Analysis of Knowledge and Implementation of Business Intelligence Solutions in Romanian SMEs

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Abstract

The present article has as main objective the analysis of the current situation concerning the knowledge and implementation of Business Intelligence (BI) solutions in Romanian SMEs, while also focusing on negative and positive aspects related to BI. The research was conducted in SMEs from Romania, ranging from different sectors, with the final aim of pointing out drivers and barriers as far as corporate business intelligence tools are concerned, in order to increase business efficiency. The method used was quantitative and descriptive research, being used a sample of 37 managers of Romanian SMEs. The questionnaire was used in order to be able to characterize the degree of knowledge and implementation of BI in the researched corporations as well as BI impact on the decision-making process. The study concluded that 70% of the companies surveyed have been using business intelligence solutions for less than 5 years, meanwhile the rest, respectively 70% have been implementing BI for more than 5 years. The most critical risk factors for the implementation of a BI are the number of active BI users and improvement of business performance. Also, the SMEs surveyed stipulated that the reasons for using BI are: improvement of business performance and time, increased profitability improvement of processes and increase of client satisfaction. The research could lead Romanian SMEs to intensify their BI implementation in order to make more informed decisions that could increase the overall competitiveness of SMEs.

Keywords

Business intelligence; business efficiency; decision-making process; SMEs; informed decision-making.

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Introduction

Today the issues that move the world, and that are studied on a large scale, are all those related to technology and business competitiveness, which is due to the gradual awareness of the importance of implementing management systems: information and communication (Barba-Sanchez, Calderón-Milán and Atienza-Sahuquillo, 2018; Domazet, Zubović and Lazić, 2018; Singh, et al., 2019). In this sense, the growing concern for business problems and solutions in terms of competitiveness and development processes, is connected to the continuous increase of specialized studies (Koprivnjak and Oberman Peterka, 2020; Zauskova, et al., 2022) that allow the creation of ideas and initiatives for the management of innovation, science and technology, as well as for the strategic business processes implemented in the different types of companies and economic sectors.

Obtaining competitive success and sustaining it, permanently requires from corporations to have the capacity to react/respond (Carcary, Doherty and Conway, 2016; de Araujo, et al., 2021) and to adapt quickly (Stone and Woodcock, 2014; Sousa and Rocha, 2019; Awawdeh, et al., 2022) to the constant changes and developments that occur in the economic, social and technological environment. Therefore, it is necessary to implement dynamic and efficient processes to visualize the changes, to make decisions leading to sustained success, to constantly evaluate the results, ensure that the entities are innovative and, thus, achieve competitive advantages (Lopes, Guimarães and Santos, 2020; Tavera Romero, et al., 2021). It is stated that the context of the information society has led to the need for better, faster and more efficient methods for extracting, filtering and transforming an organization's data into useful information and distributing it

throughout the organizational value chain (Lopes, Guimarães and Santos, 2020; Lateef and Keikhosrokiani, 2022). All these requests are fulfilled by business intelligence (BI).

The goal of the article is to assess the degree of knowledge and implementation of BI in Romanian SMEs, while also finding information on challenges and drivers of BI. Therefore, it aims to answer the following questions:

- Which is the degree of knowledge and implementation of BI in Romanian SMEs?
- Which are the drivers and barriers of corporate business intelligence in Romanian SMEs?
- Which are the reasons for using BI in Romanian SMEs?

This research provides an innovative perspective regarding the BI knowledge, implementation, drivers and challenges of Romanian SMEs, regarding the trends of educational innovation, contributing to the literature by reflecting the degree of implementation of educational innovation in Romanian HEIs and its impact on students. The study highlights also the necessity for the evaluation of the effect of EI in the Romanian higher education institutions, which could help to establish a country pro-file for EI implementation as far as students are concerned. Additionally, this study can inspire other HEIs both from Romania and on a global scale since EI is seen as a tool to improve quality and increase competitiveness.

