IMPLEMENTATION OF AN ERP - ANALYSIS AND RECOMMENDATIONS IN THE IT UNIT TESTING PHASE. A CASE STUDY (I).

BANȚA VIOREL-COSTIN
THE BUCHAREST UNIVERSITY OF ECONOMIC STUDIES
e-mail: viorel.banta@cig.ase.ro

Abstract

The purpose of this article - a case study conducted in the production area - is to bring into discussion a very important part / step, within a project of implementing an integrated system, in our case SAP – the step of performed IT unit tests (IT_BUT) from functional consultants – SAP FI module. Each stage of such a project is very important, collecting all the information from the existing phases, bringing greater clarity on the problems that have arisen, how they should be solved and what the conclusions are drawn from them. The author wishes to share these conclusions with those who are interested in this topic - the implementation of an ERP (Enterprise Resource Planning). All the case studies collected by the author during the experience gained in the numerous projects solved, will be topics discussed in the future scientific articles. Each topic addressed could be used later as a starting point in solving the many situations that have arisen. Each implementation had its particularities, each phase of the project, having its significance and priority. The unit testing part is one of the most important phases of such a project. We can distinguish here two important phases: the unit testing phase IT and the unit testing phase performed with the business environment. The unit tests performed with the business environment have the purpose of accepting the solution by the business environment, by signing, on each process analyzed, tested and debated, an acceptor, which will later become the guarantee that the implemented solution has been realized in the agreed terms. For each process will be created a script with all the steps performed, as well as the existing times and data, results. An important role in carrying out these tests will be the functional consultants together with the Key-users (if they are asked) mandated by the company that implemented the ERP solution, to perform these tests and to confirm that everything is fine.

Keywords: *Project, IT Unit Tests, Roll-out, ERP - Enterprise Resource Planning, SAP, SAP Functional consultants.*

Classification JEL: *C61, C81, M15, M41*

1. INTRODUCTION

The projects for the implementation of an ERP solution have exploded in Romania, after 1990. The cases met in their diversity, have captured several companies, local and multinational, consulting in this field of implementation of ERP solutions. And in this article, the author is dealing with an analysis of the processes performed, by a consulting company, within a stage of the project of implementing an ERP type solution, in a Romanian company, which operates in the area of production. This company has a variety of activities, from the sale, distribution, to the production side. Everything that the production part meant was extremely complicated to implement, the diversity of the products made here, leading to a very difficult analysis and implementation. In the specialized literature, the author has seen and read a series of cases, most of which, more interesting and which have brought to light a series of analyzes, on various topics, processes, stages, risks, difficulties encountered in such implementations, nationally and internationally [1].

What the author considers in this case study, as well as in future publications of this kind, is that the collection of information, in the different stages of the implementation project, helped to find some solutions, which, for the future and for those who will want to achieve the implementation steps, can be a guide to avoid or to solve all the problems encountered.

Implementing an ERP system is never an easy task, the analysis performed before, being one that must define as clearly as possible the steps to be taken, the necessary steps, the resources involved, this leading to the smooth implementation of the proposed project [2], [3]. All the studies carried out so far have shown a growing desire of companies to implement software solutions that will make their lives easier, to give a clear image, of all the processes that take place in the

