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EVALUATION OF SAP SYSTEM IMPLEMENTATION IN AN ENTERPRISE OF THE AUTOMOTIVE INDUSTRY – CASE STUDY

Abstract

Modern businesses boost management by implementing integrated IT systems, such as highly popular in Poland – SAP software, to aid the enterprise resource planning (ERP). This paper evaluates the implementation of an ERP system at a steel wheel rims manufacturer and distributor. The main research method was questionnaire, conducted at the Logistics & Customer Service department. The data acquired from the conducted research were analysed and processed to evaluate the implemented solution. Areas for improvement were pinpointed and concerned the adjustment of the software solution to the needs of the enterprise.

1. INTRODUCTION

The development of integrated computer systems can be traced back to 1950s. The first representative was the MRP (Material Requirements Planning) system, which served as a tool for ensuring the supply and demand balance by scheduling the input material supply for manufacturing. The systems subsequently evolved to MRP II (Manufacturing Resource Planning) which additionally embraced the control over the resources of the enterprise, as well as production and distribution (Lambert, Calvasina, Bee & Woodworth, 2017). The 1980s was the time when ERP systems appeared for the first time, only to gain in popularity in the 1990s (Kumar, Maheshwari & Kumar, 2003).

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What is understood under the acronym ERP is the set of enterprise management tools for the real-time distribution, processing and integration of data. ERP solutions provide an exciting boost for the effectiveness of management through redesigning processes and creating a common environment for potential additional components, functions and applications, such as the internal communication tool. These systems may give the advantage point over the competitors in the market. They integrate supply processes, warehouse management, production, sales, marketing and distribution, logistics, as well as financial and human resources (Huang & Handfield, 2015). They may prove indispensible in aiding decision-making processes concerned with planning and managing the enterprise as they provide an easily accessible database of the organisation. ERP systems are implemented to integrate and consolidate the systems across an organisation into one that can meet and serve each department's unique needs and tasks. This centralised character of ERP IT solutions facilitates the operation of the entire enterprise, for instance by the common user interface (Olson, Johansson & De Carvalho, 2018). Furthermore, the ever-changing business market environment and technological evolution requires of such solutions that they are applicable on mobile devices, such as smartphones or tablets, and offer a desired degree of automation with a view to monitoring processes on the real time basis (Costin & Cojocaru, 2017).

In its infancy, the ERP system was introduced exclusively in large organisations, on account of high implementation costs. Before long the small and medium-sized enterprises niche was filled by the vendors of ERP systems, who have decided to accommodate the system to the emerging needs by simplifying and basing it on the WWW service. Free Open Source ERP solutions have then become feasible alternatives for such businesses. ERP systems are provided in a number of forms, such as: software as a service (SaaS), open-source software (OSS) and Service Oriented Architectures (SOA), as well as hybrids of these (Olson, Johansson & De Carvalho, 2018). In the SaaS model it is a cloud service provider that supplies the ERP system (Johansson & Ruivo, 2013). An important factor determining the effectiveness of SaaS model is its integration with other elements of the management system, which would be seriously limited but for the ERP system: scalability, efficiency, accessibility, configurability and resistance to damage. The wide range of available options appears to stress the importance of the solution vendor selection process (Kłosowski, 2013).

According to the 2017 Panorama Consulting Solutions Report on ERP Systems and Enterprise Software, the major motivation of companies behind the implementation of ERP systems is to improve business performance (17%), to ensure compliance (14%), to make employees jobs easier (14%) and to better integrate systems across locations (13%) (*Panorama Consulting Solutions*, 2017a).

Bearing in mind the substantial costs, the degree of complication and the time consumption that are inescapably connected with the implementation of the ERP systems, the selection of a suitable ERP solution vendor becomes crucial for the prosperity of an enterprise. (Kilic, Zaim & Delen, 2015). The global market of ERP systems is somewhat dominated by the giants like: SAP, Oracle, Microsoft (*Panorama Consulting Solutions*, 2017b). The proposed solutions are modular, which allows for adaptation of the system to the current needs of a customer. ERP implementation is furthermore a step towards standardisation of business processes within organisations and introduction of "better practices". Since virtually every enterprise has a specific modus operandi, the implementation of ERP solutions may take one of three forms: the processes of the enterprise are subordinated to the system, the ERP is adjusted to fit in the conditions of a given company, or by compromise. However, it ought to be remembered that adjusting the ERP system to an organisation ridden with bad practices may compromise the system's effectiveness and may eventually be counter-productive (Parthasarathy & Sharma, 2016).

