

DOI: <https://doi.org/10.46793/6461-101.5335>

Scientific Review Article

PARADIGMS OF APPLICATION OF BUSINESS INTELLIGENT SYSTEMS AND ERP SOLUTIONS IN BUSINESS AND ENVIRONMENTAL PROTECTION AND SUSTAINABLE DEVELOPMENT

Kostadinka Stojanović

Faculty of Mathematics and Computer Sciences,
Alfa BK University, Belgrade, Serbia

e-mail: kostadinka.stojanovic@alfa.edu.rs

<https://orcid.org/0009-0008-5796-312X>

Nebojša Denić

Faculty of Sciences and Mathematics,
University of Priština, Kosovska Mitrovica, Serbia

e-mail: nebojsa.denic@pr.ac.rs

<https://orcid.org/0000-0003-2584-259X>

Momir Milić

Faculty of information technology, Alfa BK University, Belgrade, Serbia

e-mail: milicmomir153@gmail.com

<https://orcid.org/0009-0004-9210-4137>

Damjana Zubac

Academy of Applied Studies, Kosovo and Metohija Department Zvečan, Serbia

e-mail: damjana.zubac@akademijakm.edu.rs

Marko Vujović

Faculty of information technology, Alfa BK University, Belgrade, Serbia

e-mail: vujovicmarko250@gmail.com

<https://orcid.org/0009-0005-6294-6461>

Abstract: The paper is composed of a theoretical and an empirical part. In the theoretical part, based on existing literature and recent research, the basics of digital transformation, business intelligent systems and ERP solutions are presented. The emphasis of the research will be on ERP systems, definition, origin, structure, modules, development, as well as key factors that affect the implementation of ERP systems in practice, in addition, the reasons of companies and business systems for introducing these software solutions will be evolved in the work. The paper combines all acquired knowledge about ERP systems and artificial intelligence and focuses on the areas in which artificial intelligence changes ERP systems. The paper will also analyze and present the reasons for the introduction of ERP systems in business systems and trends for the future. In the empirical part of the research, the implementation of the ERP system in Simonida's company "Gračanica" is shown on a practical example. In the practical part of the research, a survey will be conducted in which the key users in the mentioned business system who are the end users of the mentioned ERP system will participate. Processes in the company and modules of the ERP system that cover those processes are presented. At the end of the paper, the results and answers about the effects of the ERP system in business from the aspect of green economy will be presented, in this regard, the challenges and obstacles in the introduction of the new system were analyzed, and with the help of a survey questionnaire, a more detailed insight into the user experience and attitudes towards the ERP system was obtained.

Keywords: *digitalization, business intelligence, ERP system, green economy.*

INTRODUCTION

Digital transformation is currently one of the most covered topics in business and IT magazines [6]. Although digital transformation is at the forefront of business and technology strategies, its alignment with sustainability goals has become a key issue. In this context, the concept of green digital transformation appears, which represents the integration of digital technologies into sustainable development. ERP (Enterprise Resource Planning) systems are comprehensive information solutions that consist of various modules and functions such as sales management, customer relationship management, warehouse management, production, human resources, financial management, etc. ERP is a software package that offers integrated solutions that support decision making [7]. Artificial intelligence as part of an ERP system raises questions about positive changes and changes that cause fear among employees of their replaceability by artificial intelligence. Its ability to analyze large amounts of data, recognize patterns and automate processes has brought about significant innovation and improvement in various sectors of the economy. Enterprise Resource Planning (ERP) can be defined as software used to plan business resources and is intended to manage business processes, which allows an organization to use a system

of integrated applications to manage its business and automate numerous functions related to technology, services and human resources [4]. By introducing an ERP system, business processes are integrated at multiple locations or functional areas of the company. Companies that want to develop a competitive advantage must choose the best ERP version that will reflect their competitive advantage and develop other company strengths [8]. The use of ERP systems increases coordination between different departments [2]. ERP systems allow companies to collect, store and manage data from different business units. There is a noticeable trend towards the inclusion of artificial intelligence (AI) as part of ERP systems. Demi and Haddara (2018) state that the ERP system is not something that ends, but the system adapts and develops together with businesses and organizations [5]. ERP systems achieve this by simplifying routine tasks, reducing operational costs and eliminating manual errors. The implementation of an ERP system therefore implies not only the adaptation of the standard ERP model, but also the redesign of business processes in order to achieve perfect compliance [18]. Artificial intelligence within an ERP system helps eliminate the work of employees so they can focus on what the artificial intelligence does.

