

THE DIFFICULTIES OF TRANSFORMATION SAP ERP SYSTEM FROM ACTUAL LANDSCAPE TO S/4HANA DIGITALIZATION ENVIRONMENT. A CASE STUDY.

BANȚA VIOREL-COSTIN
THE BUCHAREST UNIVERSITY OF ECONOMIC STUDIES
e-mail: bantaviorel@gmail.com

Abstract

The evolution of technology has affected the business so much that the change in business processes to match the new digital transformations. Moving towards digitization is a "must" in the years ahead, our analysis focusing on ways of approaching companies that choose to change the existing IT structure. We have made a case study with which we will highlight the best solution to address such major change within the organization. We created a questionnaire that was sent to the largest oil and gas company in order to find the real difficulties occurred. The sample is a complex one in terms of data collection, from the technical part, the conception to the economic part, which will finally make a difference regarding the chosen solution. All this transformation process has as a final point the choice of a solution that will be the point of connection and stability between the technical, economic and informatics departments – in our case, in particular, the SAP Competence Center. The approach must be transparent in accordance with existing practices in the field of architectural transformations in SAP systems.

Keywords: S/4HANA, HANA, ERP - Enterprise Resource Planning, transition economy, Portal, SAP, Cloud, SaaS, ABAP, oData, WebDynpro technologies.

Classification JEL: C61, C81, C88, M15, M41, Y10

1. INTRODUCTION

The economic environment needed a change in integrated systems, a component part of a company's entire management process. The process of change has, over time, several aspects that need to be taken into account: the economic-financial component and the technical component. The present study is carried out with the help of a questionnaire sent to representatives of the oil and gas companies operating on the territory of Romania. ERP systems have a special place in the companies we are talking about in this article, the diversity that the Romanian market now offers, being a starting point for our analysis.

The motivation we made for this study lies in our desire to see how large companies manage such a switch, from the classic ERP system, to the digital system that responds much more quickly to the needs of the business environment. The economy in our country is a very changing one, and the business environment has to adapt to the ever-increasing demands in terms of data provision[1].

The change of the IT system is a major challenge for the business environment, the possibilities offered being diverse, the choice of the best solution being made after a broad analysis of the existing processes and how they can be adapted to the new working environment. SAP has attempted to combine the need for companies to change with their desire to have an ERP system that is suited to requirements. Our research will highlight the difficulties faced by companies when they wanted to change the ERP integrated system and how they have resolved the adaptation of the new IT environment to the requirements with which the new ERP trend has come. It is good to know that a number of such researches are based on models found in the literature, so we will structure our article so that we include everything that means the presentation of the specialized literature (in which we will detail the various situations / problems the companies that have decided to implement an ERP system), we will also present a part regarding the methodology chosen for this study, we will also compare with what other authors, as a methodology, have chosen. There

will also be a part dedicated to the results obtained, as well as a part related to discussions, conclusions and suggestions for future research [1], [2], [3].

2. LITERATURE REVIEW

When a company decides to move to another level of the applications it has (in our case the transition from the current level of ERP system to the new package offered by SAP - namely the HANA database as well and the choice between S/4HANA applications or the current application) there are a number of steps that it needs to take. In the following we have done a study in the literature and selected some of the stages that any company will have to go through. There are a number of differences encountered in such implementations (ERP system transformations) and the place where they took place, these are large companies that have specificities that we have taken into account in this article, we will enumerate some of them: IT environment and data security, business environment, strategy, planning and design phase, implementation, users and organization, services, management and sourcing, diffusion, economics [1], [4], [5].

A number of articles have highlighted a number of phases used in such implementation (we adapted this according with our needs), mention here Cooper and Zmud, 1990 (further analysed by Somers and Nelson, 2004), Soh and Markus, 1995 (rediscussed by Kumar et al., 2003), Markus and Tanis, 2000, Parr and Shanks, 2000, Ross and Vitale, 2000, Esteves and Pastor, 1999. They mention a lot of phases, starting with *Initiation* (in this phase the company justify the need for adopting “the new trend” of ERP) to *Retirement phase* (this is the phase when the manager take a decision to substitute the ERP), in the following figure we put together all phases [6], [7], [8]:

