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ERP SYSTEMS FOR SMALL AND MEDIUM-SIZED ENTERPRISES FROM THE SAP AND MICROSOFT PERSPECTIVE

Abstract: Enterprise Resource Planning (ERP) systems have been the backbone of companies' e-business since the 1990s. They were originally designed for large companies which are doing business globally, but over time they have become indispensable software solutions for SMEs. Today, there are numerous ERP vendors in the ERP system market. Among the most well-known with a significant market share are the ERP systems of the companies SAP and Microsoft. The paper will present the products of the mentioned companies, their benefits and limitations and comparative analysis of their ERP systems for SMEs, SAP Business by Design and Microsoft Dynamics 365.

Keywords: ERP system, cloud technology, SME, SAP Business ByDesign, Microsoft Dynamics 365

1. INTRODUCTION

Modern companies have complex organizational structures, resources that must be managed and controlled, processes that must be integrated internally and with external partners, and a vast amount of data and information that needs to be available at all times. Managing all the above-mentioned needs requires the use of ERP systems.

In the 1970s, production-related information systems (MRP - Materials Requirements Planning) led to the development of complete software solutions. These systems supported the planning and management of exclusively production-related resources. In the 1980s, MRPII (Manufacturing Requirements Planning) information systems were developed, which enable the planning of all resources needed for production, not only material in the form of raw materials and semi-finished products, but also financial and human resources. Due to the integration of all functions in the company and the support of all internal business processes, the early 1990s were marked by the intensive implementation of integrated information systems (ERP - Enterprise Resource Planning). In the 2000s, the core of ERP 1.0 was expanded with software applications such as Supply Chain Management (SCM), Customer Relationship Management (CRM), etc. where the development of this generation of ERP heavily relied on Service Oriented Architecture (SOA). Since 2010, cloud technology has enabled ERP systems to move from local (on-premise) to the cloud, where they are now offered as Software as a Service (SaaS) (Figure 1). ERP systems are migrating to the cloud for a variety of reasons. Namely, ERP 1.0 systems were not designed to be used and adopted by users. Over three quarters of business leaders said that their ERP systems do not meet their needs, let alone future plans. The same research found that 59% of global companies were burdened by ERP's complexity, which caused challenges in their IT systems, business processes, company policies, and data management (Oracle, 2016). Due to its ROI of 2.1x, 91% lower energy consumption, and 55% lower costs, cloud ERP has been gaining traction over on-premise ERP (Oracle, 2016).

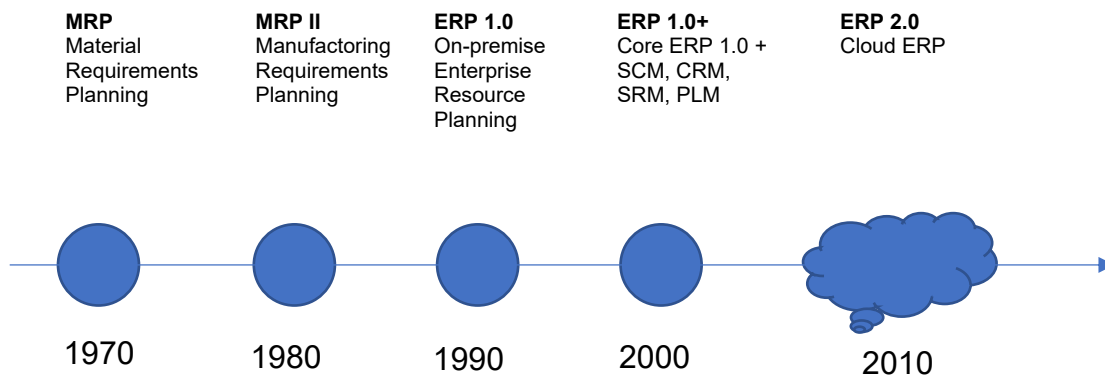


Figure 1: Evolution of the ERP system
Source: Oracle, 2016

The use of cloud computing and business processes based on cloud technology is becoming commonplace in business practice around the world. In cloud ERP, clients subscribe to software services through service providers to access a web-based enterprise resource planning (ERP) system typically hosted in data centres. Due to its ROI of 2.1x, 91% lower energy consumption, and 55% lower costs, cloud ERP has been gaining traction over on-premise ERP (Oracle, 2016). A growing number of companies are moving away from legacy ERP systems because they need real-time data insights to stay competitive in the market, and today they have a wide range of options when choosing ERP systems (Haddara, Gøthesen, & Langseth, 2021).

