

## Key aspects of the implementation of ERP systems in Macedonia

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**Abstract.** Enterprise Resource Planning (ERP) systems are a strategic tool for gaining competitive advantage through gaining company information. The beginnings of their implementation in several companies in Macedonia occurred during the last decade. In this paper, we are making an analysis of the use of ERP systems in Macedonia, explaining their implementation, benefits, challenges and disadvantages in the process. We are also making an analysis of the selection of ERP solution in the company and their implementation. After that, we are analyzing the results of the implementation and its effects on the company. The conclusion is that the company's top management is deeply convinced that the purchase of this software is a beneficial investment. It will therefore result in return of investment through improved visibility of processes, more accurate data, as well as reduction of the time needed to gain information necessary for effective company management.

**Keywords:** ERP implementation, SAP ERP, Microsoft Dynamic Navision

### 1 Introduction

In circumstances where the business environment is changing dramatically, companies face increased competition, globalization and increased customer expectations. This increases the pressure to reduce total costs in supply chains, dramatically reduce inventory levels, expand the range of products and provide reliable and accurate delivery, as well as improve services to the client and enhance quality.

In order to respond to the many challenges, many companies in Macedonia decide to implement integrated systems that, besides integration of data, give managerial decision-making support. Complex software solutions that bring their own business logic help to get the full range of current situation for the entire company as well as for each department separately. Unsuccessful implementation of an ERP system can lead to high costs for software and training, yet inability to respond to business challenges.

Due to this fact, it is necessary to make an adequate preparation of the company to implement an ERP system. It is a process that includes: planning and determining the needs and prerequisites for implementation, detecting the challenges and risks of

implementation and how to overcome them, choosing the manner of implementation of the ERP system and defining of objectives.

The purpose of this paper is to consider the trends in ERP in the Republic of Macedonia and understand the need for their implementation. We also examine the process of selection of the appropriate ERP system for each company. An overview of the necessary conditions for successful implementation of the ERP system has been made. Furthermore, we have made an analysis of the benefits of a successful implementation in a company.

The first part of the paper describes the development efforts and the progress of the implementation of ERP systems in Macedonia. The second part is focused on defining the expectations of the companies from ERP systems, key features of the technical aspect and generally accepted steps for ERP systems implementation.

In order to cope with business challenges, we then delwt into clarifying the meaning of ERP systems for companies and their handling with data. The following section deals with the actual implementation of ERP systems and the critical factors for successful implementation. In this section we show a case study, which examines the need for implementation of an ERP system in a company in Macedonia where we describe the method of solution selection, as well as all subsequent stages of the ERP implementation in the company. In the end, we make a comparative analysis of the factors affecting the implementation of ERP systems from theoretical aspect and the practical effects of the implementation. We also make an analysis of the current situation of the implementation. Concluding remarks summarize the results of the research.

## **2 Analysis of the development efforts and implementation progress of ERP systems in R. of Macedonia**

After Macedonia became an independent state, a transformation of the social capital took place, mainly with a process of privatization of the state-owned companies. The Macedonian economy, faced with globalization and increased competition in the last decade, has begun to seek a solution to improve its information infrastructure, as well as accuracy and relevance of the needed data. Some of the companies that were privatized by established international corporations and those who wanted to remain competitive in the global market realized that the most appropriate solution was to join the global trend of implementation of ERP solutions. Telecommunication companies, major insurance companies and several Macedonian pharmaceutical and food brands had already set up their critical systems of ERP solutions (mainly SAP ERP and MS Dynamic Navision). Implementation, though hard, was successful only because of the help of their mother-companies and because of the dedication of the management teams, who understood the importance of successful ERP implementation. At the beginning, they implemented modules of ERP systems, which support streaming company processes and then they were upgraded with Business Intelligence (BI) systems, crucial for business survival.

