

ANALYSIS OF THE FACTORS OF ERP SOLUTIONS IMPLEMENTATION IN ENTERPRISE

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Abstract—In this paper, we give a concise studios overview and presentation of the key factors of the success in ERP implementation projects with causes of unsuccessful implementations in practice. Main goal of ERP system implementation project in particular deadline with limited costs and capacities, also the goal is successfully implemented integrated programme package, which covers enterprise's business. This research presents systematic concepts in relation to the problem of introduction and implementation of ERP, metrics of responsibility on the project, measurements and observation of implementation project and introduction of management information system in enterprises.

Keywords—Management, Information systems, Management information systems.

I. INTRODUCTION

MANY things are written about the failure of information systems implementation projects. Bad technical methods are only one of the reasons for the failure of designing, and that is relevantly minor in relation to more significant issues such as communication systems and inefficient leadership and management. Numerous authors such as Parr and Shanks (2000) [1] then Bingi, Sharma and Godla [2] (1999) attribute the success of ERP implementation to numerous factors. In order to explain why are some ERP implementation projects successful or unsuccessful, different authors use the so-called method of „Critical Success Factors (CSFs). This approach is particularly suitable for the analysis of ERP project success because it provides frameworks for simultaneous monitoring of the impact of tactical, technical and strategic factors, which provide success or failure of ERP solution implementation. Analysis based on CSF provides:

- Determination of key role in organization, which affects the implementation process,
- Determination of the importance of changes in business processes and adaptation of programme solution [3].

II. CRITICAL FACTORS OF ERP SOLUTIONS IMPLEMENTATION SUCCESS

Salvin and Pinto (1987) [4] have presented a project implementation profile, which contains ten standpoints of critical success factors set in strategically-tactical framework. This framework was upgraded and developed by years and experience based on knowledge of various authors and experts, who have participated in implementation and studying of ERP solutions implementation projects in different enterprises and business systems.

Critical factors of success are accordingly divided into:

- Critical success factors in the phase of planning – strategic level of project implementation,
- Critical factors in execution phase, the phase of action-tactical level of project implementation.

Strategic level defines the needs of planning and refers to the support of top management. It also determines deadlines for execution of individual sub-phases of ERP solution implementation project. This beginning is important in initial phase of project execution.

Importance of *tactical level* is reflected in the continuation of project because it includes communication of all the parties included in project, renewal of the need for people in project team and obtaining appropriate skills and knowledge that will serve in further steps of ERP solution implementation, observed from technical standpoint. Precisely that is tactical beginning of ERP solutions implementation for activities included, which are confirmed by the capacity of acquisition, individual phases of sub-phases by the users, monitoring of the execution of activities, feedback on the situation of the project in individual phase, informing key persons who are directly responsible for the success of project implementation and solving urgent issues, which appear in individual phases on the ERP solution implementation project.

If the projects are well-executed both on strategic and tactical level, they are basically more or less successfully

executed projects. Researches, as well as some experts from the field of economic-financial cost effectiveness, show a critical attitude towards the practice in Serbia, advocating for higher level of professionalism in this field.

Determination of critical success factors is a reliable way that helps us to determine whether information system implementation project in the enterprise is successful or unsuccessful.

ERP implementation process is shown in the following table 1.

One of the useful tasks, based on mentioned analyzed literature [5], which is easily performed before moving to project implementation, as well as risk evaluation on the other hand. In the first example, it is easy to develop responsibility metrics. The example is mentioned in the following table 2.

Table 1:- Framework of critical success factors in ERP solutions implementation

Strategic level	Tactical level
Existing information system	Conversation with users
Business vision	Persons on the project
ERP strategy	Change of business processes and engagement of programme solution
Support of top management	Ability to adopt from the part of user Monitoring and providing feedback Communication between all participants in the project Solving urgent issues

Source: (Graeme Shanks GS, Peter B.Seddon, PBS Leslie P.Willcocks, LPW,(ed).2003, Second-Wave Enterprise resource Planning Systems, Cambridge, United Kingdom, Cambridge University Press pp.184).

Table 2:- Responsibility metrics on the project

	PL	LE	PS	FSP
Goals definition	I		P	
Requirements of a new information system	S	O	P	S
Draft preparation-document	I	S	P	P
Project organization determination	O	S	P	
Determination of resources, team leaders, motivation of participants in the project	O	S	S	
Management and monitoring of costs	S		P	S
Taking measures in case of deviation	O	S	P	S
Time monitoring of project	S	S	P	
Quality monitoring	S	S		
Communication	O	S		
Report on the flow of project	I	S		
Project conclusion – report	I		P	P

Legend: PL-project leader, E- execution, LE-leader of project executors, C-confirmation, PS-project supervisor, C-cooperates, FSP-financial supervisor of the project, R-provides responses.