In the existing scientific literature, many studies focus on the benefits and limitations of cloud ERP solutions for large businesses (Haddara, Gøthesen, & Langseth, 2021). The authors of this paper wanted to present the advantages and limitations of cloud ERP systems through examples of products from renowned companies SAP and Microsoft, which according to Panorama (2022) fall into the lower tier II of ERP systems designed for small and medium-sized enterprises. We chose these companies based on the research Panorama Consulting Group conducts every year in accordance with an established methodology on the top 10 suppliers of ERP systems, which include, among others, SAP and Microsoft with their small and medium-sized enterprise products, SAP Business by Design and Microsoft Dynamics 365 Finance and Operations, respectively (Panorama, 2023). Accordingly, this paper's research question is: RQ What are the benefits and challenges of implementing SAP Business by Design and Microsoft Dynamics 365 Finance and Operations ERP systems in small and medium-sized enterprises. The paper will achieve its goal by answering the research question, which is to identify the advantages and challenges of these popular ERP systems and perform their comparative analysis.

1.1. Categorization of ERP systems

Every ERP system is characterized by the integration of data and processes within the organization, regardless of the category to which it belongs. For example, customer information (name, address, preferred payment method, etc.) is only stored once in the ERP system in the sales sector when a customer is registered. When the customer orders products in the future, the ERP system will provide this data. Additionally, all customer orders are available in the customer's order history, which is also useful in other sectors, such as marketing (for advertising and market analysis), financial accounting (for payment history and credibility), or sales (for analysis of sales and potential sales). On the other hand, all processes in the ERP system are integrated. When a product is delivered to a customer, the inventory level in the inventory management system is reduced, as is the value of the product in stock in the financial accounting system. When the customer pays for the product, the balance on the company's account is increased and the customer's account is discharged (Adelsberger, Khatami, & Khatami, 2017).

According to Panorama (2022), ERP systems are categorized into *tiers* that are based on factors such as the size of the organization, the revenue of the ERP system supplier, the number of users targeted, and some other factors such as the functional complexity of the ERP system itself.

Systems in Tier I are designed for organizations with annual revenues exceeding \$750 million. Most companies of this size are complex, whether in terms of their operational processes or the structure of their entities. These systems address different types of industries and cover scalability requirements. Examples of ERP systems that belong to this category are SAP S/4 HANA, Oracle ERP Cloud, Infor CloudSuite.

Systems in the Upper Tier II serve small and medium-sized enterprises with annual revenues between \$250 million and 750 million. Organizations of this size can span many different types of industries and business units. Examples of ERP systems that belong to this category are Microsoft Dynamics 365 Finance, IFS, Sage X3, Eoicor E10, etc.

Systems in the Lower Tier II serve small and medium-sized enterprises with annual revenues ranging from \$10 to \$250 million. These organizations usually represent one type of industry and have only one entity. Examples of ERP Systems that belong to this category are NetSuite, abas, IQMS, Plex Systems, Microsoft Dynamics Business Central, etc.

The Tier III category includes hundreds of ERP system providers that serve mostly small business. However, some of them represent systems with a specific functional niche that is complementary to a larger ERP system. Examples of ERP systems that belong to this category are SAP ERP 100, Sage ERP 300, Aptean, ECI, etc. (Panorama, 2022).

2. RESEARCH BACKGROUND

In their systematic review of the literature, Elmonem et al. (2017) identified numerous benefits of the cloud ERP system. The benefits are lower investments because the ERP system is accessed using the Internet and does not require investments in equipment on which the ERP system would be installed, lower operating costs, fast implementation, scalability, and focusing on the core company competencies, use of advanced technology, rapid system updates and upgrades, improved access, mobility and usability of ERP, easier integration with other cloud services, improved availability and disaster recovery system, cost transparency, sales automation, use of security standards and trial version of ERP. On the other hand, Elmonem et al. (2017) also identified numerous challenges accompanying the implementation of cloud ERP systems such as subscription expenses, security risks, performance risks, limitations in terms of customization and integration, strategic risks, data confidentiality risks, loss of IT competences, limitations in terms of functionality, sensitivity of certain information and data, control over cloud ERP, hidden costs in the contract, loss of technical knowledge, etc.

