immediately on data to make faster decisions. With pervasive business intelligence, organizations data warehouse changes to a system that can proactively and reactively interact with the business stakeholders, and it provides appropriate decision options to help marketers to respond and take action based on knowledge discovery in current integrated data. This work based on the literature review presents the Pervasive Business Intelligence state of the art and related areas, leaving open for proposing a framework to guide the development of activities of Marketing Intelligence.

**Keywords:** Business Intelligence, Marketing Intelligence, Pervasive Business Intelligence.

## 1. Introduction

The pervasive impact of business computing has made information technology (IT) an essential part of regular operations and a strategic element or key to all organizations. It is not difficult to realize that organizations have accumulated large amount of data. This data has different origins and reaches the organizations through a range of channels. It is strategically important to make these data available for decision making, even because customers demand faster customer service. The growing volume of data generated every day in organizations and the crescent competitiveness of the market, leads to the need to use tools capable of generating knowledge from stored data. In the global market where competition is fierce, companies increasingly need to reduce their profit margins to remain competitive. Thus, it is essential to use the information proactively.

The fierce global competition leads organizations to consistently obtain accurate information for decision-making in order to sustain its competitive advantage. It's crucial for an organization to be proactive, acting before its competitors, by having a constantly updated vision of market development, then the Information processing becoming the platform that enhancing competitive advantage [1].

The analysis of large volumes of data is impossible without resorting to the appropriate software tools, making it essential to develop frameworks that help to automatically and intelligently, analysing, interpreting and correlating data, enabling the development and selection of strategies for action [2]. In order to assist companies in this exploration of data, concepts and tools for organizing information are critical, highlighting the Pervasive Business Intelligence (PBI) and Marketing Intelligence (MKTI) as pillars to support the decision-making. The economic decline is impelling organizations to examine ways of retaining customers, speed up their services, spending less capital be more efficient regarding their budgets, and observing regulations. Business intelligence (BI) is the ability to access data from multiple sources in an organization and deliver it to appropriate business users for analysis. Manage the performance of the business means know what questions to ask and have the facts at hand at time to answer them, and this is what business intelligence delivers. With pervasive business intelligence, organizations data warehouse changes to a system that can proactively and reactively interact with the business stakeholders, and it provides appropriate decision options to help marketers to respond and take action based on knowledge discovery in current

integrated data. Pertinent and accurate information from relevant and reliable sources entails to be successfully processed. This implies that a company needs to be confident it has the right information, at the right time, and disseminated to right people [3].

We propose a framework to guide the development of activities of Marketing. A framework of satisfying information needs for decision-making is complex and is compound by different activities to be exploited. This paper is organized as follows: after this introductory part we present related background concepts. Then, the main contribution is presented in terms of a framework proposal. Finally we draw some conclusions.

## **2. Background concepts**

### **2.1. Business Intelligence**

An increasing number of organizations are making BI more largely available to all decision makers inside and outside the organization. Internally, leads to greater responsibility by all employees and greater management stability. Externally, relationships with supplier and partners can be reinforced through effective sharing of key performance indicators for mutual benefits. However, it is not easy to implement [4] in SMEs because of the following factors: high price; high requirements for a hard-ware infrastructure; complexity for most users; irrelevant functionality; low flexibility to deal with a fast changing dynamic business environment; and low attention to difference in data access necessity in SMEs and large-scaled enterprises. But it's more important (and difficult) than ever today for organizations to make the right customer decisions. Companies know that the ability to frequently make the right customer decisions is essential to profitable growth, risk management and general performance. Due to non-controllable factors like fast-moving markets, economic and regulatory change, and new sources of competition, the right decision isn't a peaceful matter.