Several Macedonian companies successfully use ERP systems. However, there are many unsuccessful implementations of ERP systems. The implementation in most of

them failed primarily due to insufficient organizational readiness, and insufficient commitment and support from top management. One factor for failure is insufficient training of technical and non-technical projects leaders. Because of the above-mentioned reasons, the implementation of ERP systems also failed in some state institutions. It should be noted however that many companies use integrated systems of lower degree of integration similar to ERP because of lack of funds for providing ERP software solutions. One successful story is the pharmaceutical company Alkaloid. This is an example of a company whose successful positioning in the global market is related to the implementation of the ERP solution ALKASAP. The implementation of the system started in the beginning of the 2000s, as a response to the pressure put on the company by the need for application of standards. Basically, the company needed to standardize 4000 products that should be made with 20 000 raw materials. It first started with the implementation of modules for materials management, production planning, control, finance, sales and distribution. The implementation was not an easy process and problems occurred in all implementation stages. The company received three types of external support: Partner support (b4b), License support (SAP West Balkan) and Validation support (Compliance control). They also received Remote help (on-site) and help from top management who had a strong determination for implementing ERP system. Over the last decade, all mentioned modules were implemented in the company and its subsidiaries. Crystal report was used as BI support tool, which was later purchased as a BI solution by SAP and improved the system's performance [10].

The ERP development continues in 2014 with the implementation of modules for HR (Organizational management, personal development, Travel management, etc.), whose implementations should be completed at the end of 2015. The process of implementation of the quality control systems is expected to start in the company's laboratories and afterwards in all other places quality control is needed. This implementation is planned for 2016.

### 3 Expectations from ERP systems

In the big companies, data are usually stored on multiple computer systems in different functional or organizational units, sometimes under different platforms that are not interconnected. Although each of these "islands of data" provides support for specific business activities within the whole company, the performance is reduced by the lack of integrated information. Maintaining these systems may result in significant costs. In order to improve their business practices and procedures, to share more of their aggressive hidden data with suppliers, customers and distributors, companies need to change its strategy of gathering information and information dissemination. Nowadays, companies are turning to ERP systems. Thus provide two major benefits that do not exist in sectors unrelated systems [1, 5]:

1. Unified company business overview that runs the functions and services;
2. Enterprise database where all business transactions are stored.

ERP provides the information backbone of the company with a widespread information system. The base is the software that puts data into a central database that

take data and use in modular applications that run on a common computer platform. This will standardize business processes and data definitions in a unified environment. In the ERP system, data are entered once, and this provides consistency and visibility through the company. The objective of ERP systems is the management of the movement of materials, money, resources and information through corporate space. Major benefits of the ERP system include easier access to accurate, integrated information which is achieved through integrated planning and control of all relevant resources to a business system [9]. Another benefit is the elimination of unnecessary data and streamlined processes, resulting in significant cost savings [2, 4]. The integration between business functions facilitates communication and information sharing, which leads to dramatic positive effects on productivity, efficiency and effectiveness (Fig. 1).



**Fig.1** Structure of ERP system and connections

In order to be qualified as an ERP solution, one system needs to be distinguished by [3, 8]: flexibility – to be able to adapt to the real needs of a business system; Modularity and open architecture - each module is intended for a specific business function and can be implemented on different hardware and software platforms; Availability - is available to all organizational units; Simulating the various business conditions - the prediction of the behavior of the system in certain, realistic business circumstances. This prediction is made by applying the appropriate domain simulation scenarios on real business data, defined by certain assumptions that are based on forecasts.

The implementation of the ERP system is a complex process. The key of success for this process is a high level of planning and coordination, as well as systematic and consistent phased approach in understanding the critical factors necessary for ERP implementation. Although there are different approaches to the implementation of ERP systems, a synthesized approach includes the following stages as key steps in the process: planning, analysis, projecting and design, implementation and testing, evaluation, support and maintenance [10].

## **4 ERP systems as information source for successful company management**

In the decision-making process the managers select from a predefined set of possible solutions to a defined problem. This process requires support from corporate and external information systems. The information used for decision-making should be accurate, timely, relevant, complete, well presented and economical. Systems that support the decision making process should provide benefits, such as reduced communication barriers, uncertainty and support decision-making. As an integrated system, with real benefits to increased efficiency and effectiveness in all business processes, ERP is the logical candidate to guide management processes such as planning and decision making at the tactical and strategic level. However, despite its enormous potential, the role of ERP systems in decision-making is not sufficiently exploited, since here the focus is on operational processes.