Navaneethakrishnan (2013) cites the overall lower costs of a complete cloud ERP system implementation project as a major advantage compared to on-premise ERP systems. The paper compares certain characteristics of on-premise and cloud ERP systems. One of the key features of cloud ERP system is that it allows organizations to change the ERP provider at any time.

Hadidi et al. (2020) also made a comparative analysis of cloud and on-premise ERP systems. There are several main conclusions, including shorter implementation times compared to on-premise ERP systems, greater flexibility, i.e. shorter implementation times for additional modules in cloud ERP systems, and of course the ability to access the system from anywhere on Earth.

Razzaq et al. (2020) conclude that the main obstacle for SMEs to implement on-premise ERP systems was that they could not afford them for financial reasons. Cloud ERP systems from SAP, Oracle, and Microsoft appeared in the era of cloud computing, which led to a licensing model that was financially acceptable for small and medium-sized companies. The licensing model has affected a significant increase in the use of cloud ERP systems in small and medium-sized enterprises worldwide.

Elbahri et al. (2019) conducted a comparative analysis of SAP, Oracle and Microsoft being the biggest cloud ERP systems vendors, to create guidelines and recommendations for one of the mentioned systems. In their research, they found that SAP has the shortest implementation period, Microsoft and SAP are almost the same in price for organizations of the same size, but SAP brings the greatest business benefits when it comes to cloud ERP.

3. RESEARCH DESIGN

Empirical research in the form of a qualitative component took place by conducting a multiple case study (Yin, 2009; Runeson & Höst, 2009) on purposefully selected organizations in the Republic of Serbia according to Creswell's recommendations (as cited in Onwuegbuzie & Collins, 2007), that were found to possess abundant information. This information is of great importance for the purpose of the research and for answering the research question presented in the introduction. Case study companies were selected based on the following criteria: whether the company uses SAP Business ByDesign or Microsoft Dynamics 365 ERP, as well as its size, given that the research is aimed at small and medium-sized businesses. Specifically, the paper describes a case study conducted in two companies, one using SAP Business ByDesign and one using Microsoft Dynamics 365 Finance and Operations. The research instrument is a semi-structured interview developed according to Ristić (2016) and Runeson and Höst, (2009). The final interview schema is given in Appendix A. The interviews were conducted in March 2023. Interviews were conducted with ERP consultants with many years of experience, who participated in the ERP implementation projects at their companies.

4. RESEARCH RESULTS

4.1. SAP Business ByDesign and Microsoft Dynamics 365 Finance and Operations

SAP Business ByDesign is a SaaS cloud solution for rapidly growing companies hiring between 50 and 1500 employees. It enables companies to apply proven best practices through 36 built-in business processes. Besides the standard logistics processes that form the core of the ERP system and which have MRP with MES integration, there are the following: CRM, SCM, Financials, Human Resources and Project Management. Depending on the company's

needs, SAP Business ByDesign can be configured very quickly. All parts of the product have a consistent HTML5 user interface (Panorama, 2023).

Microsoft Dynamics 365 Finance and Operations is also a SaaS cloud solution aimed at small and medium-sized enterprises that has Finance, Human Resources, SCM and Commerce applications. Similar to SAP, it provides access via the web, mobile devices and desktop computers, as well as tablet devices. It has strong integration with other Microsoft products like Outlook, Excel, Word, etc. In addition, it includes the entire Microsoft app ecosystem, and is especially dominant in the application of Power BI (Panorama, 2023).

4.2. Comparative analysis of SAP Business ByDesign and Microsoft Dynamics 365 Finance and Operations cloud ERP systems

Table 1 presents a comparative analysis of data obtained through qualitative research.

