

## HUMAN RESOURCE MANAGEMENT AND BUSINESS INTELLIGENCE

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**Abstract:** This paper will present the results of the research of relevant literature and research conducted in the practice of small and medium-sized enterprises with the aim of examining the possibilities of applying business intelligence and the impact of human resource management on the improvement of business operations. Companies today, in the conditions of increasing competition, have a complex task of how to survive in the global market and maintain a competitive advantage. In their business, companies are faced with huge amounts of data that they get from internal and external sources and have a huge problem of how to choose and extract from that huge amount of data the ones they need for business. In this sense, companies are increasingly turning to the use of modern information and communication technologies for the purpose of processing large amounts of data, and are especially based on the application of business intelligence and the methods, techniques and tools that this sophisticated technology provides. During the implementation of this research, professional literature, scientific articles, domestic and above all foreign eminent experts were studied, as well as the latest works published on the Internet in the field of business intelligence and human resource management. The goal of this research paper is to present and compare different theories of business intelligence and the impact that human resources can have in business, as well as to present the specifics of business intelligence application, potential costs, risks and benefits that you can expect from the introduction of such a system. In this research work, the problem of effective application of business intelligent systems will be investigated, as well as the critical factors that influence the successful application of these technologies, with a special emphasis on the influence of human resources, methodological approach, through research and studious analysis of the latest scientific research in this field applied, how in theory as well as in practice. The paper will present the results of how the application of business intelligence methods and tools contributes to more efficient operations of small and medium-sized enterprises. In addition, the paper will present the results of a practical example in the practice of a company that is in the process of introducing a business intelligence system, and the way of implementing the decision. The results of the research provide important information for certain companies, as well as managers and providers of IT solutions in search of greater, more efficient and continuous application of business intelligence systems. In order to confirm the theoretical results, research was conducted with semi-structured interviews, detailed conversations with key users of the business intelligence system. When looking at the organizational characteristics of the company and the business environment of using the business intelligence system, we primarily focus on the elements that, along with the considered characteristics of business intelligence and human resources, emphasize their strategic importance for small and medium-sized companies, the size of the company (eg: strategic direction, achieving corporate goals and the company's focus on its clients).

**Keywords:** management, human resources management, business intelligence.

### 1. INTRODUCTION

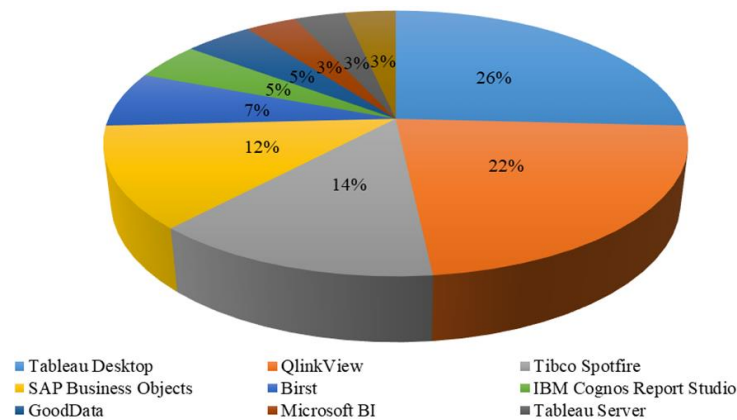
Changes in business operations are happening on a daily basis, the competition is increasing, never stronger and via the Internet available all over the world. In the conditions of the recession and the world economic crisis, the war in Ukraine, it is increasingly difficult for business systems to survive on the open global market. One of the characteristics of the business of all companies today is that for the purpose of doing business, companies have huge amounts of business data that they turn into useful information that they use in the business decision-making process. (Mladenović et al 2022). However, a huge problem arises because, on a daily basis, enormous amounts of business data arrive at companies from both internal and external sources. The obvious problem is how to extract the data that companies can use in their business from that amount. In this sense, in order to achieve a competitive advantage, a good number of companies recently decide to improve and change their business processes, most often by using modern computers, that is, the Internet. Eminent authors emphasize that in a word, if there were no networks, personal computers today would be just one of the tools for increasing productivity, as the typewriter used to be (Rainer and Turban 2019). However, among the abundance of modern technologies, business intelligence and methods, techniques and tools of this sophisticated technology have a special application in this Jovevski, D., Drakulevski, L., & Firfov, O. (2023). Eminent experts in the field Aronson, Jay E., King, David N., Sharda, R. & Turban, E. (2008) define business intelligence as a broad term that describes a series of data collection activities that are necessary for the business decision-making process. It is important to emphasize that it does not matter where the information comes from, whether from internal or external sources. In this sense, other authors emphasize that