III.MEASURES AND OBSERVATION, MYNIS PROJECT IMPLEMENTATION IN NIS, JSC NOVI SAD

For the purpose of research in this paper, appropriate measurements in NIS JSC Novi Sad were carried out, which show the satisfaction of users with new user interface in comparison to the old one. Samples were taken from forty users in NIS JSC Novi Sad. Mode of operating or executing the measurements was carried out through conversation with users (approximately 30 minutes with key users), by filling the questionnaire in and observation. Although graphical surroundings of the new programme are rather changeable, we can easily conclude that the users were well-adapted to using the same. We can see that the users are actually dissatisfied

both with the use of old user interface and the old ERP solution. The reason for this is that user has done the old applications only a few months prior to the introduction of new application. In the continuation, there is an overview of questionnaire with specific questions answered by key users of project mySAP Business Suite, in NIS, part of the answers and results is given in the following table and figures, while the essence of observation and research is entirely shown in the continuation. We express the gratitude to management of NIS, which has, besides enormous work (implementation of myNIS project, restructuring of the company, process of privatizing the obligations towards SAP consultants etc). I have found the time and enabled the realization of above mentioned activities.

IV. QUESTIONNAIRE

1. What do you expect from the mySAP Business Suite implementation?
2. Whether myNIS project provides an insight into entire business of NIS JSC Novi Sad?
3. To what extent are you satisfied with the new ERP solution and new user interface?
4. Are you satisfied with the use of new graphical environment?
5. To what extent are you satisfied with the old ERP solution?
6. Are you satisfied with the use of old graphical environment-interface?
7. Whether mySAP Business Suite implementation will affect cost reduction?
8. How will the costs be recorded with new ERP solution?
9. Whether the implementation of a new ERP solution will make management of this company easier?
10. What has NIS obtained by the introduction of SAP business solution?
11. Whether sufficient availability of people in the project is provided?
12. Whether conditions for work are provided (XW, network, training,...)?
13. Whether connecting with process information systems is provided?
14. Whether continual IT training of all users is implemented?
15. Was there a proper communication and cooperation on implementation project?
16. Whether the organization in practice was in accordance with the recommendations of the project?
17. Whether company's management was actively included in implementation project?

Table 3: Evaluation of user interface

Measurement and formula	Interpretation of measurement	Type of metric scale	Type of measurement	Invested measurement
X={1,2,3} 1-entirely knows, 2-partially knows, 3- does not know	X=1 and X=2 is an acceptable answer	Ordinal scale	X=evaluation	Observation of users in work or questionnaire

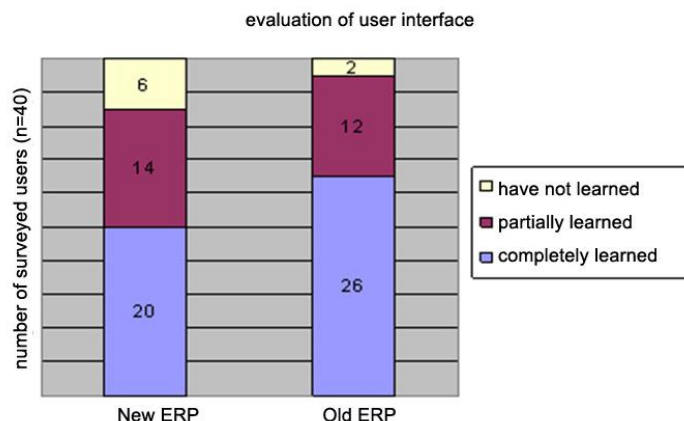


Fig. 1.- Evaluation of user interface-myNIS

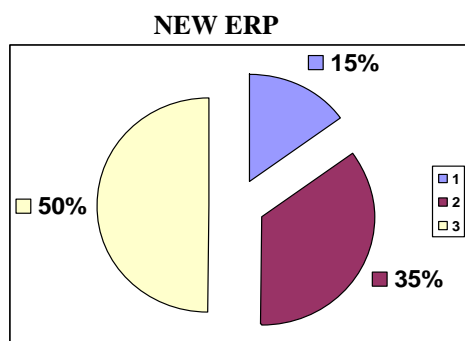


Fig. 2.- Overview of the evaluation of user interface of new ERP solution

¹-have not learned-6, ²-partially learned-14, ³-entirely learned-20

In the other example, a table is set, where we determine possible risks on projects, table is confirmed in practice as well and shown here.