CHARACTERISTICS AND TYPES OF ERP SYSTEMS

ERP systems enable business performance management by assisting in planning, forecasting, and reporting on an organization's financial results [12]. Purchasing an ERP system is such a complex task that implies a high level of risk and uncertainty, so it is important to understand which critical factors are important for the successful execution of the project, such as the selection and implementation of the ERP system. Executives in various industries are using digital advances and technologies such as analytics, mobility, social networks and smart embedded devices to advance the use of traditional technologies such as ERP, among others, to transform customer relationships, internal processes and value propositions [25]. Before purchasing any ERP solution, it is necessary to define well the business processes, the organization and determine the internal team, composed of the main managers of the company who have a vision and want to introduce ERP. The reasons for introducing the ERP system can be divided into three groups [24]:

- Technological - system integration, reduction of IT costs, availability of information in real time, obsolescence of the previous system.
- Management/Operational - process efficiency, shared database, productivity, response time, functional integration, process standardization and automation, reduction of operational costs.
- Strategic - modernization and dissatisfaction with older systems, more accurate and faster reporting to management, easier strategic decision-making, business flexibility, organizational changes in the company, overall review of business, competitive advantage.

An ERP system in an enterprise provides a central data warehouse and a hub for integration between different departments in the organization [14]. The introduction of an ERP system is therefore a big project, which can be mastered step by step. The life cycle can be divided into planning, implementation, stabilization and improvement [13]. In the first stage of decision-making, suppliers, consultants, company management and IT experts are involved. They determine the needs and limitations related to the ERP system, make the implementation decision, select the project team, software and supplier. They also prepare a rough plan of the costs and time frame of the entire process [5]. With precise definition of business problems, critical assessment of suppliers, software solution and implementation methodology, active involvement in the project and implementation process, with strict implementation within the set plan (cost and financial), we easily ensure the reduction of costs and risks to the smallest possible extent and at the same time increase the chances of successful ERP solution implementation[9]. Many companies choose to implement ERP systems because of the aforementioned benefits that these systems bring to the company. However, we are also aware of other reasons that lead companies to decide to switch to an ERP system. Thus, Figure 1 shows that most companies decide to implement an ERP system due to the desire to improve business processes (64% of companies), to achieve growth of the company's position (57% of companies) and to reduce working capital (57% of companies). We find it surprising that even 24% of companies decide to implement an ERP system only because other companies also have an ERP system.

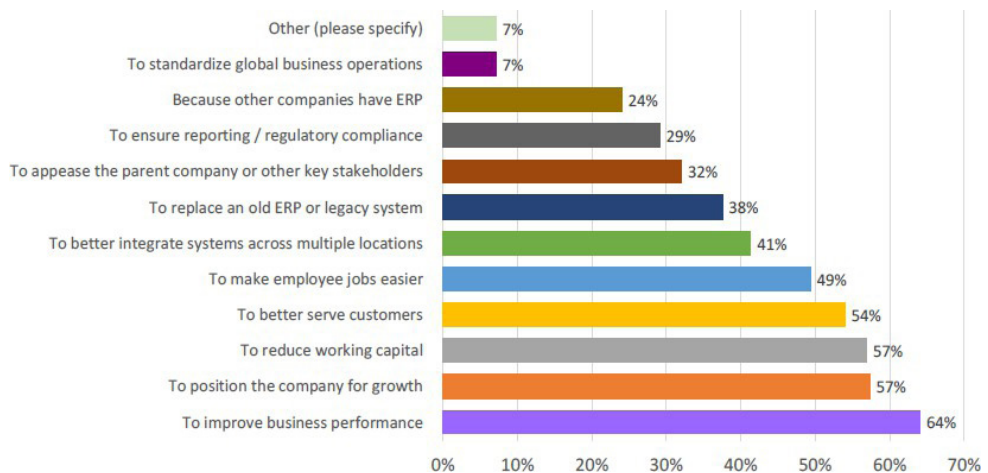


Figure 1. Reasons for implementing an ERP system [20]

Other opportunities, which are indicated to Serbian providers of ERP solutions, are also related to globalization or the offer of products on the market of former groups of countries. The expectations that companies have are influenced by large financial investments and the magnitude of promised changes. However, to get the most out of an ERP system, a structured approach with clear objectives is needed during

implementation [13]. According to the ERP system market report (Lumenia, 2019), the key trends are: digital transformation, digital marketing and customer experience (CX), intelligent ERP systems and ERP in the cloud [17]. Integrated systems transform large amounts of data into accurate information in real time, enabling early decisions to achieve business goals. We are familiar with various ERP systems, which differ according to the size of the company and according to the possibility of use. Depending on the size of the company, the author Ferrajoli (2019) lists the following ERP systems: industry-specific ERP systems and small business ERP systems [11]. These ERP systems are intended for small businesses that do not need a solution for sales and order management or human resources and complete management of warehouse or production components. ERP systems are tailored to small businesses, provide only the functionality the company needs, and are affordable.