The decision-making process is not explicitly recognized as one of the main reasons for implementing ERP systems and the main objectives behind such big investment remain operational issues such as the elimination of conflicting information, reducing redundant data, standardization of business processes and increased efficiency in managing transactions. However, operational challenges have become less important as companies mature in their process of adaptation and vendors gain more experience and awareness of the design and effective implementation of ERP systems. As a result, companies that originally implemented ERP, to overcome the operational and transactional problems tend to subsequently underpin their expectations with more strategic advantages, like improving systems in order to help the decision making. Some users claim that companies using ERP systems become more mature by implementing ERP achieve operational objectives and begin to consider the possibility of expanding their investments towards more strategic advantages, such as BAM, BPM and analysis of information activity [9, 11].

## **5 Case study: ERP implementation in practice**

The research made for the purposes of this paper explore the process of selection and implementation of ERP software solution in "Mermeren Kombinat" - Prilep, Macedonia. The research was done by a programming aspect, analyzing the practices of companies that have long term experience in implementing ERP system.

### **5.1 An overview of the company's current state**

After the process of privatization, the company's management concluded that it has insufficient information to successfully manage the company. The legacy software in the company satisfies the needs for accounting, production operations and operation of CNC machines. Therefore, there was no visibility of processes and operations that were performed in the company; there was no unified database that would generate operational reports, there was a lack of a system that monitors the production and processing of raw materials. There was no information about the quantities and

clients. For the new management, this was a huge problem. They searched for a solution in the implementation of ERP system which, beside timely information, should bring greater company goodwill. In this case, management decided not to apply full scientific methodology for Change management [7], but to use only a short version of Project management in CM, shortened by engaging external consultants.

## **5.2 Selection of ERP solution**

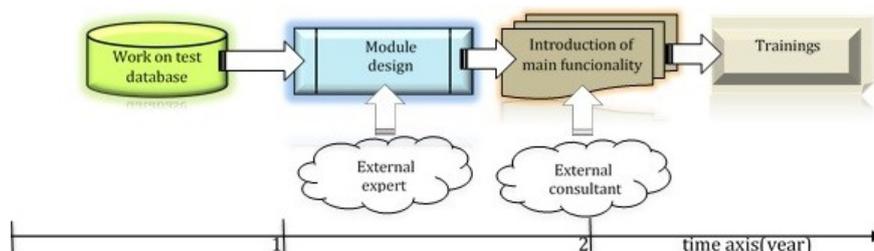
For this purpose more software packages as possible ERP solutions were reviewed. The solution was selected from offered ERP based on their functionality, rating in the local and world frameworks and customers support that was offered in the region. A team of IT partners and representatives from the departments of the company reviewed submitted ERP software solutions. Three ERP solutions were short-listed: Microsoft Dynamics Navision, SAP ERP and Panteon, local integrated application made by Datalab - Serbia. Panteon ERP solution was dropped from the selection due to the unsatisfactory support for these areas. SAP R / 3 software package by SAP AG is a modern client/server solution that sets new standards for business management solutions. The main advantage of SAP ERP is the high level of integration through the individual applications that ensure data consistency and application of experience from large companies for BPM, BAM and BI standards. Standard SAP system is divided into three areas: development environment, quality assurance and production. This solution requires high commitment to the implementation and has higher cost compared to the other two offered solutions. For this reason, the selected solution was MS Dynamics Navision.

Microsoft Dynamics Navision (MsD Nav) includes integrated systems for resource planning such as Microsoft Dynamics AX, Microsoft Dynamics GP, Microsoft Dynamics SL and business applications Microsoft Dynamics CRM, Microsoft Dynamics RSM and Marketing Pilot. Among other things, the advantage of this ERP solution is that collaborators of Microsoft Dynamics Nav have full access to the business logic and software source code and can adapt to the corporate needs more easily. MsD Nav [12] has a lot of partners who can be engaged as consultants in the implementation of the ERP solution.

