Critical Success Factors for ERP Implementation

PhD candidate Yanko Georgiev
University of Economics - Varna, Varna, Bulgaria
yanko_georgiev@ue-varna.bg

Abstract

ERP systems, representing a software solution designed and created to cover the entire activity of the enterprise, can be defined as highly complex systems. This makes their implementation an even more complex process, requiring in-depth knowledge of the business processes in the company and its various departments, as well as the ERP system, with its capabilities and limitations. The implementation of such a software solution, no matter who the implementer is and in which enterprise it is implemented, is a complex and time-consuming project. And its successful finalization depends to a large extent on the knowledge of the implementation processes and the critical factors for success.

Keywords: Enterprise Resource Planning, ERP, implementation processes, software, Critical Success Factors

JEL Code: A00

Introduction

ERP (Enterprise Recourse Planning) systems have long been known in economic circles and are increasingly used in practice. Their study began in the early 1990s. As a result, a number of definitions have been derived, one of which states that "enterprise resource planning (ERP) systems can be defined as the implementation of standard software modules for core business processes, usually combined with individual customization for competitive differentiation. The aim is to ensure breadth of integration and depth of functionality in multifunctional and often multinational organizations." (Skok et al, 2002). Apart from the theoretical orientation, their main goal is practical applicability, which is reflected in the development of software systems, but before moving on to the use of these systems, one must go through the complex processes of their implementation.

The purpose of this report is to consider the nature of the processes of implementation of ERP systems, the main problems facing companies involved in the implementation of such a project, as well as the critical success factors in the implementation of a project for the implementation of such software. Examining the questions asked, we will be able to answer what the process of is implementing an ERP system and how can increase the chances of success in the project.

1. Theoretical foundations of the processes and problems facing the implementation of ERP systems

Modern enterprises operate in an increasingly competitive environment and face a growing number of challenges. On the one hand, they have to deal with the consequences of the pandemic caused by Covid 19, and on the other hand, with increasing competition and increasingly demanding consumers. Forced to cope with these challenges and as a consequence of the development of information technology, managers must decide whether to use internally developed software solutions or to implement specialized software. Such are ERP software, which solves a number of chronic problems of internally developed systems, namely low costs, fast implementation and high quality (Laudon et al, 1996). However, it should be borne in mind that ERP systems are not a panacea and their use does not automatically solve all problems and achieve a competitive advantage, on the contrary, they also pose risks such as uncertainty in their acquisition and hidden costs of their implementation. (Hong et al, 2002). Another problem cited as the reason for failures in the implementation of ERP software is that it is a relatively unpredictable process (Griffith et al, 1999). This unpredictability is determined by the need for interaction between information technology and the organization (Markus et al, 1988).

These risks are also proven by studies. It has been found that 3/4 of ERP implementation projects are identified as unsuccessful by the enterprises carrying out the implementation itself (Griffith, 1999). More recent studies show that 96.4% of ERP implementation projects have failed (Rao, 2000) and 70% do not reach the expected benefits (Al-Mashari, 2000). The same results are confirmed by a study conducted in 2009, according to which 70% of projects for the implementation of ERP systems in small and medium enterprises (SMEs) are unsuccessful (Iskanius, 2009). Another study conducted among 64 Fortune 500 companies found that 25% of them had problems with a malfunctioning ERP system in the period after its implementation (Ha et al, 2014).

Since the share of unsuccessful projects in the implementation of ERP systems is so large, what are the factors that can help the success of the project?

Speaking of the implementation of ERP systems, it should be noted that in the specialized literature "most methodologies encourage implementers to see the implementation as a standard project with a beginning and end and composed of different stages, and not so much as an implementation program (Ahmad et al, 2013). On the other hand, as noted by N. Slack, S. Chambers, and R. Johnston, there is a clear distinction between project and program; the project is a set of activities with defined starting and ending points, which have a specific goal or result and use certain resources; the implementation program is a long process that has no definite end. Accordingly, the implementation of ERP cannot be treated as a project or a temporary process but should be considered as a dynamic and continuous process, without end (Slack et al, 2010). Here we see two different opinions, according to the first implementation of ERP is a process that ends with the implementation of the program and is rather a project to implement the system. On the other hand, there is the thesis that the implementation should not be considered as a defined sequence of activities, after the implementation of which and the commissioning of the ERP system the project is completed. In this case, the implementation of an ERP system is not a project with a clearly defined goal and end, but rather a non-stop process, which continues to work after the implementation of the system.

