

INTELLIGENT SYSTEMS IN BUSINESS FUNCTION

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Research

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Abstract: The goal of this studious analysis is to determine the extent to which sophisticated technology can be used to improve business operations. Today's time brings daily new and rapid changes in the business environment to which small and medium-sized enterprises in Serbia should adapt as soon as possible, often and on the fly. The defined objectives of the research refer to the assumption that business intelligence with its methods, techniques and tools can improve existing business processes in the company, make them more efficient while reducing overall business costs. Research shows that there are almost no companies that have not incorporated the principles of reengineering, introduction of total quality management (eng. Total Quality Management-TQM), "outsourcing" and the like into their strategies and plans. One of the most appropriate ways to create a competitive advantage for SMEs in Serbia, in the current conditions of the world economic crisis and recession, is the concept of business intelligence (eng. Business Intelligence - BI). The work is based on the original methodological approach to the development and construction of BIS and on the testing of the intelligent system and the critical assessment of its application in the process of managing the enterprise.

Keywords: business intelligence, intelligent systems, business

1. Introduction

In today's complex business conditions due to the current world economic crisis, recession, and the process of business globalization, companies in Serbia, in order to survive in an increasingly open market, are forced to change and adapt and to continuously monitor current changes and business trends. The economy and technology are developing exponentially, and this requires companies and entrepreneurs to change faster, to be different, better and more successful (Cavalcanti E.P. 2005), everything becomes dependent on the availability of information and investment in innovation and new technologies, in not only technical-technological but also business development. (Denic et al. 2023). SMEs in Serbia operate in an extremely uncertain and changeable business environment with an extremely high degree of uncertainty and the impossibility of predicting the future. (Djelosevic, Spasojevic 2021)

The latest research shows that employers in Serbia usually fight the crisis by laying off workers and freezing salaries. Almost half of the respondents (49%) stated that their company had already laid off workers, while 48% of them stated that

their salaries had been frozen. The results of the research in other countries are similar, where 38% of the respondents stated that the financing of new projects was frozen in the companies where they work, 33% said that salaries were reduced, while 32% of the respondents stated that education costs were cut (Cavalcanti E.P. 2005). There are different theories about how long the recession will last and when it will end, but in any case, everything should be done to reduce the consequences and remedy the existing problems in business. A greater number of SMEs in Serbia, as stated, are fighting the recession defensively, by reducing costs and reducing the number of employees (Denić et al 2018). Nevertheless, companies can use this time as an opportunity to gain a market position, i.e., increase their market share while the competition is weak. Research indicates that if there is one key to the survival of business systems and companies in the modern world, it is the ability to quickly react to changes in business conditions, which requires rapid detection, analysis and reaction (Denić et al. 2017). For the aforementioned needs, comprehensive, accurate and timely information is necessary. For the reasons mentioned above, busi-

ness intelligence (English: Business Intelligence - BI) in the world and in our environment is developing more and more rapidly every day. Although the literature describes BI as a strategic initiative that leads to business success, the successful implementation of BI innovations remains both a theoretical and a business challenge (Ahmad et al., 2016). Business intelligence solutions enable companies to integrate with other information systems and access information from a single source when identifying the strategies of companies (Wanda & Stian, 2015). Based on the latest research in the world and the references of the most competent authors in this field, the theoretical foundations of the business decision-making process, BI and intelligent decision-support systems are defined, through a systematic analysis of the problem of decision-making theory. Different aspects and phases of decision-making, decision-making processes, decision-making methods and types of decisions, as well as the characteristics of BI and intelligent decision-support systems, were explored and presented. Through consideration of the development and impact of intelligent systems on the decisionmaking process, developed application solutions that have found their application in SMEs in Serbia are presented.

2. Subject and problem of research

The subject of research in this work can essentially be divided into a theoretical and a practical part. In the theoretical part of the paper, the concepts, terms, functions and methods of business decision-making, BI and BIS (eng. Business Intelligence systems - BI) are explained. In the practical part, the results of research in companies in Serbia are presented. In our environment, this topic has not gained importance. It is emphasized a lot, research has not been carried out on this topic to a sufficient and necessary extent. There is not much information or data about the importance and impact on business intelligence for business. In this sense, there is no clear picture of the subject area in the environment where the scientific research work was carried out.