1. Review of the scientific literature

Today, SMEs represent the backbone of the international economy. In addition, they collect huge amounts of data from their operations and processes, daily. In order to efficiently use these data they need to make informed decisions, which leads us to the concept of business intelligence. The term business intelligence was used for the first time by Howard Dresner in 1989. However, currently, talking about business intelligence involves the integration of information for planning that leads to the optimization of company processes. According to Alnoukari, et al. (2012) BI stands for "the use of all organization's resources: data, applications, people and processes in order to increase its knowledge, implement and achieve its strategy, and adapt to the environment's dynamism". In recent years, this term has evolved significantly, since today more and more companies implement business intelligence models to improve their performance and to be competitive. According to Ayoubi and Aljawarneh (2018), "business intelligence (BI) is an umbrella term that combines tools, architecture, analytical tools, applications, data-bases and methodologies" (p. 1). One of the most complex definition was provided by Negash and Gray. According to them, „business intelligence systems combine operational data with analytical tools to present complex and competitive information to planners and decision makers. The objective is to improve the timeliness and quality of inputs to the decision process. Business Intelligence is used to understand the capabilities available in the firm; the state of the art, trends, and future directions in the markets, the technologies, and the regulatory environment in which the firm competes; and the actions of competitors and the implications of these actions" (Negash and Gray, 2008, p. 175). Therefore, business intelligence is defined as the set of tools and technologies that allow end users to quickly and easily access and analyze information and to make informed decisions aiming at improving the company's performance (Yiu, Yeung and Jong, 2020; Eriksson and Ferwerda, 2021; Huang, Savita and Zhong-jie, 2022), by constantly changing and adapting the processes and procedures in order to achieve the desired objectives (Martins et al., 2020). The purpose of information management and communication for decision making is to serve as a business strategy that aims to increase the performance of the company or the competitiveness of the business by intelligently organizing its historical data (transactions or daily operations). Business Intelligence (BI) is a tool under which different types of organizations can support decision-making based on accurate and timely information, guaranteeing the generation of the necessary knowledge that allows choosing the alternative that is most convenient for the increase of the organisational efficiency (Al-Eisawi, 2020). As far as the technologies of business intelligence are concerned, According to Wu et al., (2013), the concept of BI can be decomposed into three elements: data capture, data storage, and data access and analysis. The data is collected from both internal sources that come from the organization's operational systems and external data is obtained through customers, suppliers, government agencies, competitors, the internet, among others. (Yu, 2022). BI systems organize data collection, data storage, and knowledge management with analytical tools to understand and elucidate complex information to efficiently process and deliver results so that the sequence of business activities continues its usual course. The main components found in these systems are the sources of information- Operational database (OLTP) ETL (Extract, Transform, Load), data mining, analytical applications, data tray, Data Warehouse (DWH), OLAP technologies and others (Badgujar et al., 2022; Ilmudeen, 2022).

Due to the wide range of services it offers, BI allows knowing the income levels that a company obtains in different accounting periods, in addition to measuring the level of sales, knowing which is the best-selling

product at a general level or in a focal way, in short, IT helps to know many parameters in a short time just by applying the formulas or indicators for each variable that a company wants to know. In this way, scholars (Wani and Jabin, 2018; Shubho, et al., 2022) mention some advantages that are acquired with BI:

- Browse data from multiple database or cloud sources, allowing you to correlate data and make more convenient, informed decisions.
- Have access to the data that is required from any place only on the condition of having internet.

Other researchers state that other benefits offered by business intelligence are: saving time to find specific information, in addition to generating graphs and indicators for managerial knowledge (Srivastava and Venkataraman, 2022). In addition, with the information entered into the database by each department, administrators can determine which are the weaknesses or critical points that generate higher expenses in order to apply appropriate strategies to reduce expenses/costs (Mehanović and Durmić, 2022) and also decide on effective marketing strategies (Utomo, et al., 2022). It helps to stipulate realistic goals by comparing historical and current financial results or also by comparing the results of similar businesses. Only in this way can be elaborated projections possible to achieve.

2. Research methodology

To carry out this research, a descriptive type of research was used. The population under study is made up of 55 companies that are legally registered with the Chamber of Commerce of Bucharest. The sample used was of 37 companies and a 67% response rate was obtained (because the rest of the companies did not have a BI tool implemented so far). The techniques used to acquire the information correspond to a questionnaire structured in five dimensions: knowledge, implementation, use and tools related to business intelligence and identification data. For the processing of the questionnaires, a statistical software, SPSS 24, was used for the tabulation of the data obtained and their analysis through tables and graphs. The answers collected were turned into graphs using the Excel program belonging to the Office 365 package, using descriptive statistics.