A study conducted by Metagroup and cited by M. Ahmad and R. Cuenca showed that 36.2% of participants disbanded ERP implementation teams after the program was launched. As a result, companies have experienced the negative effect of losing business processes and IT compatibility, and this incompatibility has continued to increase (Ahmad et al, 2013). This study confirms the claim that the implementation of an ERP system cannot be considered as a project with a beginning and an end. The termination of the project, even after reaching the initially set goals, leads to a deterioration of the achieved results. The implementation of ERP software is not the implementation of a finite number of steps and processes, after which the system is put into operation, and the company benefits from the positive results of its implementation, it must be treated as a continuous process, adapting to the internal and external company environment. Speaking of an ERP system implementation project, we go beyond a standard project with start and end and define it as a continuous process that does not end with the start of work with the software, but should continue throughout the life of the enterprise if we want to achieve a positive effect and synergy between business processes and information technology that support and manage them.

While the implementation of an ERP system is defined as a process, the etymology of the word itself defines it as "implementing a plan in action or starting to use something" (software in this case). And since we are talking about the implementation of a plan, it should be composed of different steps, which are the processes of implementing ERP software. As already mentioned, ERPs are used in enterprises from different industries around the world and no identity can be outlined in their activities and any implementation of software should be adapted to the organization in which it is implemented. Thus, it is not possible to determine precise and clear steps that will lead to the successful implementation of the project, but factors can be identified that will help achieve positive results.

Before embarking on the implementation of ERP class software, it must be decided which

manufacturer and which ERP system will be used in the enterprise. The main criterion used for decision making is the compatibility of the ERP system with current business processes (Everdingen et al, 2000). This compatibility is key to the successful implementation of ERP systems. For example, there is an opinion that the compatibility between organizations and ERP is the lowest in Asia because the processes embedded in the software are influenced and organized in relation to European and American industries, which differ from Asian business practices (Soh et al, 2000). It is the influence exerted on the development and development of the software that indicates how crucial its compatibility with the processes of the enterprise in which it is implemented is.

ERP manufacturers, distributors and consulting firms point out that software is developed according to generally accepted "good practices" and should be implemented without significant developments and functional changes (Bancroft et al, 1998). At the same time, in academia, there is an opinion that the concept of "good practices" is illusory and potentially dangerous, because ERP does not provide a model for all processes, in all industries and most companies change or add new features to the software, optimizing it for his own organization (Swan et al, 1999).

We must also take into account the fact that the development of ERP applies an approach and focus to the organization of processes, rather than the development of specific functionalities. For this reason, the implementation should be seen as an activity with a wide range of organizational changes, and not so much as software installation. This type of activity requires changes in the socio-technical system of the enterprise, including technologies, tasks, people, structure and company culture in the organization (Davis et al, 1985). And resistance to this change is key to the success of ERP implementation.

2. Critical factors for the success of ERP system implementation

The implementation of an ERP system is a complex process that is influenced by a wide range of external and internal factors. This cannot be defined as a standard project given a large number of stages it goes through. It includes the steps of choosing a system, manufacturer and implementer of the software, conducting stages of research and building a working model, adapting the enterprise and the system to each other and commissioning of the final working product, approved by all involved participants. The ERP system, in its essence, is software aimed at covering and optimizing the overall activity of the enterprise. The need for interaction between the information systems and the respective IT department and all other structural units of the enterprise, make the implementation of an ERP system even more difficult to implement. The implementation of such a system requires the effective participation of the entire organization (Ahmad et al, 2013). And although many of the problems facing such a project are well known both in the scientific world and in practice, a significant proportion of companies underestimate the factors influencing the implementation of an ERP system. This underestimation can lead to a poorly implemented project, with a partially or poorly implemented system, and sometimes to failure and termination of the project. In any case, these are costs for all parties involved in the implementation that management would like to avoid.