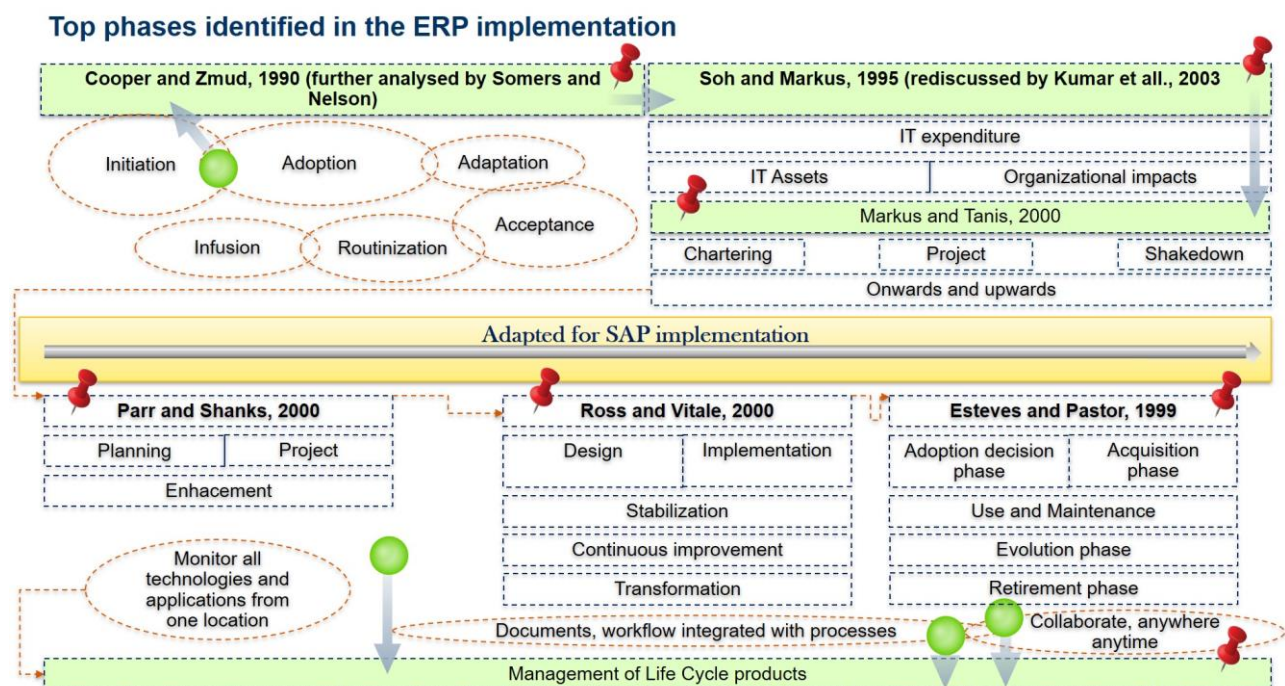


Figure 1 Phase identified in the ERP implementation (source: compilation of the authors)

Over time, based on studies by various researchers has found that there is still a phase namely "Decline" at this stage the customer decides if stops or project implementation such phases can radically change the image of the implementation [9], [10].

Many companies choose to deploy ERP solutions to standardize their existing processes but also rely on the fact that using all the phases described by us above, the possibility of an

implementation failure is almost zero. In the following step we can classify the difficulties that may arise in such an implementation / upgrade / change of IT solution [11], [12], [13], [14]:

Top difficulties classification – ERP implementation / migration

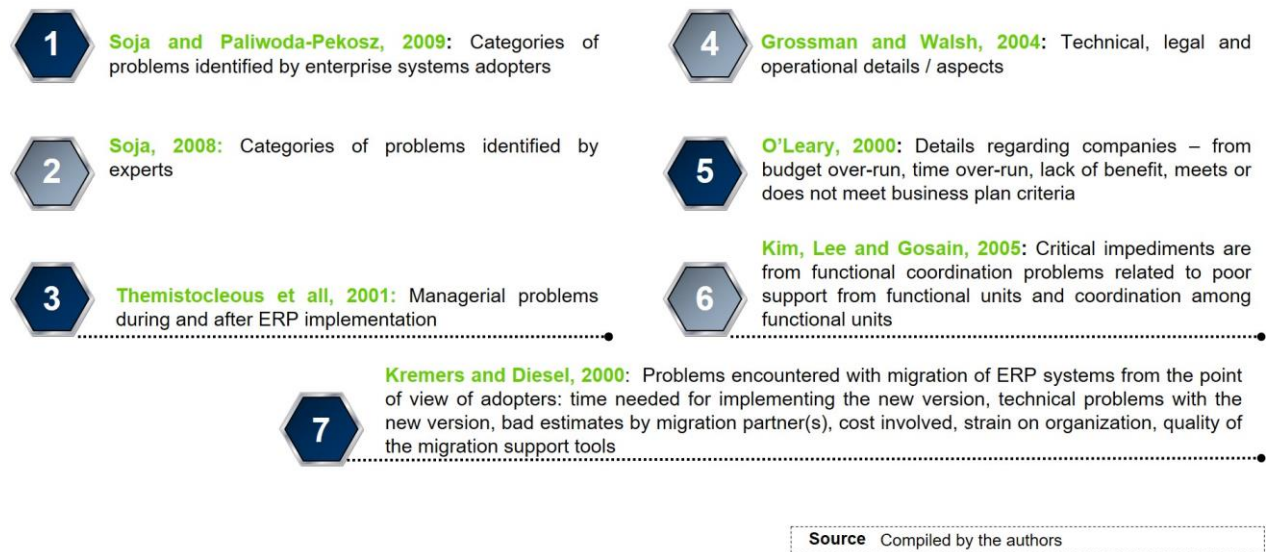


Figure 2 Top difficulties - classification (source: compilation of the authors)

The basis for research over the past few years, it has been found that the most common as a difficulty, we find the following: employee knowledge and education of the ERP solution [39], high cost, top management implication, project goals and implementation team. A lot of other problems can occur during the implementation or migration of actual ERP solution to the new one [15], like users’s availability and responsibility, the stability and conditions of the company, system efficiency. For our research we take into consideration a lot of ideas provided / suggested by Cooper and Zmud (1990), for the difficulties encountered in ERP implementation/migration side [16], [17], we take into consideration the research found at Soya and Paliwoda-Pekosz (2009).

3. METHODOLOGY

Regarding the methodologies taken into account in this article, these methodologies were based on a series of studies conducted over the years [18], with some of them, such as those in the following figure [19], [20]:

Top phases for research methodology

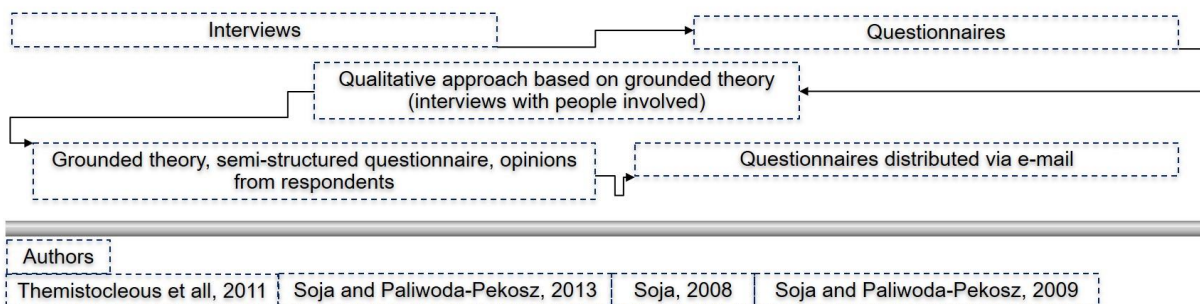


Figure 3 Research methodology (source: compilation of the authors)

In this article / research we will present a case study accomplished in a big oil and gas company. This company have begun moving to S/4HANA and the problems that have arisen along the implementation are key points in our study [21], [22]. We will present the difficulties that have been arisen in different phases of the implementation / migration project, and how these have been overcome by those involved in this activity [23]. In order to check and analyse the difficulties encountered by our three companies, we interviewed the people involved in the entire process of implementation/migration. In the following table we have the list of interviews [38]:

Interviewee	General information about interview
Vendor’s ERP Solution (SAP)	Ianuarie, 2019, duration aprox. 70 min
Vendor’s project manager – implementation /migration project	Ianuarie, 2019, duration aprox. 50 min
Vendor’s SAP Functional consultant – implementation /migration project	Ianuarie, 2019, duration aprox. 40 min
Vendor’s SAP Technical consultant – implementation /migration project	Ianuarie, 2019, duration aprox. 40 min
Client (adopter) - IT manager	Ianuarie, 2019, duration aprox. 70 min
Client (adopter) - Technical consultant	Ianuarie, 2019, duration aprox. 30 min
Client (adopter) - Accountant - End-user SAP	Ianuarie, 2019, duration aprox. 30 min

Table 1 The list of interviews (source: compilation of the authors)

In order to be as precise as possible regarding the realization of this specialized research, we have also used other methods to collect as many data / information as possible [24], [25]:

Methods used for data collection

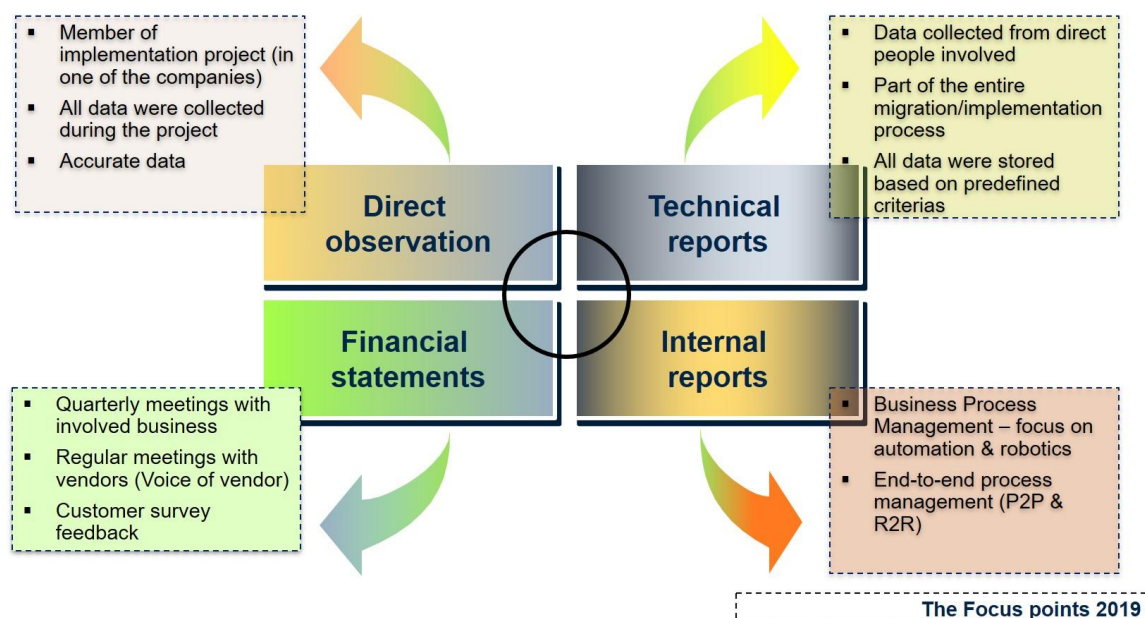


Figure 4 Other methods used for research (source compilation of the authors)

The study could be done by the author based on a series of articles, eg Soja, 2008; Soja and Paliwoda-Pekosz, 2013), the greatest advantage being that the author was part of the

implementation / migration project team, benefiting from the opinions of both the supplier and the customer-beneficiary of the new IT solution [26], [37].

4. IMPLEMENTATION / MIGRATION CASE STUDY

Description of the research study and the motivation for changing the ERP IT solution

The company that is being talked about in this case study works in the oil and gas industry. It is a multinational company based in another country - Austria. The company in Romania was acquired in 2005, the management decision being to implement SAP [35] as an IT solution, replacing two of the existing management and accounting systems at that time. The mention two systems are active in the exploration and production area as well as in the downstream area. When SAP was installed as an IT solution [38], version 4.7 was used, using the Oracle database, adding the oil add-on as part of the business environment existing in this type of company [34]. In 2011, it was decided to change the SAP version from 4.7 to ECC 6.0 Ehp4, deciding to change the database to IBM DB6 [36]. The activities of this company are diverse, from exploration and production, refining, selling and distributing petroleum products (gasoline, diesel, liquefied gas), exploring new oil and gas fields, exploring wind turbines.