MATERIALS AND METHOD

We will use a descriptive approach, in which the method of description will prevail due to the description of the ERP system and artificial intelligence [21]. We will also use an analytical approach, with which we will analyze ERP systems and artificial intelligence, and use the comparison method to compare existing solutions. In addition to the descriptive method, the research will also use the analysis method, which will allow us to examine in detail practical examples of organizations that successfully implement green digital transformation. Using the method of analysis, we will review and connect theoretical positions and facts from practice as a whole.

RESULTS

ERP systems establish control over the entire business. According to data from the Statistical Office of the European Union (European Statistical Office, hereinafter Eurostat), in 2024, 43.3% of companies in the EU used enterprise resource planning (ERP) applications. Research results for large companies, an ERP system with artificial intelligence will certainly be more interesting and useful, because it will save a lot of money and time by automating the process. Studio analyzes show that 90 percent of those surveyed, who participate in the project of implementing or renewing the information system, do not have adequate control or idea about whether their project is successful or unsuccessful. By investing in applications and digital capacities, business systems improve the user experience and enable greater interaction with customers [17]. Among small companies, 37.9% used the ERP system, while the percentage of large companies is significantly higher and amounts to 86.3%. The highest percentage of companies using an ERP system was recorded in Denmark (67.3%), and the lowest in Romania (21.7%). Business problems in the process of introducing an

ERP system can be solved by coordinating and informing management and adjusting the methods they use [13]. In 2023, the global ERP software market will grow to \$124 billion, representing a growth rate of 3.6%. The ten largest bidders together had a 33.3% market share. By 2028, the market is expected to reach \$148.2 billion [19].

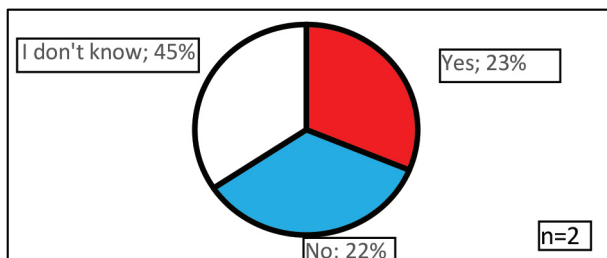


Figure 2. The impact of the ERP system on the improvement of environmental protection and sustainable development [9]

DISCUSSION

Over the past decade, artificial intelligence (AI) has become a key factor in the development of various technological applications and business solutions. According to Xue et al. (2022), new analytical tools allow companies to obtain data on multiple elements, including greenhouse gas emissions, energy consumption, and water consumption[26]. Realization of the project of introducing the ERP business information system, as one of the key resources, is always a complex and expensive project with far-reaching consequences for the organization. Hietala and Paivarinta (2021) mention that ERP systems should be viewed as a long-term decision [13]. Limitations when introducing new technologies and concepts are: outdated ERP systems that do not have a flexible core and unoptimized business processes in the company [17]. Since the beginning of the intensive use of standard application solutions, the software industry in Serbia has been marked by a debate about the justification of using domestic or foreign products [22]. In this paper, I developed a theory that also draws attention to the size and complexity of a project, such as the selection and implementation of an ERP system. The theory makes a distinction in the decision-making process between large and small companies. ERP system providers are investing significant resources in implementing AI, enabling greater automation of processes and simplification of administrative tasks [23]. This is precisely why the question arises as to which ERP solution to buy, whether they are domestic solutions, or whether foreign solutions are better, the offer of which is very large today. In theory, Hustad and Olsen (2013) describe that the costs of failed implementation can be crucial for SMEs with limited financial resources, and implementation represents a high risk for such companies [16] The challenges described by the first author Bawa (2023) are:

- complexity of ERP and AI systems - they require expertise and coordination,
- data quality – data must be accurate and consistent for AI algorithms to provide reliable results,
- employee resistance to changes,
- security and privacy – ERP and AI process and generate large amounts of sensitive data, which requires protection from cyberattacks,
- implementation costs, including user training,
- lack of qualified personnel for managing ERP and AI systems [3].