J. Rockart presents Critical Success Factors (CSFs), defining them as a limited set of areas that, if satisfactory, will provide a positive performance for the entire organization. These are a few key areas where things need to go well for business to work (Forster et al, 1989). If the results in these areas are not satisfactory, the achievements of the organization will not be desirable. Therefore, for the successful implementation of the ERP system and respectively the improvement of the overall activity of the enterprise, it is necessary to know the key factors for success, as they have a great influence on the implementation of the project and the achievement of high results.

Since J. Rockart published his study, a number of studies have been conducted to determine the key success factors in the implementation of ERP systems. T. M. Somers and K. Nelson analyzed the scientific literature concerning IT implementation, business processes, project implementation, and ERP systems implementation in 110 companies and based on the collected data identified 22 key success factors (Somers et al, 2001). Another study identified as important is

the study by J. Esteves-Sousa and J. Pastor-Collado, in which they developed a unified model of key success factors and analyzed their impact during the various stages of ERP systems implementation. Their research was done among 50 scientific papers related to the identification of key success factors in the implementation of ERP systems (Esteves-Sousa et al, 2000). Based on the results of these studies and an analysis of the scientific literature by M. Ahmad and R. Pinedo Cuenca, they list the main key success factors presented in Table 2.

Table 2. Critical factors for the success of ERP system implementation (Ahmad et al, 2013)

№	Key Success Factors (CSFs)	Manifestation (%)
1	Good project scope management	26,32
2	Management expectations	21,05
3	Formalized project plan / schedule	63,16
4	Project management	68,42
5	Steering Committee	26,32
6	Heredity	36,84
7	Cultural changes / political issues	57,89
8	Business process reengineering	78,95
9	Experience of the project manager	63,16
10	Project leader	47,37
11	Adequate resources	42,11
12	Trust between partners	15,79
13	Communication between departments	84,21
14	Cooperation between departments	73,86
15	Project team skills	78,95
16	Authorized to make decisions	15,79
17	Support and dedication to managers	100,00
18	Monitoring and evaluation of progress	68,42
19	Appropriate use of consultants	57,89
20	Implementer tools	21,05
21	Management of consultants	21,05
22	Software processing	36,84
23	Software configuration	31,58
24	Appropriate technologies	26,36
25	Troubleshooting the project	42,11
26	Software training	52,63
27	Training in new business processes	42,11
28	Implementer support	26,32
29	Data analysis and conversion	15,79
30	Strategy for ERP implementation	63,16
31	Well-defined system requirements	52,63
32	Adequate choice of ERP system	52,63
33	Clear goals and results	68,42

Table 2 lists 33 key success factors in implementing ERP software, and the Manifestation column shows the percentage of each of the presented factors in the scientific literature. For example, it can be pointed out that factors such as Support and commitment of managers, Communication between departments, Cooperation between departments, Project team skills, Business process reengineering are identified as some of the most important key factors for the success of the project. implementation of ERP system and occur in the range of 73% to 100% in the scientific literature examining the implementation of ERP software. This does not mean that the other factors derived are not important and should not be taken into account. Each of them is important once it is listed as a key one. This percentage shows only the importance of individual factors according to the authors of various studies, but it should be borne in mind that each implementation of an ERP system is an individual project and the importance of individual CSFs may vary.

The same results are confirmed by a study conducted by F. Nah and S. Delgado, as a result of which they bring out the Skills and composition of the project team, Top Management Support, Communication, Change Management, Project Management, Systems Analysis and Technical implementation, Business plan and vision for the project (Nah et al, 2006) as key and most significant factors contributing to the successful implementation of a project to implement an ERP system. The research was conducted among companies and direct participants in projects that have implemented a real implementation of ERP systems. It is also a practical confirmation of research classifying the key factors for success. That is, the same conclusions made in the scientific literature are observed in practice.

It should be noted here that the previously cited study by TM Somers and K. Nelson came to the same results in the classification of the most important key success factors, the results being close to those of F. Nah and S. Delgado and also confirmed by M. Ahmad and R. Pinedo Cuenca. Thus, we could derive a summary result for the five most important CSFs:

- Support and dedication of the managers.
- Team skills and abilities.
- Change management/reengineering of business processes
- Communication and cooperation between departments.
- Project management and tracking of results.

Deriving these five most important key factors for success, we should look at them differently and define their meaning.