All of these business areas were covered by the SAP information system, the desire of the company's management being to have accurate data, to have all the activity in a single system, to report on-line, and to connect with all clients and service providers be made in the best possible time so that their activity is not disturbed [27], [28].

The SAP system is used at maximum capabilities, from the accounting area (the one that solves all reports to the Romanian state - preparation of statements required by the state - here is also the export of data to the state institutions) to the production area and then refining of petroleum products. In the economic departments work a number of accountants who have their roles well defined in the organization chart of the company [32], [33]. The company also has an IT department, with many IT practitioners working here, some foreign-language speakers, others not. The communication difficulties with the SAP system provider have greatly influenced the possibility of resolving some errors in agreed times and costs [29], [30]. Throughout migration to the HANA environment, there have been a number of problems caused by the poor understanding of a foreign language, whether English or German [31].

The problems encountered during migration to the digital platform offered by S/4HANA

The SAP solution provider (in our case being the one who will implement the change of the system) contacted the oil and gas company in 2018, based on a large S/4 promotion campaign (ERP SAP ERP change activities), knowing that 2025 will be the end of maintenance cycle for the current SAP environment ECC solution. There have been a series of presentations either at the oil company or at the company's headquarters that distributes SAP.

It has been presented at the beginning of the discussion that this change of IT solution activity will not be easy, it will be long, the preparation of such a process of change, with different scenarios to follow, the choice of one solution being difficult to reach that date. In the process of changing the IT solution, even if it is scheduled to be achieved by 2025, the difficulties that have arisen have kept the price demanded by the implementing company as well as the number of days allocated to this change (adoption periode).

The big problem with the change of the IT solution was the budget allocated for this activity, it had to be reduced (the initial requirement being to work with external consultants), the way this was accomplished by allocating internal resources within the SAP Competence Center. In the contract that was signed between the parties it was mentioned that the last generation SAP needs a very powerful IT Infrastructure, the servers to be the last generation. There have been mentioned a series of actions that the Adopter has to solve in a very short time. The existing

infrastructure does not meet the new challenges of the software solution provider. Another issue was the ability of employees to use new technologies and their ability to adapt to new requirements as quickly as possible.

Changing the IT solution within a large company is not easy, but on the other hand it can achieve in medium and long terms a reduction in IT division spending. If end users as well as key users do not have a clear vision of what will happen, I think it is a major risk for implementing new technologies. This should be managed very well by the company's management. The investment offered by the company in such implementations is a very large one, and the results have to be in place.

In addition to the above, an employee who knows the company's processes well will help the provider in the customization and testing of new solutions that come with the change of SAP to S/4. Another point to be considered is setting targets for implementing new solutions, so if the adopter does not know exactly what to ask from the vendor, he can not help in such a change. Another issue was the new solution offered by SAP, this is totally different from the previous one, so adapting the employees to this was very difficult. Employees had to learn the new system, besides the fact that they had to do their daily tasks as well.

The phases of the project were also slightly exceeded (acceptance phase overlapped the adaptation phase), taking into account the fact that due to the change in the price of the implementation / modification of the IT solution, the implementation was done also with the help of the internal consultants (they were trained only through the project, the consultants from the implementer, making customization and training). The Routinization phase started with a series of difficulties in all areas of using the new system (reports, the difficulty to find the transactions, etc).

In our opinion the Infusion phase didn't start yet. There are a lot of other directions where this system it can help. And nowadays the adopter adapts the new solution offered by SAP, the rapidity with which this change has been made, not being well thought out. From the point of view of the implementation provider, the cost reduction was a major impediment to the successful implementation of the migration project.

5. CONCLUSIONS

In this case study I wanted to highlight a series of difficulties encountered during the migration project. We could mention that the biggest problems come from the top management area. A more consistent involvement in such projects (considering that the amounts allocated are considerable) would generate a number of thanks, both from the employee's point of view and from the point of view of the vendor (the IT solution installer).