Analysing ERP systems it becomes evident that these systems are highly desirable from the viewpoint of enterprise management, due to the fact that they: optimise the cycle time, the product development time, reduce the nuisance involved in performing routine operations, improve work quality, facilitate customer relation management, enable creating a unique database, which prevents data multiplication in the organisation and fosters integration of functions within the organisation (Kale, 2000). Despite these vast advantages, ERP systems are criticised on account of their high complexity which prevents the users from embracing the general view of the processes they are personally involved in, demands entering large amounts of data in order for the system to function properly and imposes to a greater or lesser extent systematic solutions on the users as "good practices" (Grabot, Mayere, Lauroua & Houe, 2014).

There is a wide range of methods that can be applied with the aim of conducting the analysis of available ERP systems, determining the criteria of selection and finally selecting the most suitable solution for a given company, including: a considerably popular exploratory interviews (Johansson & Ruivo, 2013) or community interview (Mishra & Mishra, 2011), or analytic network process (ANP) (Perçin, 2008), multi-criteria decision – AHP (analytic hierarchy process) (Kahraman, Beskese & Kaya, 2010), as well as hybrid methods combining the ANP multi-criteria decision methods – PROMETHEE (Kilic, Zaim & Delen, 2015).

Ruivo, Oliviera and Neto (2015) have conducted a comparative analysis of four existing systems: Microsoft NAV, SAP All-in-one, ORACLE JDE, and SAGE X3 in SMEs where they focused on such areas as: Collaboration, ERP use, Analytics, ERP value. The study showed that what appears to be the focal point for Dynamics and ORACLE is analytics system capability, whereas for SAP

and SAGE – a greater collaboration of system capability. Furthermore, SAP and ORACLE appear to agree on the importance of greater ERP use, which is not the case for Dynamics and SAGE (Ruivo, Oliveira & Neto, 2015).

Once the decision is reached, the process proceeds to the next phase – the implementation. The implementation of ERP into a living enterprise tissue is as complex as it is time-consuming, not to mention the tremendous risk and substantial costs of introduction. The mean cost of ERP implementation reported by 342 respondents amounted to USD 1.3 million. The process proved equally time-inefficient, and the average from the reported answers was 16.9 months (*Panorama Consulting Solutions*, 2017a). The implementation of ERP is a process that essentially accounts for the specific character of the enterprise and its processes, engages vast resources, knowledge, skills and experience of the personnel. The process furthermore requires considerable capital investments, supply chain aptitude and transparency of the information circulating within (Huang & Handfield, 2015). Unfortunately, the success of such an endeavour is largely unpredictable, for which the significant part of responsibility may be attributed to the human factor (Jenko & Roblek, 2016). According to a last year's „Report on ERP Systems and Enterprise Software", 70% of respondents stated that they had achieved success, 26% - had conceded failure, and 4% were undecided; the numbers compared to the previous year have shown a 13% increase in success stories, but a 19% increase in the failed implementation category (*Panorama Consulting Solutions*, 2017a). From these results it becomes apparent that the success of ERP implementation cannot be guaranteed and involves a considerable risk factor.

In the body of literature in the field, there are numerous research works devoted to implementation of ERP and post-implementation verification. The latter however, are to a greater extent focused on measuring success based on success factors, such as Return on Investment or profit. Researchers employ diverse methods to determine and evaluate the project success in enterprises. Ngai (Ngai, Law & Wat, 2008) has introduced 80 critical success factors (CSFs) describing the implementation of ERP, which have provided the base for Sun, Wenbin and Rocky for the development of CSFs key performance indices (KPIs), which are associated with each stage of ERP implementation by ten local ERP experts. KPIs are determined with the Dumpster-Shafer method and evaluated by 10 experts. The models has been adjusted for the commercial use in a Chinese consulting agency. The solution is burdened with certain limitations in terms of appliance of the obtained results in other countries, owing to the fact that the relevance of certain factors may be culture- or country- specific (Sun, Ni & Lam, 2015). Huang and Handfield have endeavoured to assess the effect of ERP implementation and system vendor selection on the efficiency of the supply chain, based on the supply chain maturity model adapted from Gupta and Handfield (2011) (Huang & Handfield, 2015). Sudhaman and Thangavel have conducted analytical works into the efficiency of ERP projects, from the perspective

of software quality, based on their quality measures (defect counts) by means of the Data Envelopment Analysis Constant Returns to Scale (DEA CRS) model and have identified the most efficient ERP projects (Sudhaman & Thangavel, 2015). The literature offers instances of ERP system users studies based on exploratory interview methods (Mahendrawathi, Zayin & Pamungkas, 2017; Gattiker & Goodhue, 2005), where along the technical elements the human factors is concerned. This is the method, which is presented in the following sections of this paper.