Although Howard Dresner being considered the father of the term "Business Intelligence" since he used the term in 1989, at the time an analyst at Gartner, Hans Pete Luhn was the first to use the term "business intelligence" in a paper with the title "A Business Intelligence System", published in 1958 by IBM [5]. Dresner was looking for a term to define the best tools that enabled access to information and quantitative analysis of the same, and describe the area as "concepts and methods to improve business decision-making by using fact-based support systems" [6], for Negash [7] "Business Intelligence is a data-driven DSS that combines data gathering, data storage, and knowledge management with analysis to provide input to the decision process.", Luhn defined business intelligence as "the ability to apprehend the interrelationships of presented facts in such a way as to guide action towards a desired goal." [8]. According to Barbieri [9], the BI can be understood as the use of various sources of information to define the competitive strategies of an organization.

Business Intelligence bridges between different systems and users wishing to access information. Provides an environment that facilitates access to information needed for day to day activities, allowing analyse the current situation of the business and its performance. Systems and BI tools have a key role in the strategic planning process of organizations. These systems allow collect, store, access and analyse organizational data in order to assist decision making [10].

### **2.2. Pervasive Business Intelligence**

Pervasive Business Intelligence (PBI) emerges as a natural evolution of the application of BI in organizations, with a movement in two directions, vertical (top-down) and horizontal (cross-Departments), with an application from the strategic level to the operational level. There are various PBI definitions, is the ability to deliver integrated right-time data warehouse information to all users, providing the necessary visibility, insight, and facts to make decisions in all business processes [11]; PBI is the improvement of the strategic and operational decision-making capabilities of an organization, through the design and implementation of it as a whole (organizational culture, business processes, and technologies) [12].

The implementation of PBI in organizations is supported in applications that access the data in real time, supporting the actions of CRM and marketing campaigns. The application of PBI is enhanced when the front-line employees are in contact with the client and can generate new sales opportunities, up-sell and cross-sell [11]. PBI aims to integrate and align all processes to enable the delivery of relevant information to

users who need to support decision making. According IDC there are five key factors with large influence on BI pervasiveness [12]:

- Design quality: users' expectations about BI solution components are met.
- Degree of training: satisfaction level with training on use of BI tools, and the use of analytics to improve decision making.
- Prominence of governance: importance of data governance and associated data governance policies in BI system.
- Nonexecutive involvement: nonexecutive management involvement in promoting and encouraging use of the BI tools at the organization.
- Prominence of performance management methodology: importance within the organization of a formal performance management methodology.

### **2.3. Marketing Intelligence**

According to Mackenna [13], the information technologies are an essential key component to react to market changes and satisfy customers, helping marketers in decision making and implementation of marketing plans. A well-known example was the application made by a major U.S. supermarket chain, where it was discovered a universe of buyers of diapers also bought beer on the eve of the weekend in which games were broadcast on television. This knowledge has been used, thus increasing their sale.

The concept of general intelligence and MKTI in particular has evolved, being seen as a driver for strategy and market success [1]. A MKTI system is a set of procedures and sources used by marketers to get their daily information on relevant developments in the environment in which they operate [14]. Another definition, MKTI is a system to capture the information needed for decision making in marketing [15]. The fundamental purpose of MKTI is to help marketing managers to take the decisions they face every day in their various areas of responsibility, including pricing. Huster [16] define MKTI as the ability to understand, analyse and evaluate data from internal and external environment, related to the organization, customers, competitors, markets and companies to improve decision-making tactical and strategic, and the integration of competitive intelligence, marketing research, market analysis and analysis of business and financial information. The MKTI is a complex process, whose efficiency affects the quality of marketing decisions, including pricing [8].

In the future, efforts should be aimed at measuring the demands of not satisfied consumer, through their behaviour, measuring consumer response to marketing activities, and analysis customer's feedback. Allowing identify trends in consumer tastes, and points of friction between the organization and customers. With modern technology can be done on a larger scale, with lower cost [17]. MKTI seeks to transform data into information, and information into intelligence. The data are the basis of all structure, from which we perceive and record a given reality [11].