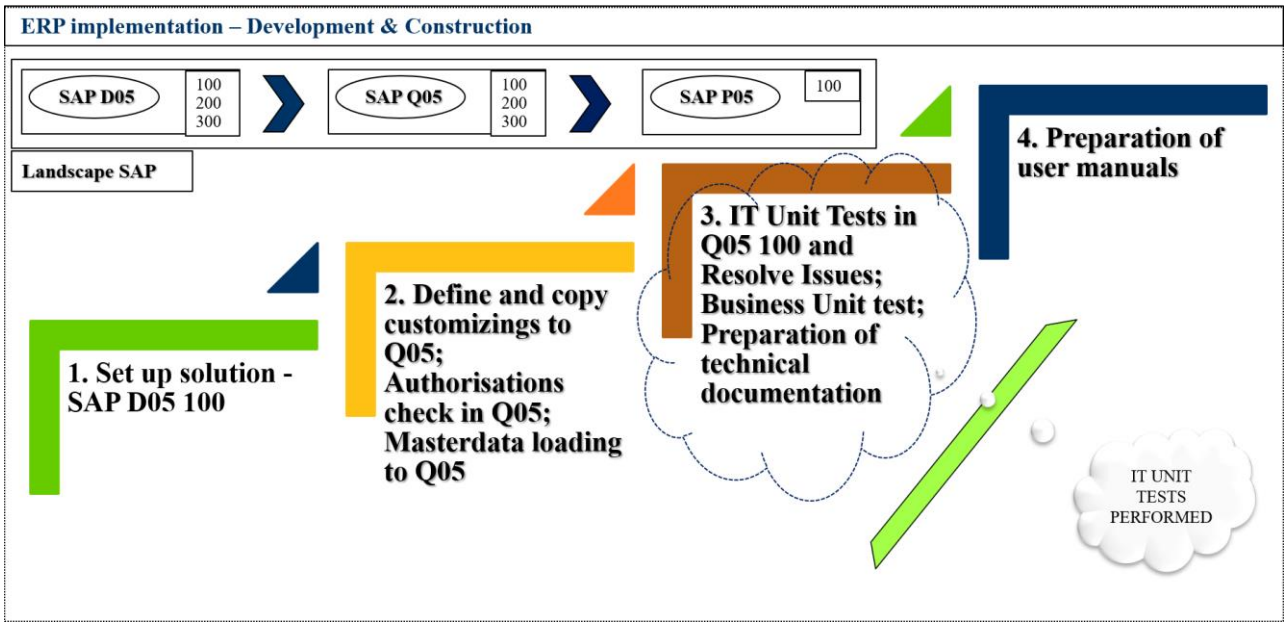
company and to do, as easy as possible, to obtain informations. These must be reached as quickly as possible to those who, without these dates, managing the departments within the company, would be very difficult for them [4]. In the project that the author talks about in this case study, it was a very heavy implementation, an implementation that revealed several difficulties that Romanian companies have encountered, over time. The lack of an implementation strategy made it difficult to collaborate between the entities involved in this project of implementing an ERP system - we discuss here about SAP (Systems, Applications and Products) [5].

2. LITERATURE REVIEW

The author read a series of studies made by many researchers, noting their ability to bring to light a number of factors that have contributed to the successful or not implementation of an ERP system, we mention here (Matende and Ogao, 2013; Haddara and Hetlevik, 2016; Dumitru at all., 2012). A type of analysis was done by (Gable et all., 2003) in which it was brought into discussion why to make such an investment, in such type of system, this having as poles of management pressure - so to be able to justify the investment made, knowing that this is not a small one, so that the results of the implementation have led to a performance, quality and competitiveness of the company. The decision to integrate within the company an ERP type system has required over time, discussions and investments of time and money, very large, so that these were associated with a number of problems arising in the implementation phase, research in this goal also (Malaurent and Avison, 2016).

Throughout the research, the author found that many authors have tried to develop various models to evaluate IS information systems, whether they have been successfully implemented or not. Not always these models have been adapted and adapted with the specificity of each implementation, the results obtained are not convincing. A group led by (Harris and Weistroffer, 2008) discussing several reasons that have been considered, from the specificities met, characterizable approached to the complexity of the model that will be implemented using an ERP type system. In the present paper, another approach was chosen, namely the analysis of each step encountered in the implementation process, in this case - business unit test - IT.

Figure 1 ERP - Development&Construction phase (source: compilation of the author)



As is described in the above Figure 1, the SAP phase Development & Construction will be analyzed, step by step, by the author of this article, others article were readed and based on the

performed results, will conduct to an authentic result of this sresearch, the result can be used in other studies, by the reserchers and in implementations, by the companies which deals with this kind of activities. ERP System: Enterprise Resource Planning is defined as customizable, standard application software, which includes integrated business solutions for the core processes (Rosemann and Wiese, 1999).

3. THE RESEARCH SCOPE AND MOTIVATION: METHODOLOGY AND KEY STEPS

For each article were taken as working methodologies a series of tools designed to help the author to collect, manage, interpret and draw conclusions appropriate to the title of the scientific paper. The creation of questionnaires meant to be distributed to the types of participants (in our case SAP Consultants which are aprt of the implementation project described in this article) eager to share their experience on such a project, made it easy to interpret the results obtained [6], [7].

The diversity of materials available from other projects to which the author took part was also considered. Some of them had similar additions, this highlighting the fact that certain features are kept from one implementation to another. The particularities were always adapted to the field in which the implementation of ERP solution was made [8], [9], [10].