Table 1: Results of the qualitative component of the research

Question from the questionnaire	SAP Business ByDesign	Microsoft Dynamics 365 Finance and Operations
Type of company (e.g. production, trade):	Production	Production
Number of employees in the company:	130	950
Which ERP system do you use in your company?	SAP Business ByDesign	Microsoft Dynamics 365 Finance and Operations
Is the ERP system based on cloud technology?	Yes	Yes
If the answer to the previous question is YES, is it a private or public cloud?	Public cloud SAP Business ByDesign	Public cloud Microsoft SaaS
In your organization, how long did it take to deploy the ERP system?	9 months	9 months
How much of your employees' daily work is performed directly through ERP?	It depends on the sector: 90% in accounting and finance, cca 40% in production, cca 80% in procurement, logistics.	The biggest percentage amounts to 70% in the administrative part of the supply chain, as well as in production administration. In other departments, primarily customer support departments, this share is significantly smaller, e.g. in procurement, quality, project management, industrial engineering - it varies between 25 and 35%. It should be borne in mind that a certain share is lost due to the existence of different interfaces between ERP and separate applications (Store function within procurement, CASQ-it within quality control, ExFlow function within finance, etc.)
Are the ERP system's functionalities, in which employees perform their work, fully in sync with the related physical processes?	The affirmative answer to this question refers to what employees record in ERP as regular daily activities.	Not fully harmonized, primarily due to the limited implementation time of this system, as well as the implementation costs, the ERP was provided as a template created on the basis of user requirements that were standardized not only for the factory where the case study was carried out, but for the entire group. Therefore, it was necessary to adapt certain processes to the ERP functionalities. There is certainly some flexibility in modifying ERP functionality, but with an appropriate business case.

<p>How much of employee-generated reports come directly from the ERP system?</p>	<p>The largest number of reports come directly from ERP. Periodical reports, which are specific, may be created manually through Excel, but most are exported from ERP and processed further in Excel.</p>	<p>Approximately 40% of reports come directly from ERP. These are standardized reports that are used mostly at the group level. As many processes were adapted to the functionality of the ERP system during implementation, the same is true of reports. In general, it has not proven to be functional and cost-effective to create new standardized reports, taking into account the powerful features of tools like PowerBI, which, by combining different tables and potentially different sources of data with D365 as a data source, provide far more advanced reporting capabilities.</p>
<p>Aside from the ERP reporting functionality, what other tools do employees use for reporting?</p>	<p>MS Excel is an auxiliary tool used for reporting.</p>	<p>About 50% of the company's reports are generated by PowerBI, with Excel used occasionally in some cases. Over the last three years, this has changed dramatically, whereas Excel was the primary tool for creating reports (e.g. Excel query + custom offline tables)</p>
<p>When doing their daily work, do employees need to use other auxiliary tools such as MS Excel? If so, please specify that tool.</p>	<p>We use MS Excel as an auxiliary tool in our daily work.</p>	<p>They frequently use MS Excel, approximately 10% u SCM, and between 15 and 20% in finance and procurement.</p>
<p>How satisfied are employees with the speed of the company's ERP system?</p>	<p>Generally, they are satisfied, although they sometimes complain about a slower system response, but that is a matter of personal perception - since it is a Cloud solution.</p>	<p>Users are generally satisfied with the speed of the ERP system, especially compared to the previously used system. There is no doubt that the actual performance available to the company's employees is not only limited by the Microsoft solution, but also by the company's decision to hire more or fewer resources (direct impact on SaaS costs). So, resources are allocated differently depending on certain functionalities. As far as speed is concerned, the ERP system is adequate and meets our requirements.</p>
<p>How often do employees experience problems with the ERP system, which prevent them from performing their operational tasks?</p>	<p>There were no such cases.</p>	<p>It happens on average once a week that a problem arises that blocks operational work for several users. The frequent problems caused by code changes are a direct consequence of adjusting functionality, establishing new ones, and optimising existing ones, as well as the fact that the platform is shared for the entire group – often all factories are affected. Most of these problems were solved by the quick intervention of technical support.</p>