3. The aim of research with hypotheses

One of the primary research goals of this work is the analysis of business intelligence and business intelligence systems, which will fully satisfy the needs of SMEs in Serbia for business information and propose a different approach to developing BIS and building its own decision support solutions. In this direction,

the request was made that the intelligent system thus formed should be simple enough for use by key users and managers in the decision-making process. The goal of the research paper is an attempt to qualitatively analyze the advantages and effects of applying modern sophisticated software tools for SMEs in Serbia. In addition, the paper aims to investigate the variability of the displayed technologies in different specific environmental conditions and application situations in companies. The main hypothesis in the paper is: Business intelligence affects the improvement of the business of SMEs in Serbia, forming a positive attitude about the effects of the application of the development of business intelligence methods and tools in the company.

The well-known expert Joros points to the problem of processing business data, and in his research states that the primary source of business information for SMEs is very broad and includes: manufacturers, customers, business associations, government officials, radio and television, libraries, newspapers, magazines, government publications, trade and professional and electronic sources (Joros B. N., 2014). However, according to this author, the latest research results indicate that 72%

of companies and business systems estimate that half of the information that is collected and stored expensively and for a long time will never be used when making decisions, and that only about 5 to 7% of the information manages to use it in the purpose of their business. In this sense, by adopting the concept of BI and managing business information, the company can use the remaining data collected from numerous sources, turning it into quality information using the BI system (Turban et al, 2008). The introduction of BIS in a company implies the choice of a certain strategy, and as a rule it represents a large separate job that requires a project approach (Sommer D., 2008).

Business intelligence systems need to be established in order to analyze the large amount of organizational data and to provide accurate information for the success of the decision-making process (Yeoh & Popovic, 2016). Bearing in mind the presented business problems of the company, the basic intention of BIS development is reflected in achieving an optimal solution within a certain time frame, knowing that over time the existing system will need to be upgraded so that it continuously meets the needs that led to its introduction (Irani Z., 2000).

The three most important factors that make managers decide to use BIS are: improving business planning, monitoring key business indicators and reporting to top management (Denić et al, 2014). Research also indicates that for SMEs from various economic activities, there are recommendations and the most common practices for using BIS. However, regardless of this, there are certain common characteristics, typical of successful BIS projects. In the initial phase of BIS establishment, it is necessary to transfer the separate initiative or request for BIS to other business functions or departments in the SME. It is very important to avoid the demotivation of employees in SMEs during the BIS introduction project, because there is fear and uncertainty about possible organizational changes and changes in the performance of daily business activities. (Fatić V. 2019) The next picture (Figure 1) shows the BI process.

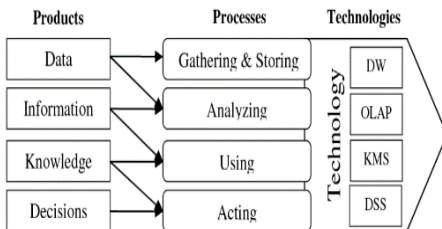


Figure 1. Business Intelligence process [Shollo, A., & Kautz, K. (2010)]

In the reference provides scientific literature and based on experience from practice, the following advantages that BIS provided to SMEs can generally be stated as:

- Improvements in the SME management process;
- Planning, control, measurement and implementation of changes that lead to an increase in income and a decrease in company costs.

4. Research results

The initial research assumption that business intelligence affects the operations of companies was confirmed in the operations of the investigated companies, and the management of the companies: "Simonida-Gračanica", "Obilić-Petrol" Lipovica, PUK Regional Waterworks and Sewerage, and the Urban Institute showed an extremely positive position on the effects of the application of the development of intelligent decision support systems in the company. By using the advantages provided by the techniques: ETL, OLAP, DM, DW, and business intelligence with their dynamic applications, an excellent interaction with the end user is enabled. Taking into account all the previously mentioned aspects of the creation and use of intelligent information sys-

tems, it is concluded that intelligent information systems undoubtedly affect the company's operations. The graphic representation in the following image (Graphic 2) presents the results of conducted research and surveys on SMEs in Serbia, which unequivocally confirms the hypothesis. The diagram shows the results of a survey conducted in SMEs in Serbia, different in type of activity, ownership and organizational structure, on a representative

5. Conclusion

In this paper, systematic research has proven that the development of intelligent systems for decision support in companies: improves the process of business decision-making, enables more efficient management and realizes the competitive advantage of the company. This work provides answers to the challenges faced by SMEs in Serbia, in whose operations large amounts of