Another direction that was considered, was that of the information found on the specialized sites, which is not to be neglected, in an era of technologies adapted to any field. So, for this article we take intro account the following [11]:

- questionnaires (defined questions based on level of knowledge);
- interviews (local and group);
- times and data collected from the SAP system;
- test reports created for each process;
- test scripts created special for this project:
    - test script for MM module
    - test script for WMS module
    - test script for PP module
    - test scrips for SD module.

The author was taken into consideration the answers for the following type of users (seven types): test manager, quality assurance manager, quality assurance lead, consultants (located in two parts: Romania and Poland).

Based on the data collected, the on-site analyzes and the information processed during the interviews, a dashboard could be made in which to highlight each stage, with the necessary steps, the results obtained as well as what measures were taken for remedy them (meetings, decisions, solution changes - where appropriate) [12].

Of course, that for the studies carried out will be considered all that means the media, from the Internet to everything that means marvelous databases used in the storage of scientific articles, case studies, analyzes, implementations, risks, solving situations. key, books, web postings, etc. Thus, were used several terms (ERP, implemenation, risks, data, analysis, SAP, case study), which subsequently helped the author to get an idea of how other researchers have built the necessary scenarios. a more detailed analysis of the problem of implementing an ERP system.

All these researches were used by the author for the research activity, a list of them constituted the starting point for this article, because the specificity of SAP must be considered. The way of thinking, the possible ways of implementation, the guides offered by those from SAP, have made the present research have the specificity adapted to the case for which the present work has something to offer to those who want to know as much about these types. for implementing an ERP system - in our case SAP [4], [5], [13].

The case study was done by the author, with the hope that the data collected and provided to all interested parties will be subject to a more in-depth analysis. This analysis will have to be done by each implementation team, before the steps taken, for each stage, are taken. Thus, a decision can

be made to help the implementation team in making the best decisions, the time allocated to be as covering for each phase as possible, and part of the risks to be minimized as much as possible [14].

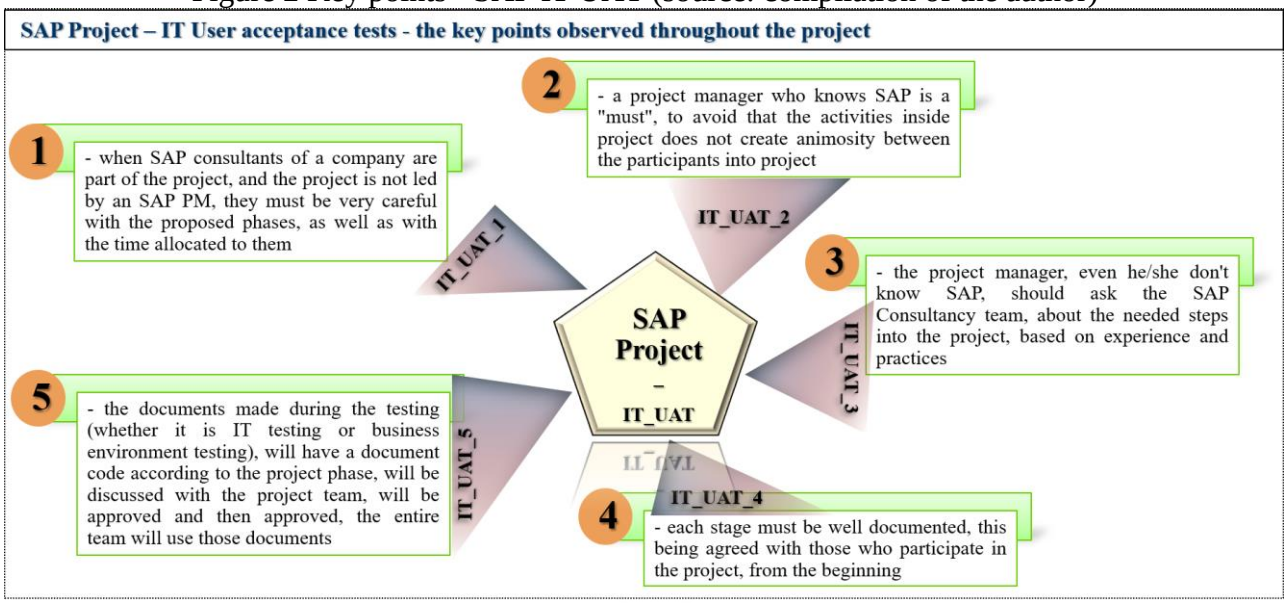
4. THE CASE STUDY – DETAILED ANALYSIS OF CONTEXT FOLLOWED

Details regarding the context in which the case study was conducted - the field, the working environment, the company