3. Results and discussion

The first two questions were tabulated independently, being necessary to determine the number of SMEs that have a business intelligence tool (BI) they work with. Out of 55 SMEs registered at first for the research, only 37 used BI, which meant that 77% have a business intelligent system, while 23% lack this tool that helps in decision-making. Further on only these 37 respondents filled in the questionnaire. In addition, 30% of the companies surveyed have been using business intelligence solutions for less than 5 years, meanwhile the rest, respectively 70% have been implementing BI for more than 5 years.

It was found that the respondents consider that the implementation of Business Intelligence is important when applying it in any company, since it acts as a factor that generates strategies and a great potential for competitive advantage; that is, BI can be defined as privileged information used to respond to business problems.

Table no. 1 records that the most critical risk factors for the implementation of a BI.

Table no. 1. BI challenges in Romanian SMEs

Challenges	Frequency		Percentage
	Yes	No	
User perception	22	15	59.4
Investor Support	19	18	51.4
(Knowledge) Active BI users	37		100.0
Cost savings	27	10	73.0
Improvement of business performance	37		100.0
Better information access	9	28	34.3

Source: Survey applied to entrepreneurs from Romanian SMEs.

The number of active BI users and improvement of business performance with 100%, followed by cost savings with 73%, then the user perception variable with 59.4%, followed by the variable investor support, 51.4% and better access to information 34.3%. Although the option of having better access to information is the one with the lowest percentage, it can be seen that the difference between the other options is actually small. In this sense, it can be inferred that, given the results of the survey, there is a balanced perception of the risk factors to implement business intelligence.

In Chart 1, Reasons for using BI, it is observed that 100% consider the variables: improvement of business performance and time, as the most important, followed by the variable increased profitability with 91,9%, then the variable Improvement of processes with 86,5% and increase of client satisfaction with 81,1%. Two other variables: improved quality of decision making and improved agility had more than 50%, meanwhile the last of the variables (cost reduction) got 32,4%. In this sense, they consider the implementation of BI essential, as a valid reason to improve business performance, profitability and client satisfaction while reducing time of processes and operations with this technological tool.