business intelligence is a term for using internal and external company information to help make better business decisions (Kimball & Ross, 2002). Business intelligence can therefore be defined as a set of architecture and operational applications, decision support applications and databases that provide users with easy and simple access to business data (Atre & Moss, 2003). The same authors emphasize that "Business intelligence is neither a product nor a system. It is an architecture and collection of integrated operational and decision support applications and databases that enable the business community to easily access business data. Business intelligence, or business intelligence, is specific to each organization, just as it is the case with policies and business rules according to which society is managed and business is conducted in practice. (Castro & Calvanapon 2023). That uniqueness should be explored in order to have a competitive advantage". (Larissa T. Moss, Shaku Atre 2003). Efficient and effective application of business intelligence requires quality human resources, IT literate. Today, despite the enormous and measurable importance of companies, they are relatively far behind in the field of application of business intelligence and decision support systems, precisely because of the lack of quality human resources and professional staff (Pancić et al. (2023).

Chronologically, the essence of business intelligence appeared for the first time already in the fifth century BC, and in the book "Art of War", authored by the Chinese general Sun Tzu (Stading, 2010). In his article, he claims that victory in war is possible only to the extent that we have complete knowledge and understanding of the strengths, weaknesses, and advantages of our opponent. After that, in 1958, the well-known author Hans Peter Luhn, published an article in the IBM magazine entitled "Business Intelligence System". Some authors emphasize that this paper describes in detail a tool that allows us to collect business data and information, and an intelligent system that has the business capabilities of performing intelligent activities (Evans, 2010). The same author states that in 1989 Howard Dresner introduced business intelligence as a set of concepts and methods used to improve the business decision-making process by using a decision support system based on business data that processes and transforms it into business decisions, and those decisions then help improve the business (Evans, 2010). Certain authors such as English (2006) particularly point out that the problem with most existing definitions of business intelligence is that they mostly talk about technology or software components, but that essentially business intelligence is far more than being able to understand abstract operations, and often predict future events. Business intelligence gives us the ability to see both the forest and the trees.

However, despite all these facts and benefits of applying business intelligence, many companies today often still doubt and ask themselves whether the business intelligence system can actually contribute to more efficient operations of the company, that is, the organization that is suitable for the introduction of such a system and the like. The following image shows some of the best-selling business intelligence tools in the world.

**Figure 1: Some of the most semi-polar tools business-intelligence**



Source: <http://www.experfy.com/blog/sap-business-objects-vs-sas-business-intelligence-comparison/>

The growing amount of business data and information has over the past few years, the ability to create, collect and store information has outstripped our ability to use this information for business purposes. In this sense, several independent business systems and some private institutions have developed evaluation models through which it is possible to measure the maturity level of each business intelligence system (Eckerson , 2008).

## 2. STRUCTURE OF THE BUSINESS INTELLIGENCE SYSTEM

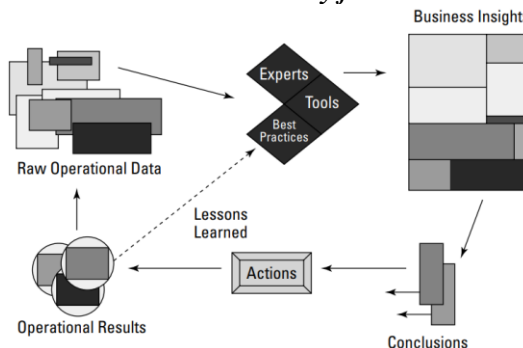
In addition to human resources in the technical sense, the application of business intelligence generally involves the use of data warehouses and/or business data warehouses and the use of analytical instruments intended for the end user Topcheva & Hadzi-Nikolova (2023). Business intelligent systems consist of a series of tools and techniques, especially technical conditions facilitating the passage of the most basic information to end users. The data collected from various data sources, which usually represent a transaction system, is transferred to the data warehouse, with the application of ETL (Extract Transform Loading) process of cleaning and transformation into the correct format, which can be accessed by business intelligence tools. By using such systems, managers can implement advanced ad hoc analysis and use them to make previously unknown discoveries about their business. Some authors state that the sources of business intelligence data are mainly operating systems that serve to capture business transactions (Kimball, Ross, Thornthwaite, Mundi & Becker, 2008, p. 14).