For this research, as a case study, a stage was analyzed, from a very large project, in which the author was one of the actors of that implementation, one of the most complex and laborious implementation projects. The analyzed company is one of the largest players in the used paint and adhesives industry in Romania. This company is a private company, located in Bucharest, in an industrial area, with great economic potential, and which, as all the Romanian companies have done, has not managed to escape the privatization. It was purchased by a large company, a world leader in offering to the market, the types of materials, related to the area described by the author above. This company has a market share of more than 50%, so the new investors wanted a better control over the business acquired in Romania.

The company that the author talks about in this case study has businesses (distributors) in most of the counties of the country, these being categorists depending on the volume of sales they can make. There are 4 types of such distributors: bronze, silver, gold, platinum, these being rewarded at the end of the year, depending on how much they sold from the products that the factory in Bucharest makes. The company, before being acquired by the American group, worked with another integrated system, this being one of the starting points (data contained in this system) for the project mentioned in this article. All data has been migrated to the new SAP system, with additions to the data types required for SAP. The SAP system for the Romanian company is an ERP system, version 6.08, the platform used was NetWeaver. As modules implemented, we mention: Finance FI, Material Management MM, Warehouse Management WM, Production Planning PP and Sales and Distribution SD [5], [15]. It is good that, with each research, completed with a case study, we bring to the foreground some of the key points observed throughout the project, which, somehow, influenced the development of the entire implementation, or, of the phase about which the author speaks in this article, as we can see in the following picture:

Figure 2 Key points - SAP IT UAT (source: compilation of the author)



Details about SAP UAT IT tests performed: problems occurred, mitigation plan, results

The phase we will talk about in this article is part of the project stage entitled "Design and Configuration". The stages of a project provide, at one point, a period dedicated to IT testing. Here all the functional consultants, check all the customization carried out, following step by step, each transaction that is part of the processes to be implemented.

At the same time, here the consultants should check the ABAP developments, carried out by the development team. For each project, this stage involves the creation of scripts (excel sheet files) in which to write all the observations regarding the stage / transaction / process executed. The following figure shows a test script model, a model that was used to gather the data needed for the SAP FI/CO IT UAT stage [16], [17].

Figure 3 Input data excel sheet - SAP IT UAT (source: compilation of the author)

Product Test ID	Finance & Controlling 001		SAP System Q05 / client 300					
Team Responsible	FI / CO							
Purpose of Test	Unit test IT / transactions							
Business Process								
RICEFW Included								
Dependency								
Sign-off (Go Live) Criteria								
Script Developer	SAP Consultant Name							
Script Sign Off								
Execution Responsible								
Sign-off Responsible								
Start Date	xx/xx/xxxx							
End Date	xx/xx/xxxx							
Script Execution:								
Product Test ID	0							
	SAP System Q05 / client 300							
Step No.	Action / Description	Input Data	Test Conditions Status					
			Test Conditions / Prerequisites	Expected Result	Actual Result	Pass/Failed	Comments	Defect-ID
100	Basic data							
1	Transaction: FS00 Edit G/L Account Centrally	G/L Account Company code				Pass		
2	Transaction: FSP0 Edit G/L Account Chart of accts data	G/L Account Chart of Accts				Pass		
3	Transaction: FAGLB03 G/L Account Balance Display	Account Number Company Code Fiscal Year Ledger				Pass		

Based on the file model presented above, the case study will highlight the results obtained in the tests, as well as the involvement of the consultants in the period allocated to the unitary IT tests [19]. The data collected during these phases of the project will be analyzed in the following way: what was the involvement of the functional consultants? Could the unit tests be redeployed without the help of the business (key-users, end-users, management)? How many errors did they discover? Most of the errors were based on: the lack of authorizations / the processes implemented do not correspond to the customization performed / the misunderstanding of the business model that was intended to be implemented? Could the bugs have been resolved without the involvement of other participants in the project? [18], [20].