The support and dedication of managers, both middle and high level, is essential for the success of any project and in particular for the implementation of an ERP system. The role of top management in implementing an IT solution includes understanding the capabilities and limitations of information technology, establishing achievable goals for the system, showing a strong commitment to the project and bringing the IT strategy to the attention of all employees (McKersie et al, 1991). Accordingly, non-fulfilment of these obligations or their delegation to a lower employee may lead to failure or termination of the project. Demonstrating commitment to the project by senior management has a direct impact on the commitment of other employees of the company and reduces resistance to its implementation.

The skills and abilities of the team are of particular importance not only for the successful implementation of the project but also for achieving optimal results. Earlier in the presentation, we noted that the implementation of the ERP system affects all departments of the company and as a project of a similar scale, team members are required to know the business processes, the organizational structure of the company and understand the goals. ERP projects are usually a

combination of business processes, information technology, project implementer and project consultants (Esteves-Sousa, et al, 2000). And this requires properly selected specialists in each field.

Often, ERP implementation requires a fit between the software and the organization. On the one hand, changes are required in the software, and on the other hand in the enterprise and the processes taking place in it. Managing change and reengineering business processes is such an important factor for success because it aims to organize the necessary changes in a way that is suitable for both the manufacturer or implementer of the software and the enterprise in which it is implemented. The aim is to achieve a balance in which the interests of both parties are preserved, and in the meantime, the best results are achieved.

Communication and cooperation between departments is a key factor for success, due to the very nature of ERP systems. This is software that covers all departments of the enterprise and without adequately established communication and cooperation between all units of the organization can not build a working unified system. Speaking of communication and cooperation, it should be noted that in addition to between departments, they must be carried out internally in teams, but also throughout the chain of the organization. Results and problems should be discussed at the enterprise level, not just between departments, and this process should accompany each stage of implementation. Or, as K. Schwalbe puts it, communication is the oil that makes everything go smoothly (Schwalbe, 2000).

Project management is not an activity typical only for the implementation of an ERP system but has been a part of economic life for a long time. Project management is defined as the application of knowledge, skills, tools and techniques to project activities to achieve the project objectives (Schwalbe, 2008). The need and complexity of project management are also determined by their size. The combination of software, hardware, equipment, human resources and different processes makes ERP projects large and complex, and this implies the need for more skills to manage them. On the one hand, it is required to clearly and specifically define the scope of the project, the set goals and the desired results, and at the same time to follow each stage and the achieved. Project management requires an understanding of both the technical aspects and limitations of the software, as well as the resources available to the enterprise and the processes to be covered. This is an extremely important factor for success and if the project is not well managed, with a clearly defined plan, steps and stages, it can lead to deterioration of the result, and even to the termination of the implementation of the ERP system. For this reason, the selection of a project manager should be approached with great responsibility.

Although considering the five most important key factors for success in the implementation of ERP systems, it should be borne in mind that the others, presented earlier in the presentation, have a significant impact, and it depends largely on factors such as enterprise selected ERP software, external and internal environmental factors. Each CSFs influences the final result of the project and the achievement of positive results on them increases the positive result of the implementation of ERP and supports the successful start of the system.

As a result of the study we could draw the following conclusions:

First, the concept of implementation of ERP systems means all ongoing processes in the enterprise for the preparation and implementation of selected ERP software, including the steps to select a system, manufacturer and implementer of software. In the process of implementation, a decision is made whether to use only existing functions of the selected system or to develop new ones.

Second, the implementation should be seen as an activity with a wide range of

organizational changes, not so much as software installation. This type of activity requires changes in the socio-technical system of the enterprise, including technology, tasks, people, structure and company culture in the organization.

Third, knowledge of the stages of implementation of ERP systems allows companies wishing to integrate such a system to better anticipate the scope of the project, the expected problems and difficulties and to more accurately systematize the expected results, minimizing the difference between expected and achieved goals.

Fourth, there are several key success factors, knowledge of which can lead to better results. Underestimating or ignorance of these factors, in addition to worsening the results achieved, may lead to the complete termination of the ERP implementation project.