<p>In terms of ERP functionality, do employees have access to adequate technical support? How would you describe it and rate it?</p>	<p>Instructions were provided by the consultants and were created during the implementation. There is also a comprehensive English-language help integrated into the ERP solution. It is rated with a high score of 9.</p>	<p>Multiple levels and categories of technical support are available. As well as external consultants and analysts, the local IT team coordinates all ERP-related difficulties and requirements. ERP has never been down for more than two hours in the worst ERP system outages seen so far. The partial work stoppages, in terms of certain functionalities, processes (e.g. receiving goods), lasted up to one working day. Certainly, the technical support is always available, detailed, everything is documented and continuously improved. Overall, it is rated with a high score.</p>
<p>Finally, list the most significant advantages and limitations of your company's ERP system.</p>	<p>Identified advantages are: uniqueness of data entry (data/document is entered in one place), current visibility of posted documents in reports, possibility to cancel documents, ability to obtain multiple complex reports with a single click and no manual processing is required. No limitations have been identified regarding the ERP System used.</p>	<p>An important advantage was absolute independence from the company's infrastructure. All ERP functions can be accessed via a laptop with internet access; speed of work and solutions within ERP; technical possibilities of connecting through interfaces with other applications; integration with other services and applications, suitability for control in terms of audits, access control; relatively low rollout costs; short implementation period. Identified limitations are: ERP costs per user are high, a reliable, high-quality Internet connection is necessary; certain technical solutions are more complex due to the cloud platform (e.g. industrial label printers should be configured on 3 servers which are local print server, regional print server and bottomline label print server – this introduces 3 environments where potential problems can occur, as well as 3 environments that affect print solution performance degradation).</p>

Source: Authors, 2023

5. FINAL CONSIDERATIONS AND LIMITATIONS OF THE RESEARCH

Cloud ERP systems have become dominant over their predecessors, on-premise ERP systems, in the past five years, as already mentioned in the introductory discussion. Various reasons have been identified by the research conducted in manufacturing companies belonging to the category of medium-sized businesses, which slowly but surely have led to the dominance of cloud ERP systems. In the first place, the client's company makes a capital investment when buying an on-premise ERP system (Elmonem et al., 2017). Small and medium-sized companies are especially affected by this, since they need to allocate significant financial resources in a short time to procure and tax their ERP system, for annual ERP maintenance, for the hardware on which the ERP will be hosted, for the license for the DBMS, for security tools to protect the ERP system, for tools to enable ERP recovery in the event of a crash, etc. In the cloud ERP, all of the above is handled exclusively by the ERP provider, where license costs are reduced to a monthly level and represent an operational cost for clients. For small and medium-sized businesses, the reasons above represent a key argument in favour of cloud ERP. Another very important fact is that the implementation of on-premise ERP systems often takes one to two or more years, while that of cloud ERP systems usually takes three to six months (Oracle, 2016). Based on actual case studies, both organizations took nine months to implement cloud ERP systems. Even with such a long implementation period, small and medium-sized businesses should implement a cloud ERP system because they can experience all the benefits of an ERP system relatively quickly. A major benefit of using the ERP system is the ability to generate different reports for different user profiles (from operational to top managers) based on the data that is fed into it, that have been pre-defined. The use of auxiliary tools, such as Power BI and MS Excel, can be beneficial in situations where it is not worthwhile to create new reports in the ERP system. With SAP Business ByDesign, users did not experience any problems performing their daily tasks, while with Microsoft Dynamics 365 Finance and Operations, such situations occurred because of frequent changes to the ERP system's functionalities and its optimization. As a

result of adequate technical support, these issues were quickly resolved. According to users, both ERP systems are satisfactory when it comes to the speed of work, that is, their responsiveness. Another advantage is that cloud ERP system is also independent of the organization's infrastructure, in other words, it can be accessed with only a client computer (laptop, desktop, tablet) and an internet connection.

One shortcoming of all ERP systems, including cloud ERP systems, is the inability to execute all internal business processes to a high level (over 90%). Based on the research, this percentage varies from 25% to 90% depending on the process. For certain activities that cannot be performed in a formal information system, organizations turn to MS Excel as an auxiliary solution. It is the issue of trust in ERP system providers, i.e. sensitivity, security and availability of data and information 24/7/365 that pose the biggest challenges to cloud ERP systems.

Research strategies based on case studies have certain limitations that are inherited by comparative empirical research, such as inductive reasoning (from the individual to the general), the inability to draw conclusions about causality, and potential atypicality of organizations and/or respondents in relation to the population, which is mitigated by the use of multiple case studies in this research. Furthermore, two medium-sized organizations were included in the sample of organizations, while small-sized organizations (up to 50 employees) were omitted from the intentional sample.

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