Although the basic reasons for its application in modern business can be seen from the concept and definition of business intelligence, it is useful to state some of the primary needs for the introduction of BI: (Turban et al. 2002)

- ✓ Existence of the need to increase income, reduce costs and make business more competitive:
- ✓ Existence of the need for modeling and managing the complexity of the modern business environment:
- ✓ Existence of the need to reduce IT costs:
- ✓ Existence of the need for proactive behavior, improvement of communication:
- ✓ Existence of the need for constant monitoring of the work of organizations:

In the process of business intelligence, the methods of filling the data warehouse and the aforementioned ETL process are characteristic. Then the data warehouse which is a data space that stores a large amount of aggregated data about past events. Also software solutions for online analytical processing OLAP (English: On Line Analytical Processing ;) which are primarily used in the analytical process in the context of various system information. And finally the Data Mining (English Data Mining) method, which is a systematic automated finding of information in large amounts of data. In the beginning, a characteristic scheme of application of a rounded continuous cycle of business intelligence activities is presented, with which a rational approach to their decision-making process is adopted on the basis of information from business. Business intelligence can support this cycle.

**Figure 2: New data and results constantly feed the decision results cycle**



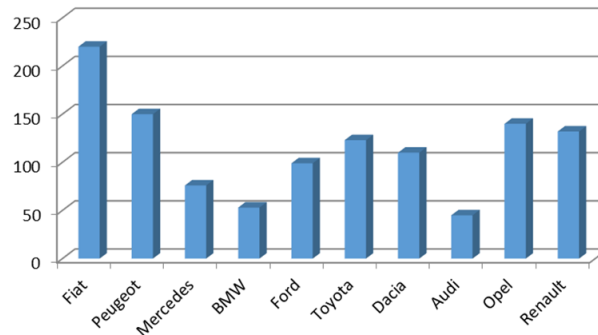
Source : S. Scheps, *Business Intelligence For Dummies*, 2008, pp. 18.

## 3. RESULTS

The consistency of application of intelligent systems in solving business problems, i.e. the effectiveness of business intelligent systems, affects not only the usefulness but also the continuation of its continuous use (Larsen et al., 2009), as the author emphasizes in research, because you can use business intelligent systems to perform business function to solve business problems more quickly and efficiently and therefore key users intend to use them in the future. The latest representative research confirms the fact that users have more autonomy when performing their business tasks (ie managers, analysts, programmers and users from marketing), it is also stated that they apply business intelligence and are happy and motivated in their future work (Mitchell et al. , 2012). it can be emphasized that it is particularly important for companies to pay attention to the characteristics of the business intelligence system and the characteristics of the user's behavior, and the satisfaction of using the business intelligence system (which most strongly predicts the user's intention to use the business intelligence system permanently). At the same time, we should not forget the place of use of the business intelligence system as well as the organizational performance of the company, which can also affect their continuous use. In the analyzed example in practice, by applying business intelligence, all data are integrated into a single system, users are enabled to see data in the format that suits them best, to perform various additional analyses, etc. At this moment, it is possible for managers to get

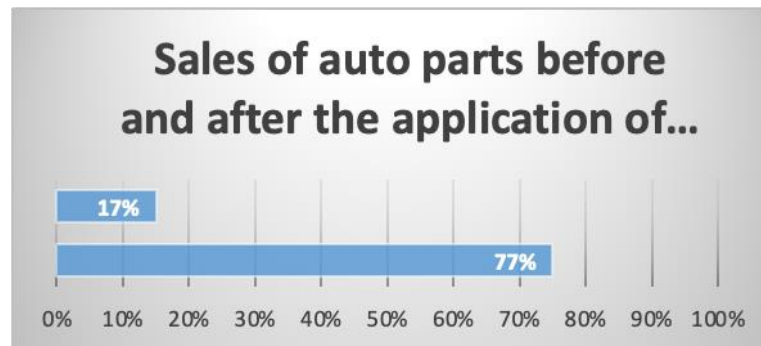
answers to various ad hoc queries in a very short time, and in this way it was very easy to get a lot of useful information. One of them is that in a concrete company that sells cars and spare parts, "Fiat" is by far the best-selling brand of all the cars on offer (Fig. 3.)