In the following table we have the numbers of test perfomed based on the SAP team:

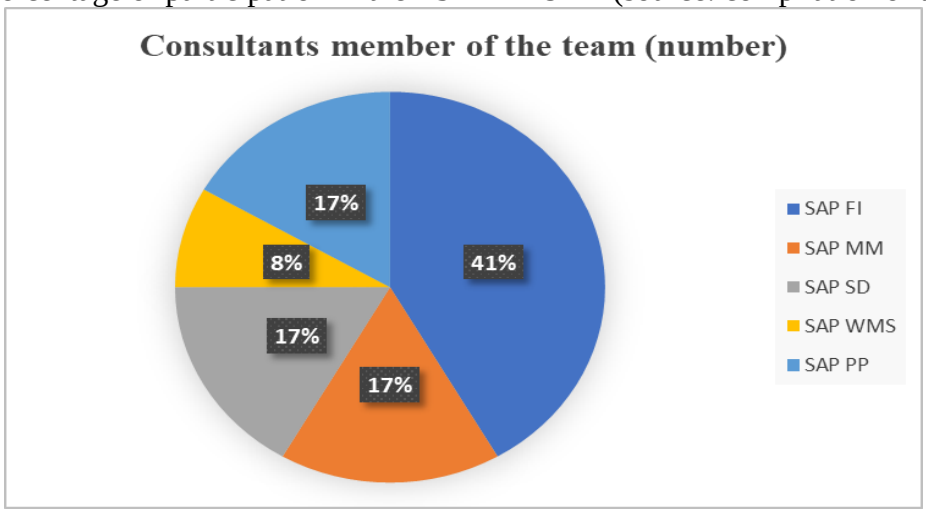
Table 1: The matrix of tests performed / team /

	Consultants member of the team (number)	Number of tests performed NID_1	Number of tests which need Input data NID_2	Tests performed with expected results ER_1 ER < 50%	Tests performed with expected results ER_2 50%=<ER=<90%	Tests performed with expected results ER_3 ER = 100%
SAP FI	5	28	22	12 (1)	14 (2)	2 (3)
SAP MM	2	37	30	10 (1)	20 (2)	7 (3)
SAP SD	2	40	28	8 (1)	22 (2)	10 (3)
SAP WMS	1	19	8	2 (1)	13 (2)	4 (3)
SAP PP	2	47	36	18 (1)	22 (2)	7 (3)

Note: expected results (ER): 1 (ER < 50 %) / 2. (ER<=50 % and =< 90%); 3. (ER = 100%);
value NID_1 = ER_1 + ER_2 + ER_3;
value 12 (1) – means: 12 tests perfomed by 3 consultants with expected erors bellow 50%.

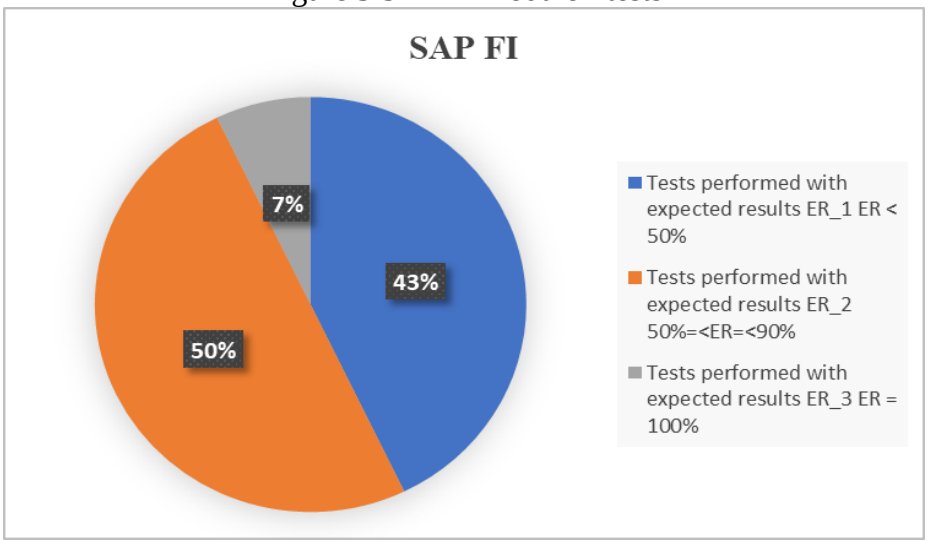
We can make calculations regarding the collected data and analyze the obtained results, as follows, based on the below table we have the folowing graphs:

Figure 4 Percentage of participation in the - SAP IT UAT (source: compilation of the author)