## **3. Framework Proposal**

A process of satisfying information needs for decision-making is complex and is compound by different activities to be exploited. Our challenge is to propose a framework to guide the development of activities of Marketing Intelligence based in data modelling, as an add-on to PBI. Pervasive business intelligence provide support to managers decision-making with the tactical and strategic information they need for understanding, managing, and coordinating the processes in organizations [18]. The MKTI framework assessment process is measured either by the ability to identify and collect data relevant to analysis, and extracting relevant knowledge to support decision making in marketing. The MKTI process comprises two primary activities: data in and data out, and a set of procedures and methods for collecting, analysis and representation of information for use in making marketing decisions (see Fig. 1). Getting data in, usually is referred as data warehousing, and includes the flow of data from a set of source systems and its integration into a data warehouse. The source systems represent internal and external data. We can say that getting data in is the most challenging aspect of BI, and it can requires about 80 percent of the time and effort and generating [19]. Getting data in delivers (data out) is the focus of attention of organizations, and consists of business users

and applications accessing data from the data warehouse to perform enterprise reporting, OLAP, querying, and predictive analytics [19].

The MKTI process consists of a set of procedures and methods planned for collecting, analysis and representation of information for use in making marketing decisions [20]. We propose five basic processes for MKTI: planning, collection, analysis, representing and projections. In planning process are defined the objectives and the necessary information for marketers marketing decisions. Then, the collection process, extract, transforms and load organization internal and external data sources, that include CRM, prospects data, market data and competition. The analysis process is the more complex and difficult, all activities should be developed in order to analyse the data, looking for patterns, and loaded organized and coded information on marketing data mart, as subset of the data warehouse. The representing process, access mart data and apply marketing metadata models for representing information from marketing perspective. In the projection process, results will be distributed to marketers for review and posterior feedback if needed.

In MKTI framework one of the components presented is the metadata. The metadata model describes fields, values, sizes, ranges, field's definitions, data owners, latency, and transformation processes. Metadata provides transparency as data moves from sources to the warehouse to end users [19].

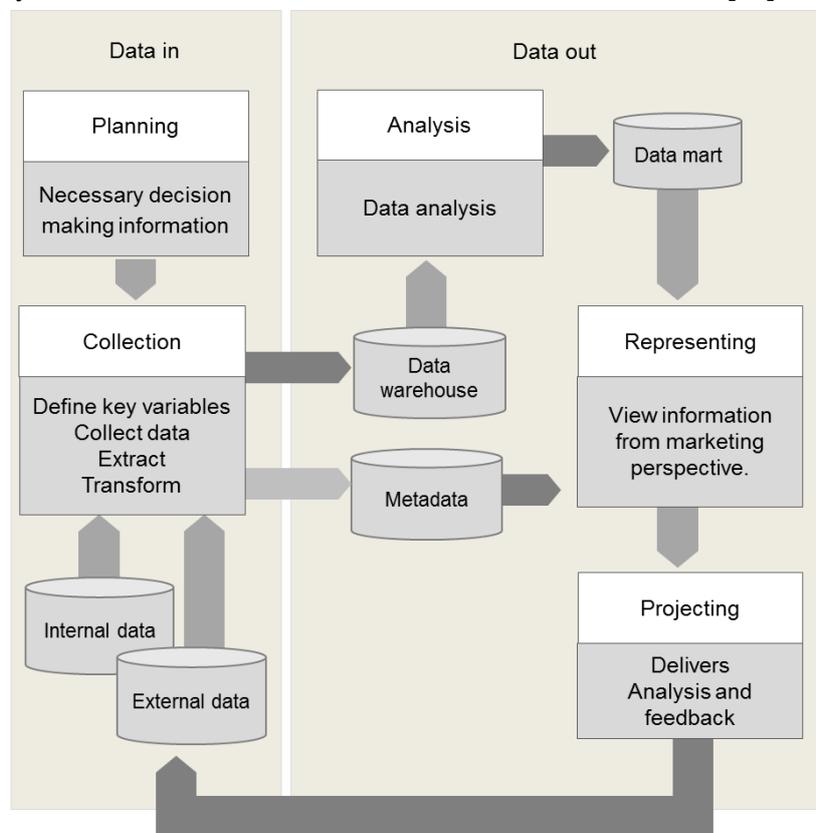


Fig. 1: Marketing intelligence framework.