*Figure 3: Car sales report*



It was through the application of PI that it was established in a particular company that only 17% of customers, new or used cars, return to "SIGMA" to buy spare parts when the time comes. When the managers found out about this information, they used it in the best possible way and gave a 12% discount on certain parts that car buyers can use until the end of the year. It is incredible that the percentage of sales of spare parts among car buyers has increased from 17% to as much as 77% (Figure 4). This and many other data obtained by applying DM-discovery of knowledge in the data significantly increased the company's profit and improved the business decision-making process.

*Figure 4: Sales of auto parts before and after the application of business intelligence*



#### 4. DISCUSSIONS

Business intelligence systems provide a unique opportunity to control the entire organization, in this sense, successful companies or organizations cannot be imagined today without the use of business intelligence tools and techniques. Information technology today enables companies to better and more easily manage and manage business activities. Especially in the last few years, business intelligence systems are increasingly important. Today, companies create, collect and store huge amounts of data, but it is increasingly difficult to process this business data and use it for the purpose of improving their business. At this moment, business intelligence is the basis of any activity, and is a tool or process used to obtain quality business information, especially to support business decision-making and thereby improve the corporate management of the company.

#### 5. CONCLUSIONS

The research results indicate that business intelligence systems represent a strategically important tool for business entities that enables the creation of competitive advantages and new market opportunities, and on the other hand, monitoring goals and policies for successful business. It is for these reasons that many companies have already introduced business intelligence or are in the phase of preparations for its introduction and implementation. This technique allows all business analyzes to be conducted in a timely manner and results and reports to be delivered to

key users of the system in a timely manner, which allows managers enough room to maneuver to make the right decisions at the right time. The purpose of business intelligence is to create a vital business organization that enables predictions and prevention of events that are undesirable for the organization, as well as creating and confirming good relations with all participants in the business process. The results of the research show, however, that business projects are usually always continuously developed and never fully completed. Often, at a certain stage of development, there is a desire to analyze the situation and assess the level of development and maturity of such projects. In the scientific literature and on the Internet, there are many articles on the topic of the effectiveness of the Business Intelligence System. Scientific articles mainly focus on individual models and significantly analyze business intelligence from the perspective of individual models of the effectiveness of business intelligence systems. In the literature, various models can be found for assessing the maturity of business intelligence, and it is evident that there are indeed many models, however it is noticeable that they are mostly from consulting companies in the field of business intelligence, so it is very difficult to get any detailed information about the models themselves, even more difficult in the evaluation process, which is also logical, because by disclosing these companies, they may lose customers. The results of research according to key users indicate that business intelligence is an excellent tool for monitoring business, quickly acquiring data and information needed to bring appropriate activities, production, marketing, directing sales development and data management for the company also means the possibility of progress, development and work productivity. If we want to be competitive with companies from the most developed economies in the world, then we must take advantage of modern sophisticated technologies that enable more efficient and productive operations, and always look for any new opportunities to exploit. One of the obstacles to the more effective application of business intelligence in business is weak and insufficient computer literacy as well as the willingness of employees to innovate and to document the control system entirely in electronic form. A good number of managers still have huge amounts of printed documents and reports in front of them, which they deal with for hours trying to extract the essence from them.

In this sense, the results of this research work, as well as future studies and research that should be continued on this topic, can benefit company managers by providing concrete measurable effects of the application of modern business intelligence systems in companies.