In general, companies in Serbia are poorly aware of the fact that a standard internationally recognized ERP system represents and what are its advantages. The situation is still better compared to a year ago, and it is to be expected that it will improve even more over time. Huang et al. (2021) define 35 critical success factors, which according to the taxonomy of critical success factors fall into this category [14]. This taxonomy refers to the implementation of ERP systems in the cloud. Out of the mentioned 35 factors, those in the internal environment dominate: organizational factors (15), human factors (12) and technical factors (5), while only three factors are related to the external environment. This means that most factors are under the control of the ERP system user. On the domestic market, last year and this year, sales of ERP class software packages increased by about 30%, which is also a kind of sign of the revival of the economy and the search for competitive advantages in the development of an increasingly efficient business information system.

CONCLUSION

Artificial intelligence is the ability of a machine to imitate intelligent human behavior. As part of an ERP system, artificial intelligence facilitates warehouse management, financial management, customer support, human resource management and sales. Finding a successful connection between the ERP system and the organization's business processes is critical to a successful ERP implementation. Most companies have digitally transformed their operations in recent years. The impact of foreign companies appearing on the Serbian market, either through acquisitions or green-field investments, is also positive. The work represents a practical contribution for the selected company, in order to better prepare for the next ERP system change and take into account the key factors for a successful implementation. In addition, it is a contribution for companies considering digitization of their business or preparing for the implementation of a new ERP system, because the processes from decision to implementation are defined in detail and important factors for successful implementation are highlighted. ERP implementation requires the company's internal knowledge and the knowledge of its suppliers or customers in the case of integration. It is expected that the IT ERP market in Serbia will experience a boom in the next few years". For process management and resource planning, they use an ERP system, which, however,

should be a support, not a limitation. For this reason, the selection and introduction of an ERP system requires good preparation. In Serbia, which has a significantly cheaper workforce, and because of that, the above-mentioned logic of choosing ERP software is not justified. In addition, there are several solutions in Serbia, even in the class of ERP software, which are simply better than the world's market leading solutions. We live in an era where we need to embrace technology and simplify processes as much as possible. The key role is for companies to explain what their systems do in a way that builds trust among users. We have compared the use of artificial intelligence within the system and found that they are already taking advantage of AI quite well, regardless of the sector. For large companies, an AI system will certainly be more interesting and useful save a lot money and time. With artificial intelligence, ERP systems will become adaptive and able to prevent potential problems. These results provide a clear basis for further research and development of standards and best practices to more effectively address these critical topics and ensure sustainable improvements in the digital transformation of businesses from a green economy perspective.

REFERENCES

1. Ahmad, M. M. in Pinedo Cuenca, R. (2013). Critical success factors for ERP implementation in SMEs. *Robotics and Computer-Integrated Manufacturing*, 29(3), 104–111.
2. Al-Shboul, M. A. (2018). Towards better understanding of determinants logistical factors in SMEs for cloud ERP adoption in developing economies. *Business Process Management Journal*, 25(5), 887–907.
3. Bawa, S. S. (2023). *How Business can use ERP and AI to become Intelligent Enterprise*. International Journal of Innovative Science and Research Technology, 8. <https://doi.org/10.5281/zenodo.7688737>
4. Beal, V. (2019). *ERP – enterprise resource planning*. Available 07. September 2025 at www.webopedia.com: <https://www.webopedia.com/TERM/E/ERP.html>.
5. Demi, S., & Haddara, M. (2018). *Do Cloud ERP Systems Retire? An ERP Lifecycle Perspective*. *Procedia Computer Science*, 138, 587–594. <https://doi.org/10.1016/j.procs.2018.10.079>
6. Denić, N., Stojanović, K., Stojanović, J., „Possibilities of applying IoT in the municipality of Gračanica” The Book of Abstracts International Scientific and Professional Conference “ALFATECH” Smart Cities and modern technologies March 15, 2024, Belgrade, Serbia, 20 –20, ISBN 978-86-6461-070-4, COBISS.SR-ID 139964169, DOI: 10.5281 / zenodo .10802515
7. Denić, N., Moračanin, V., Milić, M., i Nešić Z., (2014), *Risk Management in Information System Projects*, Tehnicki Vjesnik-Technical Gazette, (2014), vol. 21 br. 6, ISSN 1330-3651 (Print), ISSN 1848-6339 (Online), pp. 1239-1242., UDC/UDK 658.51.001.3:004.451, <https://pdfs.semanticscholar.org/e296/bdeb45d1529063da938bf6182e2cf02ba946.pdf>