Another source of difficulty comes from the employees' area: these never rise to expectations, with new IT solutions coming up with a host of novelties that are not very quickly adopted and are very difficult to use. In fact, reducing the budget allocated to this change has led to the fact that the training has been reduced, so the employees have not gained enough knowledge. Such a thing generates a series of inconveniences, both from the employees and from the management. In fact, reducing the budget allocated to this change has led to the fact that the training has been reduced, so the employees have not gained enough knowledge. Such a thing generates a series of inconveniences, both from the employees and from the management.

Another difficulty encountered by the project manager assigned by the vendor for this project was that of cost cutting. This is happening more and more frequently in Romanian companies. This generates a great deal of effort on the part of a small number of consultants. Involvement of internal consultants, in the context in which they have never been trained, leads to the creation of environmental frustrations in which the employee is working. Achieving both daily work tasks and tasks from the project is another source of stress and trouble.

Future research will be directed to the decision-making area in terms of choosing to hold the on-premise or cloud-based SAP system as well as in the decision-making area for continued use of the ECC application using the HANA database or the actual transition to the S / 4HANA application with the native HANA database.

BIBLIOGRAPHY

- [1] **Roztocki N., Weistroffer H.R.**, “Information Technology Investments: Does Activity Based Consting Matter?”, *Journal of Computer Information Systems*, vol. 50, no. 2: 31-41, 2009
- [2] **Cooper R., Zmud R.**, “Information Technology Implementation Research: A Technological Diffusion Approach”, *Management Science*, vol. 36, no. 2: 123–139, 1990.
- [3] **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.
- [4] **Esteves J.M., Pastor J.A.**, “An ERP life-cycle-based research agenda, published in First International workshop in Enterprise Management and Resource Planning: Methods, Tools and Architectures”, *EMPRS’99*, Venice, Italy, available on-line at <http://jesteves.com/EMRPS99.pdf>, 1999.
- [5] **Grossman T., Walsh J.**, “Avoiding the pitfalls of ERP system implementation”, *Information Systems Management*, vol. 21, no. 2: 38–42, 2004.
- [6] **Huang Z., Palvia P.**, “ERP implementation issues in advanced and developing countries”, *Business Process Management Journal*, vol. 7, no. 3: 276–284, 2001.
- [7] **Kim Y., Lee Z., Gosain S.**, “Impediments to successful ERP implementation process”, *Business Process Management Journal*, vol. 11, no. 2: 158–170, 2005.
- [8] **Kremers M., van Dissel H.**, “ERP system migrations”, *Communications of the ACM*, vol. 43, no. 4: 53–56, 2000.
- [9] **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.
- [10] **Markus M. L., Axline S., Petrie D., Tanis, C.**, “Learning from adopters’ experiences with ERP: Problems encountered, and success achieved”, *Journal of Information Technology*, vol. 15, no. 4: 245–266, 2000.
- [11] **Roztocki N., Weistroffer H.R.**, “Information Technology in Transition Economies”, *Journal of Global Information Technology Management*, vol. 11, no. 4: 1–9, 2008a.
- [12] **Roztocki N., Weistroffer H.R.**, “Information Technology Investments: Does Activity Based Consting Matter?”, *Journal of Computer Information Systems*, vol. 50, no. 2: 31–41, 2009.
- [13] **Soh C., Markus M. L.**, “How IT creates business value” in *Proceedings of the Sixteenth International Conference on Information Systems*, Amsterdam, The Netherlands: ACM, 1995.
- [14] **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.
- [15] **Soja P.**, “Understanding determinants of enterprise system adoption success: Lessons learned from full-scope projects in manufacturing companies”, *Production Planning & Control*, vol. 21, no. 8: 736–750, 2010b.
- [16] **Soja P., Paliwoda-Pekosz G.**, “What are Real Problems in Enterprise System Adoption?”, *Industrial Management & Data Systems*, vol. 109, no. 5: 610–627, 2009.
- [17] **Soja P, Paliwoda-Pekosz, G.**, “Impediments to enterprise system implementation over the system lifecycle: contrasting transition and developed economies”, *The Electronic Journal of Information Systems in Developing Countries*, vol. 57, no. 1: 1–13, 2013.