## REFERENCES

- Aronson, Jay E., King, David N., Sharda, R., & Turban, E. (2008). *Business Intelligence, A managerial approach*. New York: Upper Saddle River.
- Atre, S., & Moss, L. (2003). *Business Intelligence Roadmap: The Complete Project Life cycle for Decision-Support Applications*. Boston: Addison Wesley.
- Castro, G. M., Aitken, H. G., & Calvanapon, A. A. (2023). Business Intelligence Tools for a Digital Services Company in Peru, 2022. *International Journal of Business Intelligence Research (IJBIR)*, 14(1), 1-14. <http://doi.org/10.4018/IJBIR.318330>
- Eckerson, W.W. (2007b). *Beyond the Basics: Accelerating BI Maturity*. Pristupljeno 10. 07. 2023 na adresi [http://download.101com.com/pub/tdwi/Files/SAP\\_monograph\\_0407.pdf](http://download.101com.com/pub/tdwi/Files/SAP_monograph_0407.pdf)
- English, L. (2006). Business Intelligence Defined. *Business Intelligence Network*. Pristupljeno 15. 07. 2023 na adresi: [www.b-eye-network.com/view/1119](http://www.b-eye-network.com/view/1119).
- Evans, P. (2010). *Business Intelligence is a Growing Field*. Pristupljeno 20. 07. 2023 na adresi: <http://www.databasejournal.com/sqlc/article.php/3878566/Business-Intelligence-is-a-Growing-Field.htm>
- Jovevski, D., Drakulevski, L., & Firfov, O. (2023). DIGITAL TRANSFORMATION AND PRODUCTIVITY. *KNOWLEDGE - International Journal*, 59(1), 15–21. Retrieved from <https://ikm.mk/ojs/index.php/kij/article/view/6178>
- Kimball, R., Ross, M., Thornthwaite, W., Mundy, J., & Becker, B. (2008). *The Data Warehouse Lifecycle Toolkit (2nd ed.)*. Indianapolis: Wiley.
- Larsen, T. J., Sørenbø, A. M., & Sørenbø, Ø. (2009). The role of task-technology fit as users' motivation to continue information system use. *Computers in Human Behavior* 25 (2009), 778-784.
- Liautaud, B., & Hammond, M. (2001). E-Business Intelligence: Turning Information into Knowledge into Profit, pp. 105.
- Mitchell, J. I., Gagné, M., Beaudry, A., & Dyer, L. (2012). The role of perceived organizational support, distributive justice and motivation in reaction to new information technology. *Computers in Human Behavior* 28(2012), 729-738.
- Mladenović, M., Petković, M., & Cenić, I. (2022). ECONOMIC ASPECTS AND LEGAL REGULATIONS OF RECYCLING IN THE REPUBLIC OF SERBIA. *KNOWLEDGE - International Journal*, 54(3), 397–402. <https://doi.org/10.35120/kij5403397m>

- Pancić, M., Čučić, D., & Serdarušić, H. (2023). "Business Intelligence (BI) in Firm Performance: Role of Big Data Analytics and Blockchain Technology" *Economies* 11, no. 3: 99. <https://doi.org/10.3390/economies1103009>
- Ritacco, M., & Carver, A. (2006). *The Business Value of e-Business Intelligence*. San Jose: Business Objects.
- Rainer, K., & Turban, E. (2019). „Uvod u informacione sisteme”, Novi Sad, SP Prin, str. 19.
- Sap business objects vs sass business intelligence comparison, <http://www.experfy.com/blog/sap-business-objects-vs-sas-business-intelligence-comparison/>
- Scheps, S. (2008) *Business Intelligence For Dummies*. Hoboken: Wiley.
- Stading, T. (2010). *Bulletproof Your IP Strategy Through Business Analytics*. Pristupljeno 12. 08. 2023 na adresi <http://ezinearticles.com/?Bulletproof-Your-IP-Strategy-Through-Business-Analytics---Introduction&id=4048647>
- Topcheva, T., & Hadzi-Nikolova, M. (2023). COMPARATIVE ANALYSIS BETWEEN THE PERSONAL NOISE EXPOSURE LEVEL OF INDUSTRY WORKERS AND SCHOOL TEACHERS. *KNOWLEDGE - International Journal* , 59(3), 231–234. Retrieved from <https://ikm.mk/ojs/index.php/kij/article/view/6208>
- Turban, E., McLean, E. Wetherbe, „Information technology for management“, J. John Wiley & Sons, Inc. 2002, „Информациона технологија за менаџмент“, превод књиге, Београд, Завод за уџбенике и наставна средства, 2013, стр. 28.
- Yeoh, W., & Koronios, A. (2010). Critical success factors for business intelligence systems. *The Journal of Computer Information Systems* 50(3), 23-32.