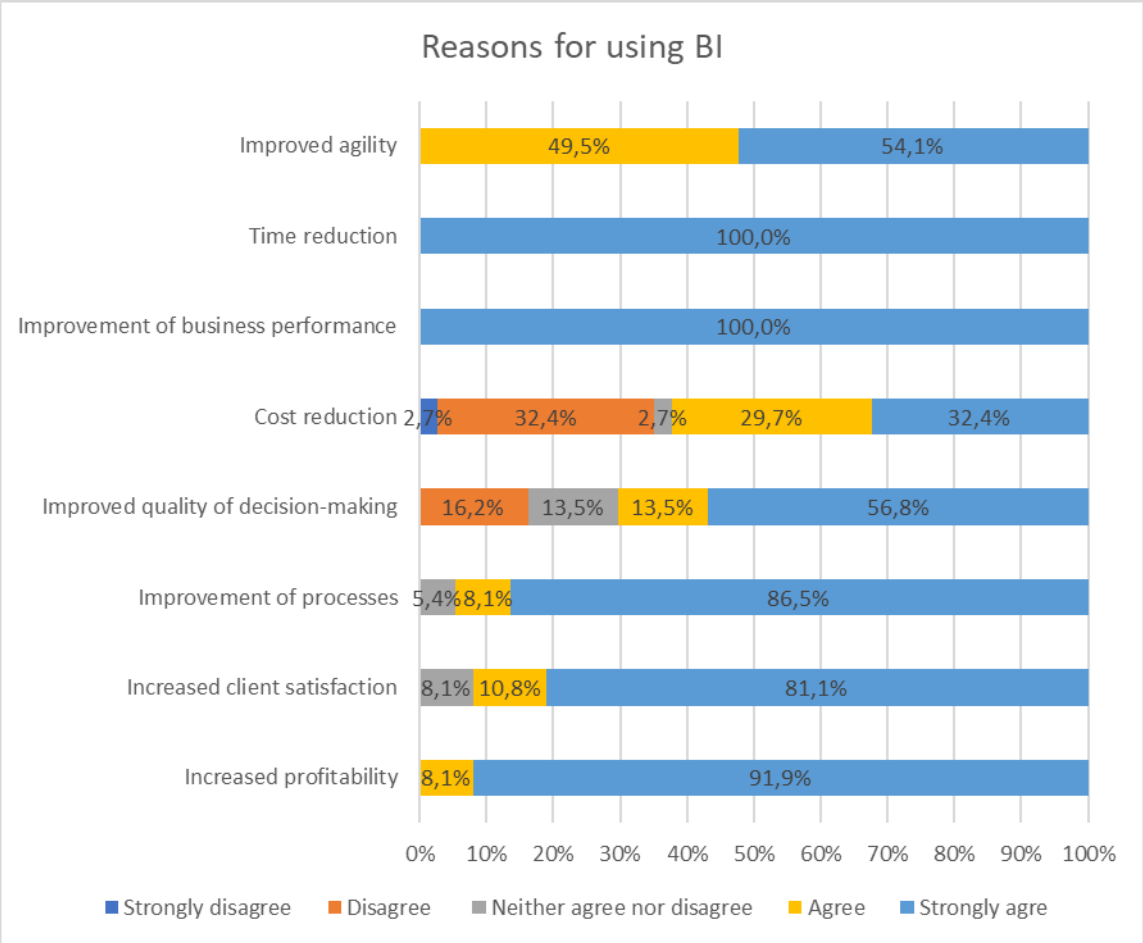

Chart no. 1. Reasons for using BI
Source: Survey applied to entrepreneurs from Romanian SMEs

As can be seen in the graph below (Chart no.2), the variable: I have access to reports and analyzes (86,5%), followed by the variable: I create my own reports and analyzes with (43,2%). In other words, they know very little about taking advantage of the use of BI. Having knowledge and managing data administration properly highlights that information is a valuable resource that must be accessible so that all users, that must be stored safe, as a valuable resource.

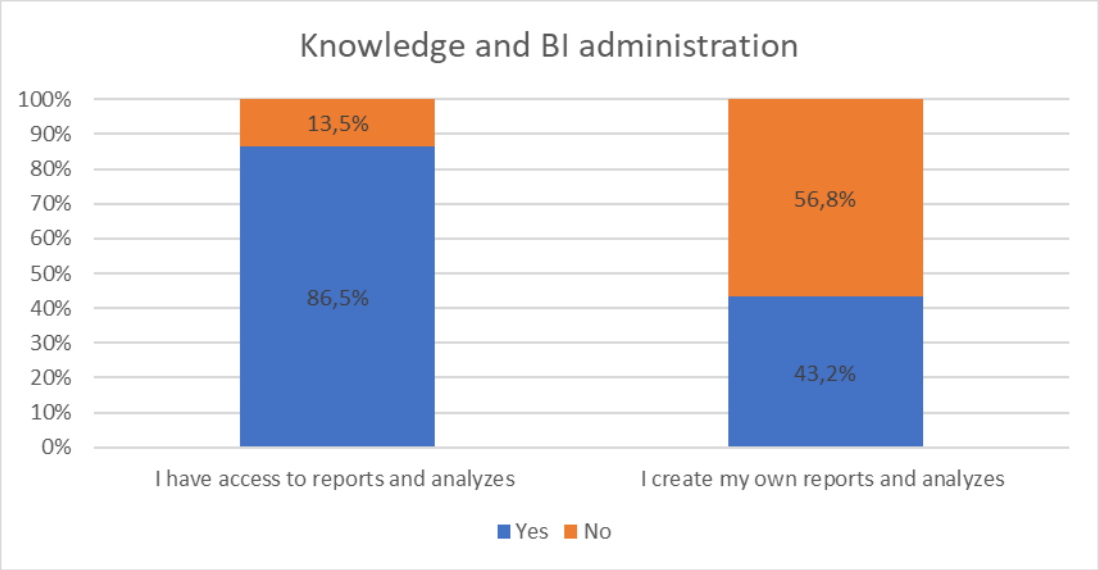

Chart no. 2. Reasons for using BI
Source: Survey applied to entrepreneurs from Romanian SMEs

Conclusions

The development of the research revealed the current state of knowledge and implementation in Romania in relation to business intelligence in the internal processes of the analyzed SMEs. Out of 55 SMEs registered at first for the research, only 37 used BI, which meant that 77% have a business intelligent system that helps in decision-making. Also, the research proved that respondents, in spite of the fact that have access to reports and analyzes, hardly create their own reports and analyzes (43.2%). These results of the research show that SMEs from Romania, are far from making efficient use of BI in their processes, in spite of their knowledge that BI provides greater control in the handling of information and improvements in the decision-making process. The study revealed research gaps and opportunities for Romanian SMEs as far BI is concerned. Future researchers may take up qualitative researches in order to evaluate the knowledge and BI implementation either on SMEs or on large enterprises.

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