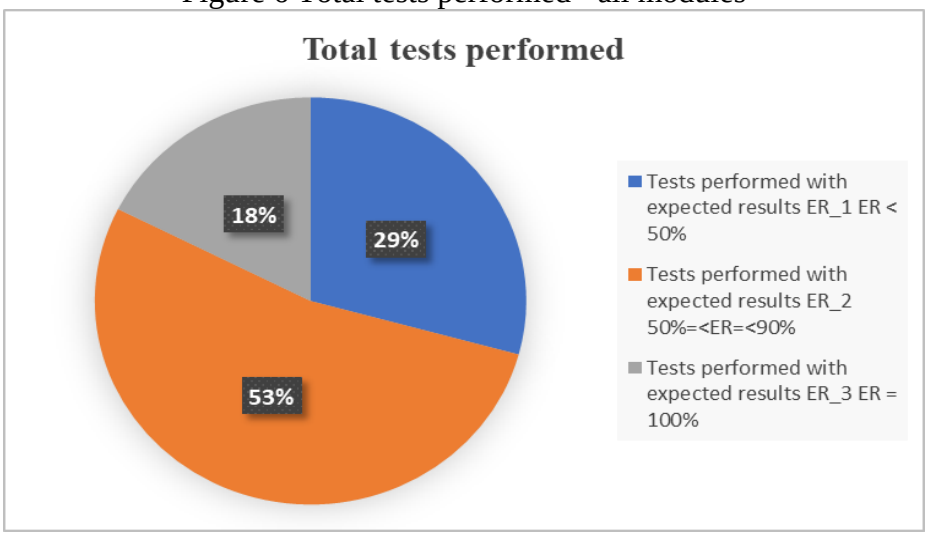
Based on below graph (Figure 4) we can conclude that the major module for this project is SAP FI, even that the production environment is the main scope (sensitive) scop for this implementation. The complexity of the Romanian legislation requires that the number of consultants on each project differ. In most implementations FI consultants are more numerous. Moreover, on this project, one thing that must be taken into account for those who know such implementations, is that the choice of the main consultant (leader) on each module should be one, in the case of FI, which has also adapted such systems for the Romanian market, which knows very well the Romanian legislation. In this case, the leader was from another country, senior SAP FI, which made the discussions take a little longer (due to the way of interpretation, understanding and adaptation of the legislation in our country versus customizing the SAP system), between the members the implementation team (from Romania), the business environment and him. Recommandation: is better to be used local consultants with experience and good knowledge of romanian legislation for a slight implementation, discussion times will be reduced, understanding of processes is much easier, understanding the system will be much easier to achieve.

Figure 5 SAP FI module - tests



In the figure above, the author took as an example, the SAP FI module, the tests performed here highlighting a very small percentage (100%) of the tests, the results showing that a percentage of 43% of the tests did not highlight the results expected by the consultants (which led to additional discussion times, adaptations of the system through custom solutions, necessary modifications to the discussed solution). After the first tests it can be stated that, for the SAP FI module, the 50% percentage according to which the tests offered an expected result (such as small subsequent adaptations), the agreed solution could be customized in the system.

Figure 6 Total tests performed - all modules



In the figure above, from the analyzes carried out by the author, it can be seen that after the first tests (all tests performed - all modules were taken into account) the percentage of ER-2 (good) increased (53%), which results highlighting that the project is satisfactory from the point of view of implementation. The fact that 29% of the solution has not yet provided the expected answers, in this phase, is a good one from the point of view of the solution delivery time, ie there is still time allocated to resolve the errors that have arisen.

5. CONCLUSIONS

This article is the first in a longer series (four – FICO / MM / WMS / PP) in which the author wants to highlight several aspects related to each phase and how it is related to an implementation. There are several factors that, over the time, have helped or not helped in the completion of the implementation projects in our country. It is known that we have a fluffy legislation, that the adaptation of computer systems is not an easy one. But, to bring in additional functional consultants from outside the country, who only know how to customize an informed system, is a bit forced from my point of view. Therefore, for each implementation project, my recommendation is to use consultants from Romania with good knowledge regarding the legislation of our country, how to adapt the information system to the rules existing here, to have a good communication ability (they will carry out the subsequent trainings for those who will use the system). Everything written above, can be used by those who want to analyze the impact of a better organization of the project plan, of the teams that are part of the project, of the leaders who will lead such implementations. Depending on the specificity of the place where this system will be installed and the complexity of the existing business model, the choice of the team and those who will lead is very important. One thing that the author wants to highlight: it is very good for the project manager of the implementation project to be a connoisseur of the way of implementation and operation with the system that will be the object of the implementation. This will avoid a series of misunderstandings that will generate time-consuming discussions.