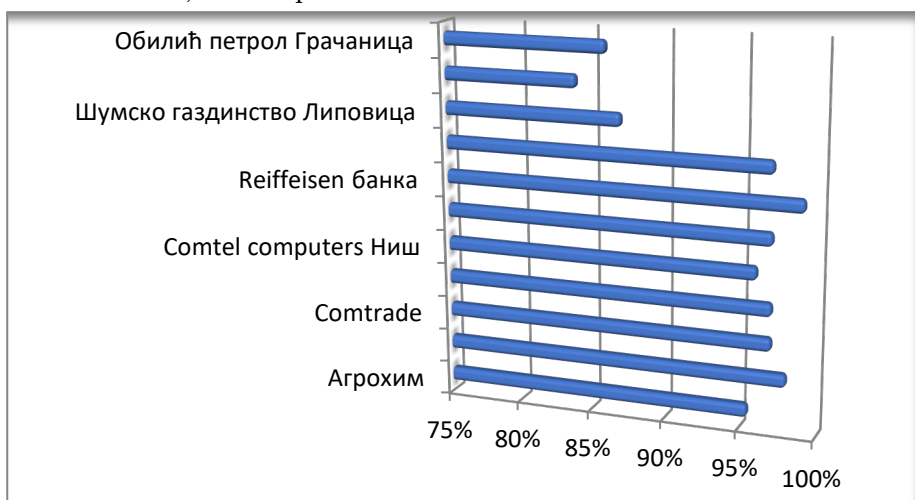


Figure 2. Improvement of business by application of business intelligence [N. Denić 2015]

sample, in order to confirm the hypothesis that business intelligence affects the improvement of the business of SMEs in Serbia, forming a positive attitude on the effects of the application of development methods techniques and tools of business intelligence in the enterprise.

data are generated, which, together with external data sources, represent the basis for making appropriate business decisions. The research results of this work fill the gap in the field of economic and socio-technical research on the development of intelligent decision support sys-

tems in the function of improving the business of SMEs. It relies on the connection of decision theory, business intelligence, intelligent systems and project management, where new original, unique models of the development of intelligent decision support systems are presented. The basic research concept of the dissertation is guided by the idea that by synthesizing modern IT methods and techniques: ETL, OLAP, DW and Data Mining through the practical application of business intelligence concepts, tools and techniques, a new high-quality information system for SMEs can be developed, which improves work at the operational level, and it primarily facilitates top management to make correct business decisions important for the survival and development of SMEs in Serbia. The results of studious research indicate that the biggest contribution to the efficiency of the company is a quick insight into a large amount of data and shortening the time of accessing information. Analysis of PIS reports provides the opportunity to develop the pattern, effectiveness and efficiency of business operations with the possibility of timely influence and intervention on the business processes of SMEs and business improvement.

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INTELIGENTNI SISTEMI U POSLOVNOJ FUNKCIJI

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Sažetak: Cilj ove studiozne analize je da se utvrdi do koje mere sofisticirana tehnologija može da se koristi za poboljšanje poslovanja. Današnje vreme donosi svakodnevno nove i brze promene u poslovnom okruženju kojima mala i srednja preduzeća u Srbiji treba što pre da se prilagode, često i u letu. Definisani ciljevi istraživanja odnose se na pretpostavku da poslovna inteligencija svojim metodama, tehnikama i alatima može da unapredi postojeće poslovne procese u kompaniji, učini ih efikasnijim uz istovremeno smanjenje ukupnih troškova poslovanja. Istraživanja pokazuju da gotovo da ne postoje kompanije koje nisu inkorporirane principe reinženjeringa, uvođenje ukupnog upravljanja kvalitetom (eng. Total Quality Management-TQM), "outsourcing" i slično u svoje strategije i planove. Jedan od najprikladnijih načina za stvaranje konkurentске prednosti za mala i velika i preduzeća u Srbiji, u trenutnim uslovima svetske ekonomske krize i recesije, jeste koncept poslovne inteligencije (eng. Business Intelligence - BI). Rad se zasniva na originalnom metodološkom pristupu razvoju i izgradnji BIS-a i na ispitivanju inteligentnog sistema i kritičkoj proceni njegove primene u procesu upravljanja preduzećem.

Ključne reči: poslovna inteligencija, inteligentni sistemi, posao