2. CASE STUDY: BACKGROUND

The object of the following study has been previously mentioned: this is a manufacturer of high-quality steel wheel rims for cars and LCVs. Currently the company is a supplier for a number of high profile automotive corporations, including: Fiat, Audi, Volkswagen, Maserati, Iveco, Renault, Hyundai, or Kia. In the organisational structure of the enterprise, we have the following departments: Maintenance, Wheel Rings and Assembly, Wheel Disk and Tooling, Painting and Packaging, Rim Shear Line, Logistics & Customer Service, Human Resources, Work Safety and Environment, Accounting and Finance, Purchasing, Sales, IT, Quality Assurance, Construction and Design Development, and New Investment Projects.

The reported study was carried out among the 30 employees of the L&CS (Logistics & Customer Service) department of the company. This department is primarily responsible for coordination of material and raw material flow in the supply chain. The employees plan transport and distribution of finished goods to buyers, and maintain relations with carrier partners. The employees of the department are in the constant search of new solutions for streamlining their work. Logistics Specialists strive to optimise transportation costs, and therefore closely cooperate with the Sales Department and Purchasing Department when designing new goods transporting routes and methods. The scope of their duties involves contacting clients and carriers. Production Planning Specialists analyse the supply chain data and are responsible for short-term and long-term planning of production, preparation of production schedules and control of production realisation and stock levels, as well as analysis of the workload of production lines with a view to their optimisation. All the listed activities aim to secure timely delivery and customer satisfaction.

The work at the company is organised around Microsoft Office, SAP ERP 6.0 and SAP Netweaver 7.0 software. The software is available under per seat license and connected in a local network. The software is in Polish language version. SAP ERP is obviously an ERP-class system for enterprise resource planning, and enterprise management support. The system holds and enables access to the company database, applications and various analysis tools, which

significantly facilitates supply, production, customer care, sales financial and human resources management processes. By integrating the multiple separate modules the data is entered only once to provide access to all in need of accessing it. In addition the open architecture of this solution enables integrating the in-house system with external systems utilised by the company.

The SAP system implemented in the enterprise consists of the following modules: Corporate Services, Financials, Human Capital Management and Operations. SAP ERP Corporate Services is a module for the improvement of administrative processes regarding the company assets, project portfolio, business trips or foreign sales. Additional functions of the module include work safety and environmental protection compliance activities. SAE ERP Financials is a useful tool enabling in-depth analysis of financial data and finance control. The system automates the financial accounting and management and facilitates management of financial resources and settlement of accounts. SAE ERP Human Capital Management enables automation of all processes concerned with human resources management. SAE ERP Operations governs logistic processes and embraces the entire process: from placing the request to flexible invoicing and payment. The module optimises the material flow in the company and improves the management of designing and production processes and, above all, automates the production process (Missbach & Anderson, 2016).

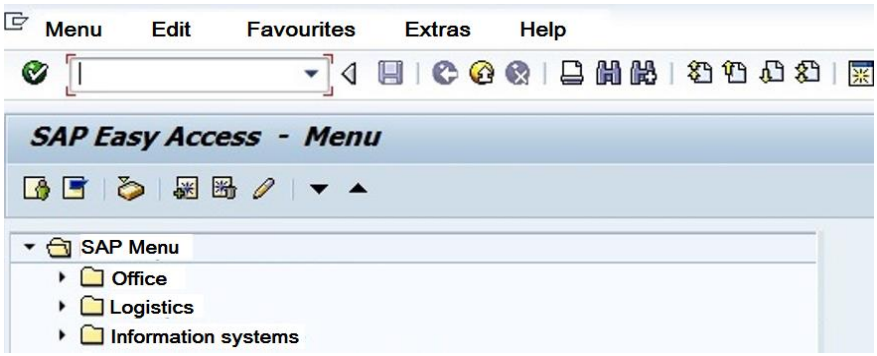

Fig. 1. Screenshot of the main dialogue box of the SAP system

The SAP system is navigated by transactions (commands), which are individual codes expressed by a series of letters and digits. Figure 1 shows the main dialogue screen appearing after logging into the system. The command field in the top left corner of the screen allows the user to input the appropriate code by hand. The main screen shows only those elements to which a given employee is permitted to access.

3. METHODOLOGY AND STUDY RESULTS

The conducted study was aimed to evaluate the implementation of the SAP system in an enterprise - manufacturer and distributor of steel wheel rims for the world leaders in the automotive industry. The assessment was based on the research questionnaire conducted among the personnel of the Logistics & Customer Service department.

The research methods employed in the study were: exploratory interview, observation and analysis of internal documentation obtained from the enterprise. The exploratory interview took the form of a questionnaire composed of 17 questions: 2 open-ended, 12 semi-open-ended, 3 close-ended, and 3 rating-scale questions. The initial question was the contingency question to determine the experience of employees with the ERP-type system. The respondents were asked about particular areas of their duties where the system was implemented, and the areas of information that it provides.