## **5.3 Challenges in MS Dynamic Navision implementation**

Numerous problems appeared during the implementation of MsD NAV solution. Some of them are due to the decision to work on a test basis for more than a year. The aim was for the employees to be better trained and to get used to the operation of the new system, so that they will be able to run a live database without problems. This led to prolonging the implementation period to 2.5 years, which is a common practice in ERP implementation. However, because of the long period of time, employees continued to make mistakes. Although there have been rules introduced to minimize errors and to correct them, the percentage of errors did not decrease. The second detected problem, which was the prolonged period of 2.5 years, was due to the

insufficient number of developers available for the implementation. From the programmers' point of view, in the implementation of the modules required for a company with good development plan, there should not be problems and complications. The biggest challenge was designing the modules for manufacturing and accounting and their flawless operation under national legislation. For this reason, the company hired an expert to implement the ERP solution whose task was to ensure the process of developing modules in the company take place smoothly and without problems with the ultimate aim to reduce the time of implementation. This management act proved to be very successful. The company employed external consultants who helped the teams in the introduction of the main functionalities of the ERP system - generating reports from data. By taking these steps, the complex situation of the ERP implementation of the company had improved (Fig. 2). Another challenge that should be mentioned is the non-acceptance of the new system by employees and permanent doubt. It is a real problem manufacturers face in each implementation of ERP system. It takes patience and trainings.



**Fig.2** Time axes of ERP system implementation in the company

The application of ERP system in the company after the implementation was analyzed, according to used modules and their utilization. This analysis was the subject of a comparison with the application of ERP systems in Greece. We considered data from internet research on the situation of the use of ERP systems in Greece and compared it with obtained data from our company [6].

The analysis of the results of the survey showed that, while a key module in the implementation of ERP systems in companies in Greece is accounting [6], in our case study, some of the remaining modules were also active, in particular module production (80.3%), whose implementation took several years and module supply (88.8%). The ratio of the functionality of the modules in the target company is shown in Table 1, which was obtained as a statistical report from the ERP system, MsD Nav.

**Table 1** The most used modules of ERP in the company: 1-Finance and accounting, 2-Supply management, 3-Production control, 4-Costs, 5-Fixed assets, 6-Taxes, 7-Logistics, 8-Sale and Marketing 9-Quality management, 10- e-commerce

Module	1	2	3	4	5	6	7	8	9	10
% of usage	95,9 %	88,9 %	80,3 %	75,1 %	71,4 %	69,3 %	57,5 %	40,6 %	19,8 %	11,5 %

Analysis of the results of the implementation of ERP system as well as the online survey [6] show that the implementation of the ERP system in accounting does not contribute to reducing the number of employees in this sector, which corresponds with the results of a similar research by O'Leary [5] 2004. This research also found that the use of ERP systems in accounting has no effect on reducing the number of employees in the accounting department. In the target company in the Republic of Macedonia, the team in this department had increased by one member. The ERP system did not reduce the volume of data entry for operators, but facilitated receiving reports and improved data accuracy. The biggest benefit of implementing an ERP system management is the visibility of the data and receiving accurate and timely reports for the Board of Directors.

Jet Report [12] is used for generating reports, which is associated with MS Excel and provides direct data flow from MsD Nav database and processes complex reports. Reports contain advanced analysis, statistical and mathematical functions and visual display or dashboards. This tool is a perfect addition to any ERP system, but it has to be purchased with a separate license. According to top management, the acquisition of Jet Report is an excellent investment.

The general manager and the person responsible for the ERP system claim that complex reports that took a few days to prepare are now received in a matter of seconds. With the help of Jet Report, data from the database directly loaded and errors were reduced from 65.8% before implementation to 15.3% after, with a tendency to decline. Commonly used in company reports are those that show the movement of profits and budget, an overview of sales per employee, sales report and employee salaries report. When creating reports, Jet Report shortens the time end users spend for at least 3 hours a week, 12 hours per month or 144 hours per year. These are significant time savings per employee annually, which allows diverting the rest of the staff time to other activities required by the company.

Although the analysis of the overall ERP investment proved it long and hard process, the general manager said that this process has contributed to improving the visibility and availability of data in real time and increasing accuracy, which justifies the investment. According to him, it is "Investment which justified the money and provided mitigating circumstances that were expected." The overview of the cost of implementation of the ERP system and the period after that is given in Fig.3.