- [18] **Soja P.**, “ICT in Poland: lessons learned from enterprise system adopters”, presentation delivered at the Swedish Institute Annual Contact Seminar: Innovative ICT – Networking in the Baltic Sea Region, Stockholm, Sweden, October 28th, 2010, available on-line at https://www.researchgate.net/publication/228380426_ICT_in_Poland_Lessons_Learned_from_Enterprise_System_Adopters, 2010a.
- [19] **Somers T.M., Nelson K.G.**, “A taxonomy of players and activities across the ERP project life cycle”, *Information & Management*, vol. 41: 257–278, 2004.
- [20] **Themistocleous M., Soja P., da Cunha P.R.**, “The same, but different: enterprise systems adoption lifecycles in transition economies”, *Information Systems Management*, vol. 28: 223–239, 2011.
- [21] **Themistocleous M., Irani Z., O’Keefe R.M., Paul, R.**, “ERP problems and application integration issues: an empirical survey”, *Proceedings of the 34th Hawaii International Conference on System Sciences*, 4-7 January, Maui, HI, vol. 9: 9045, 2001.
- [22] **Keller E.L.**, “Lessons Learned”, *Manufacturing Systems*, Vol. 17, Issue 11, pp. 44-50, 1999.
- [23] **Chen S.G.G., Lin Y.K/K.**, “Performance analysis for Enterprise Resource Planning systems”, *Industrial Engineering and Engineering Management, IEEM2008, IEE International Conference*, on pp. 63-67, 2008.
- [24] **Leu J.D., Huang L.T.**, “Logistics planning of the IC manufacturing industry: A method based on the SAP-APO” *Computers & Industrial Engineering, CIE 2009, Intel. Conf. on*, pp. 760 – 766, 2009.
- [25] **Zhou Y.**, *SAP Business ByDesign, Data Eng. ICDE '09. IEEE 25th Internl. Conf. on*, pp. 1760, 2009.
- [26] **Weidmann C., Teuber L.**, *Conception and Installation of System Monitoring Using the SAP Solution Manager*, Galileo Press, 2009.
- [27] **Peter M., Pohl T.**, “*Developing Enterprise Services for SAP*”, Galileo Press, 2009.
- [28] **Lin C.C., Shih, D.H.**, “Information System Reengineering for Enterprise Resource Planning as Businesses Adapting to the E-business Era”, *Software Engineering, WCSE'09, WRI World Congress on*, Vol. 3, pp.222-226, 2009.
- [29] **Banta V.C., Cojocaru D.**, “Development Center Tool a Software Application for Change Request Management”, *17th International Conference on System Theory, Control and Computing Joint Conference SINTES 17, SACCS 13, SIMSIS 17, ISBN 978-1-4799-2228-4, ISBN 978-1-4799-2227-7, IEEE Catalog Number CFP1336P - CDR, p42-47, 11 - 13 October, Sinaia, Romania*, 2013.
- [30] **Orosz T.**, “Analysis of SAP Development tools and methods”, *Intelligent Engineering Systems (INES), 15th IEEE International Conference on*, pp. 439 – 443, 2011.
- [31] **Jardim-Goncalves R., Grilo A., Agostinho C., Lampathaki F., Charalabidis Y.**, “Systematisation of Interoperability Body of Knowledge: the foundation for Enterprise Interoperability as a science”, *Enterprise Information Systems*, vol. 6, no. 3, pp. 1-26, 2012.
- [32] **Antolovic M.**, “Getting Started with SAPUI5”, SAP Press, 2015.
- [33] **Szirtes T., Rivlin A.**, “Implementing SAP Fiori Launchpad”, SAP Press, 2015-12.
- [34] **Bavaraju A.**, “SAP Fiori Implementation and Development”, SAP Press, 2016.
- [35] **Goebels C., Nepraunig D., Seidel, T.**, “SAPUI5 - The Comprehensive Guide”, SAP Press, 2016.
- [36] **Bönnen C., Drees V., Fischer A., Heinz L., Strothmann K.**, “SAP Gateway and OData”, SAP Press, 2016.
- [37] **Gahm H., Schneider Th., Swanepoel C., Westenberger E.**, “ABAP Development for SAP HANA”, SAP Press, 2016.
- [38] **Adams DJ.**, “SAP Fiori and SAPUI5: Debugging the User Interface”, SAP Press, 2016-2
- [39] **Prewett G., Pytel M.**, “Implementing SAP Fiori Security”, SAP Press, 2016-06.