Individual evaluations of the probability of problem occurrence are evaluated on the scale from 1 to 5, where 1 is small probability and 5 is high probability of the occurrence of the problems mentioned. Precisely in this way, on the scale from 1 to 5 the consequences are evaluated, where with 1 were evaluated the ones that cause slightest damage and 5 those that inflict the greatest damage. Risk result [6] is thus named risk

factor, which is a product of probability evaluation, as well as evaluation of consequences. Critical limit presents project team. That is usually when risk factor achieves value 15. Risk factors need to be observed through the entire time of the project. It is necessary to react without delay. In such example, urgent meeting of project supervisor and project leadership is required. On the meeting we determine possible solutions that need to be put in the function as rapid as possible.

In practice, very frequent opinion is that information system implementation project in business system is finished, if it is introduced in planned time framework. However, that is not the only measure for success of

implementation project. In the essence, this does not mean that one information system is successfully implemented in environment of some organization. In addition of time frameworks, it is also important that project is installed in such a way that functionalities of ERP solutions serve the intention, to support all the requirements that the users required and that were planned, i.e. specified through the process of analysis. In the end, this shows us the procedure of testing the information system, whose results are indicators of success or failure of introducing the information system. In the practice, very rare are the examples where such testing of information system is not performed at all.

Table 4: - Evaluation of work on project risk

Risks on the project	PR	EQ	RF	Possible solutions
Lack of resources	2	5	10	Check the resources and possible alternatives.
Team work	3	4	12	Cooperation with team members.
Support of leadership	5	5	25	Representatives of the project are included in all and warn about possible consequences of success or failure and on competition power.
Undefined expectations	4	3	12	Additional consultations with users, clear all dilemmas and uncertainties.
Staff qualifications	2	5	10	Prepare alternative solutions of selecting the staff, predicting reserve staff.
Motivation of people on the project	3	4	12	Precisely define the tasks of individuals, clear determination of goals, additional motivation in the form of financial means.
Resistance to changes	4	4	16	Precise determination of functions, provide the necessary help of consultants.
Appropriate leadership	2	5	10	Replacement of leader.
Appropriate executors	2	5	10	Thorough conversations and execution analysis, references, replacement of executors.
Appropriate communication	3	3	9	Increase informal part of communication between team members, appropriate determination of tasks of individual members on project, listen to clients, know to argument your decisions.
Non-national connection of project strategy	1	5	5	Revision of business plan, verification of harmonization between goals and execution activities.
Availability of planned staff	3	5	15	Supply the ones responsible for staff by attribution of primary resources.
Inadequate training of users	2	5	10	Thorough preparation of school material, listen to recipients, prepare them for active participation. Prepare training for real data of certain enterprise. Performance needs to be executed in the form of symposium whenever it is possible.
Application of business process	4	5	20	Business processes should always be adapted to ERP solution always when there is a chance, analyze the possibilities, costs and risks that is brought about by the adaptation of ERP solution to business process.
People teetering on the project	4	2	8	Well-define contractual and partnership relation, conversations on problems and possibilities of solving the same.
Solving the urgent problems	3	5	15	Urgent and effective decision-making, rapid approach to solving of urgent problems.
ERP solution application	4	4	16	Warn about the consequences of application, determination of the application range, application needs to be thoroughly documented, orderer needs to be familiar with costs that the application directly carries with it.

Legend: PR-probability for a potential problem to occur, EC-evaluation of consequences, when it comes to problem, RF-risk factor

V. CONCLUSION

From the standpoint of the one who proposes ERP solution, among other things we also consider the cost effectiveness of ERP solution, when we speak about success or failure of project implementation. Main issues of secure cost effectiveness are:

- Weak sales; ERP solution is sold to client, who has no benefit defined, what does he want to achieve by the introduction of ERP solution on one hand, and on the other hand that there are no financial means that provide the completion of such a project. Very often, problem of successful implementation of ERP solution is in poor management of the buyer since the very phase of selling activities.
- Poor control or supervision of ERP introduction projects; client or customer of ERP solution are not sufficiently included in cooperation on the project which results in:
 - Users not understanding which new ERP solution there is for their enterprise and thus they do not understand the need of employees to adapt to the new system.
 - Buyer is not actively included in project, from which it results that there are no possibilities of participation when making decisions related to the implementation of the new ERP solution.
- Lack of familiarity of business processes of orderer; reason for this can be lack of qualifications of the one who proposes the solution, as well as lack of patience and desire for as rapid as possible implementation of solution. In the end, it follows that the orderer should be given competitive advantage over competitors among the ones who propose the solution. Consequence is that in final phase we have dissatisfaction of the orderer due to too many hours spent in vain on solving the conflict with the orderers.

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