BIBLIOGRAPHY

[1] **Narayanan V.**," Configuring Financial Accounting in SAP ERP", SAP Press, 3rd edition, updated edition 2018, E-book formats: EPUB, MOBI, PDF, online, ISBN 978-1-4932-1723-6
[2] **Naeem A., Sheikh T.,**" SAP ERP Financials: Configuration and Design", SAP Press, 2nd, updated edition 2011, E-book formats: EPUB, MOBI, PDF, online, ISBN 978-1-59229-781-8
[3] **Korolev S.,**" ABAP Development for Financial Accounting: Custom Enhancements", SAP Press, 2011, E-book formats: EPUB, MOBI, PDF, online, ISBN 978-1-59229-739-9
[4] **Babu J.,**" Managing FI-CO Master Data in SAP", SAP Press, E-book formats: EPUB, MOBI, PDF, online, 2016-02, ISBN 978-1-4932-1345-0
[5] **Ovigele P.,**" 100 Things You Should Know About Financial Accounting with SAP", SAP Press, 2011, E-book formats: EPUB, MOBI, PDF, online, ISBN 978-1-59229-725-2
[6] **Matende S., Ogao, P.,** "Enterprise Resource Planning (ERP) System Implementation: A case Study for User participation", Procedia Technology 9 (2013) pp. 518-526, 2013
[7] **Haddara M., Hetlevik T.**, "Investigating the Effectiveness of Traditional Support Structures & Self-organizing Entities within the ERP Shakedown Phase," Procedia Computer Science, vol. 100, pp. 507-516, 2016.
[8] **Dumitru V.F., Albu N., Albu C.N., Dumitru M.,** "A Contingency-Based Approach to ERP Implementation and Organizational Implications - what is Different in Emerging Economies?", Proceedings of the 7th International Conference Accounting and Management Information Systems, June 13–14, Bucharest, 2012.
[9] **Malaurent J., Avison D.,** "Reconciling global and local needs: a canonical action research project to deal with workarounds," Information Systems Journal, vol. 26, pp. 227–257, 2016.
[10] **Grossman T., Walsh J.,** "Avoiding the pitfalls of ERP system implementation", Information Systems Management, vol. 21, no. 2: 38–42, 2004.
[11] **Huang Z., Palvia P.,** "ERP implementation issues in advanced and developing countries", Business Process Management Journal, vol. 7, no. 3: 276–284, 2001.
[12] **Kim Y., Lee Z., Gosain S.,** "Impediments to successful ERP implementation process", Business Process Management Journal, vol. 11, no. 2: 158–170, 2005.
[13] **Kremers M., van Dissel H,** "ERP system migrations", Communications of the ACM, vol. 43, no. 4: 53–56, 2000.
[14] **Kumar V., Maheshwari B., Kumar U.,** "An investigation of critical management issues in ERP implementation: Empirical evidence from Canadian organizations", Technovation, vol. 23, no. 10: 793–807, 2003.
[15] **Rahimi F., Møller C., Hvam L.,** "Succeeding in process standardization: Explaining the fit with international management strategy.," Business Process Management Journal, vol. 22, pp. 1212-1246, 2016.
[16] **Roztocki N., Weistroffer H.R.,** "Information Technology in Transition Economies", Journal of Global Information Technology Management, vol. 11, no. 4: 1–9, 2008a.
[17] **Rosemann M., Wiese J.,** "Measuring the Performance of ERP Software: a Balanced Scorecard Approach", 10th Australasian Conference on Information Systems, 1999.
[18] **Soja P.,** "Difficulties in enterprise system implementation in emerging economies: insights from an exploratory study in Poland", Information Technology for Development, vol. 14, no. 1: 31–51, 2008.
[19] **Matende S., Nabukenya, J., Ogao P.**, " User Participation in ERP Implementation: A Case-based Study ", International Journal of Computer Applications Technology and Research, Vol.4 – Issue 1, pp: 24-29, ISSN: 2319-8656, 2015
[20] **Harris, M. A., Weistroffer, H. R.,** "Does User Participation Lead to System Success?", Proceedings of the Southern Association for Information Systems Conference, Richmond, VA, U.S.A., 2008