8. Denić, N., Vujović, V., Stevanović, V., i Spasić, B., (2016), "KEY FACTORS SUCCESSFUL IMPLEMENTATION OF ERP SYSTEMS" "The journal Tehnički Vjesnik/Technical Gazette, ISSN 1330-3651, Vol. 23/No. 5, OCTOBER 2016, (pp.1335-1341) DOI: 10.17559/TV-20150618213311, <https://doi.org/10.17559/TV-20150618213311>
9. Denić, N., Stojanović, K., Stojanović, J: Justification and specificity of application of business intelligence - Vol. 1 No. 1 (2025): AlfaTech, 2025, pp.1-4 22.04.2025, April 2025 DOI: 10.46793/AlfaTech1.1.01D
10. Eurostat. (2024, maj). *E-business integration*. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=E-business_integration
11. Ferraioli, T. (2019). *The Types of ERP*. Available 22. September 2025 at smallbusiness.chron.com: <https://smallbusiness.chron.com/types-erp-5161.html>.
12. Globalteckz. (2019). *Advantages and benefits of ERP systems*. Available 24. September 2025 at www.globalteckz.com: <https://www.globalteckz.com/advantages-and-benefits-of-erp-system/>.
13. Hietala, H. in Päivärinta, T. (2021). Benefits Realisation in Post-Implementation Development of ERP Systems: A Case Study. *Procedia Computer Science*, 181, 419– 426.
14. Huang, Y.-Y. in Handfield, R. B. (2015). Measuring the benefits of ERP on supply management maturity model: a »big data« method. *International Journal of Operations & Production Management*, 35(1), 2–25.
15. Huang, Q., Rahim, M., Foster, S., & Anwar, M. (2021). *Critical Success Factors Affecting Implementation of Cloud ERP Systems: A Systematic Literature Review with Future Research Possibilities*. <http://hdl.handle.net/10125/71186>
16. Hustad, E. in Olsen, D. H. (2013). ERP Implementation in an SME: A Failure Case. In Devos, J., van Landeghem, H. in Deschoolmeester, D. (ur.), *Information Systems for Small and Medium-sized Enterprises* (213–228). Springer: Berlin.
17. Lumenia. (2019). *ERP Market Review Report 2019*. <https://lumeniaconsulting.com/insights/publications/erp-market-review-report-2019>
18. Panayiotou, N. A., Gayialis, S. P., Evangelopoulos, N. P. in Katimertzoglou, P. K. (2015). A business process modeling-enabled requirements engineering framework for ERP implementation. *Business Process Management Journal*, 21(3), 628–664.
19. Pang, A., Markovski, M., & Ristik, M. (2024, 10. jun). *Top 10 ERP Software Vendors, Market Size and Market Forecast 2023–2028*. <https://www.appsruntheworld.com/top-10-erp-software-vendors-and-market-forecast/>
20. Panorama Consulting Group. (2018). *Panorama's 2018 ERP Report*. Available 12. September 2025 at www.panorama-consulting.com: <https://www.panorama-consulting.com/resource-center/erp-industry-reports/panoramas-2018-erp-report/>.
21. Radovanović, M. B. (2020) *Prilozi metodologiji i filozofiji nauke*, Izdavački centar Filozofski fakultet Univerzitet u Nišu, pp. 1-173, Niš 2020. ISBN 978-86-7379-538-6
22. Stojanovic, J., Denić, N., Stojanović, K., "Transformation of E-administration into digital administration and smart cities and villages" " The Book of Abstracts International Scientific and Professional Conference "ALFATECH" Smart Cities and modern

- technologies March 15, 2024, Belgrade, Serbia, 20 – 20, ISBN 978-86-6461-070-4, COBISS.SR-ID 139964169, DOI: 10.5281/zenodo.10802515
23. Stojanović, K., Denić, N., Stojanović, J. "Paradigms of application of business data analysis and business intelligence in public administration and local self-government" " The Book of Abstracts International Scientific and Professional Conference "ALFATECH" Smart Cities and modern technologies March 15, 2024, Belgrade, Serbia, 20 – 20, ISBN 978-86-6461-070-4, COBISS.SR-ID 139964169, DOI: 10.5281/zenodo.10802515
 24. Tortorella, G., Fries, C. E., & Trindade, C. (2015). *Reasons for adopting an ERP system in a public University in Southern Brazil*. <https://www.semanticscholar.org/paper/Reasons-for-adopting-an-ERP-system-in-a-public-in-Tortorella-Fries/b2a8a76fec0715b8b71ff08f80ecee8668563401>
 25. Westerman, G., Calmédjane, C., Bonnet, D., Ferraris, P. & McAfee, A. (2011). Digital Transformation: A roadmap for billion-dollar organizations. *MIT Center for digital business and capgemini consulting*, 1(1-68).
 26. Xue, L., Zhang, Q., Zhang, X. & Li, C. (2022). Can digital transformation promote green technology innovation?. *Sustainability*