## 4. Conclusions

With the intensification of competition between companies in open markets, organizations must learn about themselves and to the market, through the collection and analysis of data.

The MKTI is a complex process that goes from the collection of data from the organizations environment, until the generated quality information to assist marketing and strategic decision making. Organizations must to avoid invade customers with the highest rankings, and the marketers must remember that customers with low rankings should not be neglected, but instead should be cultivated to become better customers.

## 5. References

- [1] C. Lackman, K. Saban and J. Lanasa, "The Contribution of Market Intelligence to Tactical and Strategic Business Decisions," *Marketing Intelligence & Planning*, January 2010.
- [2] R. Goldschmidt and E. Passos, *Data Mining: Um Guia Prático*, Rio de Janeiro: Elsevier, 2005.
- [3] A. Palmer and B. Hartley, *The Business and Marketing Environment*, 3rd ed., London: McGraw-Hill, 2000.
- [4] G. Xie, Y. Yang, S. Liu, Z. Qiu, Y. Pan and X. Zhou, "EIAW: towards a business-friendly data warehouse using semantic web technologies," *The Semantic Web*, pp. 857-870, 2007.
- [5] H. P. Luhn, "Business Intelligence System," *IBM Journal*, pp. 314-319, 1958.
- [6] P. Evans, "Business intelligence is a growing field," *Database Journal*, 2010.
- [7] S. Negash, "Business Intelligence," *Communications of the Association for Information Systems*, pp. 177-195, 2004.
- [8] P. Kotler, *Marketing management*, 12th Ed ed., Upper Saddle River, N.J.: Prentice-Hall, 2004.
- [9] C. Barbieri, *Business Intelligence: Modelagem & Tecnologia*, Axcel Books, 2001.
- [10] D. A. Aaker, V. Kumar, G. S. Day and R. Leone, *Marketing Research*, 10th Edition, Wiley.com, 2009.
- [11] J. Markarian, S. Brobst and J. Bedell, "Critical Success Factors Deploying Pervasive BI," *Informatica*, Teradata, MicroStrategy, 2008.
- [12] D. Vesset and B. McDonough, *Improving Organizational Performance Management Through*, IDC, 2009.
- [13] R. Mackenna, *Acesso Total: O novo Conceito de Marketing de Atendimento*, Rio de Janeiro: Campus, 2002.
- [14] K. Mochtar and D. Arditi, "Role of marketing intelligence in making pricing policy in construction," *Journal of management in Engineering*, vol. Vol. 17, pp. 140-148, 2001.
- [15] M. D. Hutt and T. W. Speh, *Business marketing management: A strategic view of industrial and organizational markets*, 3rd Ed. ed., Chicago: Dryden, 1989.
- [16] M. Huster, "Marketing Intelligence: A First Mover Advantage," *Marketing Intelligence Review*, vol. Vol. 8, pp. 13-17, 2005.
- [17] R. Burke, "The third wave of marketing intelligence," *Retailing in the 21st Century*, pp. 113-125, 2006.
- [18] F. Tseng and A. Chou, "The concept of document warehousing for multi-dimensional modeling of textual-based business intelligence," *Decision Support Systems*, vol. Vol. 42, pp. 727-744, 2006.
- [19] H. Watson and B. Wixom, "The current state of business intelligence," *Computer*, vol. Vol. 40, pp. 96-99, 2007.
- [20] K. B. A. Fletcher and K. Deans, "The structure and content of the marketing information system: A guide for management," *Marketing Intelligence and Planning*, vol. Vol. 6, p. 27-35, 1998.