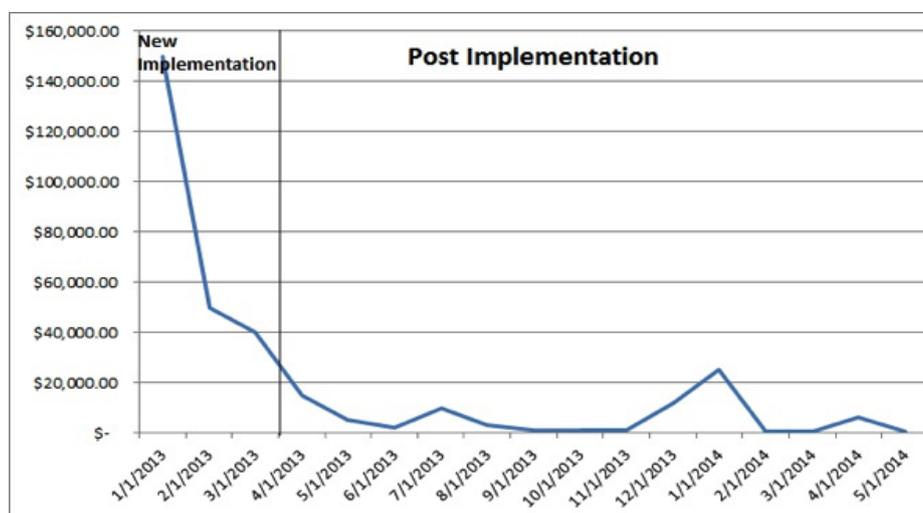


Fig.3 Overview of costs of ERP implementation during and after

## 6 Conclusions and recommendation

Competitive business environment in Macedonia inevitably entails the use of ERP systems as the corporate strategic weapons. Although shy, ERP systems are implemented in several companies in Macedonia. This paper analyses the use of ERP systems in Macedonia, clarifies the process of implementation of ERP system, the benefits, the challenges and the disadvantages in this process. Careful study of the theoretical bases for the functioning of an ERP system and current trends in this field help in the planning and implementation of the ERP system in the company and its successful implementation. According to the established need, the target company made the choice for ERP system and this system was implemented. The result from the implementation is receiving reports that are helpful to the managers in decision-making. The accuracy and timeliness of data is greatly enhanced by the successful implementation of the ERP system, which leads us to a conclusion that the objectives of the implementation of the ERP system are achieved. The plan for a new investment is to connect this ERP system to the new GPS system to monitor machines.

The company management is deeply convinced that the acquisition of this software is an investment whose return on assets is seen through visible and invisible benefits one of which is the enormous visibility of all processes that did not previously exist. This fact helps in planning and decision-making, which shows that ERP is indispensable for the efficient functioning of the company.

The example of several Macedonian companies shows that successful brands have managed to implement ERP systems since the year 2000 and achieved the objectives of implementation. With great commitment of top management and implementation teams, several major Macedonian companies are leaders in ERP implementation.

They implement new modules because they understand the power of information and knowledge they carry.

## References

1. Appleton, E.L.: How to survive ERP, *Datamation*, 43(3), (1997), 50-53
2. Brakely, H.H.: What makes ERP effective?, *Manufacturing Systems*, 17(3),(1999), 120
3. Al-Mashari, M.: Enterprise resource planning (ERP) systems: a research agenda, *Industrial Management & Data Systems* Vol.103 N.1, (2003), 22-27
4. Bernroider, E. and Koch, S.: ERP selection process in mid-size and large organizations, *Business Process Management Journal* 7(3), (2001), 251-257
5. Daniel E. O'L.: *ERP Systems: Systems, Life Cycle, E-commerce, and Risk*, 2000
6. Kanellou A., Spathis C.: Accounting Benefits and Satisfaction in an ERP Environment, *International Journal of Accounting Information Systems*, Volume 14, Issue 3, September 2013, (2013), 209-234
7. Kaloyanova K., Mitreva E.: A Comparison of Change Management Implementation in ITIL, CMMI and Project Management, *ISGT'2012, Sofija*, ISSN 1314-4855,(2012)
8. Sumner M.: *Enterprise Resource Planning*, Prentice Hall, (2005)
9. Sharma P.: *Enterprise Resource Planning*. Aph Publishing Corporation, Newdelhi, APH Publishing Corporation, (2004)
10. Savoska S., *Upravuvanje so informacii i odlucuvanje*, Chapter 2, FAMIS, UKLO, Bitola, (2013)
11. Kaunas University of Technology, <http://www.ktu.lt/lt/mokslas/zurnalai/ekovad/15/1822-6515-2010-691.pdf>, 21.4.2015
12. <http://social.technet.microsoft.com/wiki/contents/articles/18248.microsoft-dynamics-nav-overview.aspx>. 10.1.2015