Conclusion

From the very creation of computer systems, business and science began to seek the application of modern technologies in economic circles. Supporting and optimizing the activities of the enterprise is a key aspect of the possibilities for the use of information technology, and software is an important tool for achieving these goals. ERP systems are the modern solution for organizing, managing and controlling the activity of enterprises from each economic sphere. The application of these systems is becoming more widespread, and the benefits of their use are visible to a wider range of managers.

The rapid development of information technology leads to poor knowledge and lack of knowledge necessary for the successful implementation of software solutions. This is the reason why the scientific literature has been dealing with the problem of implementing ERP systems for years. The research in the direction of defining the critical factors for the success and their manifestation in the stage of realization of a project for implementation of an ERP system carries important information both for the producers and implementers of software, as well as for its users. Knowing the critical factors for success is an important step towards increasing the percentage of successfully completed projects for the implementation of ERP systems and a step towards their wider use in practice.

References

1. Ahmad, M. Munir, and Ruben Pinedo Cuenca. “Critical Success Factors for ERP Implementation in SMEs.” *Robotics and Computer-Integrated Manufacturing*, vol. 29, no. 3, June 2013, pp. 104–111.
2. Al-Mashari, Majed. Association for Information Systems AIS Electronic Library (AISeL) Constructs of Process Change Management in ERP Context: A Focus on SAP R/3. 2000.
3. Bancroft, N., Seip, H., Sprengel, A. (1998) *Implementing SAP R/3*, 2nd Edition, Manning Publications, Greenwich, CT.
4. Davis G. B., M. H. Olson (1985) *Management Information Systems*, McGraw-Hill, New York.
5. Esteves-Sousa, J., Pastor-Collado, J. (2000) Towards the unification of critical success factors for ERP implementations. // In Annual Business Information Technology (BIT) 2000 Conference, Manchester, UK (Vol. 44).
6. Everdingen Y., Hillergersberg, J., Waarts, E. (2000) ERP adaptation by European midsize companies, Communications of the ACM 43 (3).
7. Forster, Nancy S., et al. (1989) Critical success factors: an annotated bibliography.
8. Griffith, T. L., Zammuto, R. F., Aiman-Smith, L. (1999) Why new technologies fail? Industrial management.

9. Ha, Y., Ahn, H. (2014) Factors affecting the performance of enterprise resource planning (ERP) systems in the post-implementation stage. Behaviour & Information Technology, 33(10).
10. Hong, K. K., Kim, Y. G. (2002) Information & Management 40, The critical success factors for ERP implementation: an organizational fit perspective.
11. Iskanius, P. (2009) Risk management in ERP project in the context of SMEs. Engineering Letters. 17.
12. Laudon, K. C., Laudon, J. P. (1996) Management information Systems: Organization and Technology, Prentice-Hall, Englewood Cliffs, NJ.
13. Markus, L. M., Tanis, C., Van Fenema, P. (2000) Multisite ERP implementations, Communications of the ACM, April.
14. McKersie, R. B., Walton, R. E. (1991) Organizational Change in M. S. Scott Morton, The Corporation of the 1990s: Information Technology and Organizational Transformation, NY: Oxford University Press.
15. Nah, F. F. H., Delgado, S. (2000) Critical success factors for enterprise resource planning implementation and upgrade. // Journal of Computer Information Systems, 2006, 46(5).
16. Rao, S., Enterprise resource planning: business needs and technologies. Industrial Management & Data Systems.
17. Schwalbe, K. (2008) Information Technology Project Management, Reprint. Cengage learning.
18. Shcwalbe, K. (2000) Information Technology Project Management, Course Technology, Cambridge, MA.
19. Soh, C., Kien, S. S., Tay-Yap, J. (2000) Cultural fits and misfits: is ERP a universal solution? Communications of the ACM 43 (3).
20. Somers, T. M. and Nelson, K. (2001) "The impact of critical success factors across the stages of enterprise resource planning implementations," Proceedings of the 34th Annual Hawaii International Conference on System Sciences, Maui, HI, USA.
21. Swan, J., Newell, S., Robertson, M. (1999) The illusion of “best practice” in information systems for operations management, European Journal of Information Systems 8.
22. Sweat, J. (1998) ERP: enterprise applications suits are becoming a focal point of business and technology planning, Information Week.
23. Volkoff, O. (1999) Enterprise system implementation: a process of individual metamorphosis, American Conference on Information Systems.