The survey questionnaire was presented to each of the 30 members of the L&CS department. Although this department has a young team, their experience with the system is quite extensive, as it is shown in Table 1. Based on the Table it becomes apparent that the selected employees are suitable for the revision of the system, as they are sufficiently experienced and because they depend on it on day-to-day basis they may share interesting insights into the errors of the system and suggest certain improvements.

Tab. 1. Years of work experience with the SAP ERP system

Years of work experience with SAP ERP	Number of replies	Percentage
< 2 years	9	30%
2–3 years	16	53.3%
> 3 years	5	16.7%

Subsequent questions asked the respondents to share their reflections regarding the intuitiveness of the system, its integration with other software already in use in the department (Microsoft Office), and to assess whether the implemented system has contributed to reducing working times of specific processes (Figure 2). Over half of the respondents considered SAP ERP as intuitive. One respondent developed the answer by adding that the interface was complicated. Admittedly, the system contains a number of elements in the dialogue boxes, which might be difficult to grasp for new users. Most commonly used basic options are intertwined with options for advanced users, which may prove particularly confusing in the interaction with the system. Over 75% of respondents regarded integration of SAP with Microsoft Office software as sufficient. The daily operations of the logistics department involves the Microsoft Office software either at the beginning or at the end of the business

process conducted in the SAP environment. Initially, the data from Excel spreadsheets are automatically integrated into the SAP system, with no need for manual intermediation by generation of text files and importing duplicated files. The integration improves, inter alia, the effectiveness of report generation, without the need for mechanical copying of once entered data.

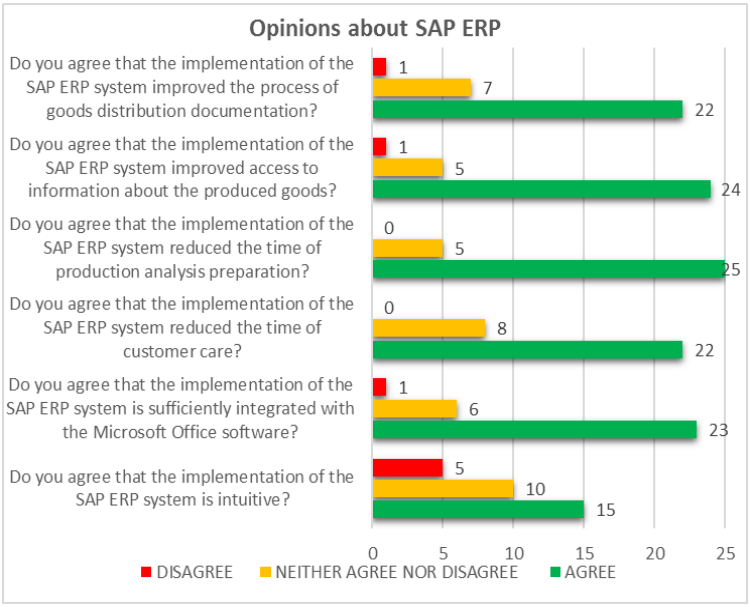

Fig. 2. Opinions about SAP ERP

The vast majority of the ones surveyed was of the opinion that the introduction of SAP ERP system had had a positive effect on reducing: the time of customer service (73.3%) and the time necessary to produce various analyses and reports (83.3%). A complete production report generated by the SAP ERP system considerably improves the daily work of production planners. Due to the versatility of this module, planners are presented with a tool enabling detailed analysis of data regarding particular production orders and generation of various cumulative reports, which may be further collated to highlight desired pieces of information. Further questions, shown in Figure 2, concerned the information provided by the SAP ERP system. In this case also the majority of respondents agreed that the access and flow of information regarding production (80%) and distribution (73.3%) have shown signs of improvement since the implementation of the system. SAP ERP enables quick and uncomplicated inspection of the correctness of production processes. The software may be used to control production on real-time basis, e.g. to assess whether a suitable remedial action should be commenced. The system enables timely reaction to off-norm situations,

even when the process has already been started. If it were not for such a tool as SAP ERP, each necessary analysis would have to be manually conducted, which in the conditions of simultaneous manoeuvring several production lines, and daily production running into thousands, would have to involve extreme time waste, not to mention the lack of immediate reaction to unexpected scenarios. The SAP ERP system provides significant support to the entire organisation in terms of customer management. SAP provides data of sales profitability for particular customers, market segments or distribution channels. Therefore, it constitutes a basis for the optimisation of prices, e.g. by providing the knowledge of actual production costs.

The respondents of the survey were furthermore asked about the impact of SAP implementation on particular elements in different areas of the enterprise functioning (Figure 3). Similarly as in their response to previous questions, the vast majority of respondents have pointed to SAE ERP-induced improvements in material and raw material flow in the enterprise, control of stock level, due order delivery, customer management and closer returnable packaging control.

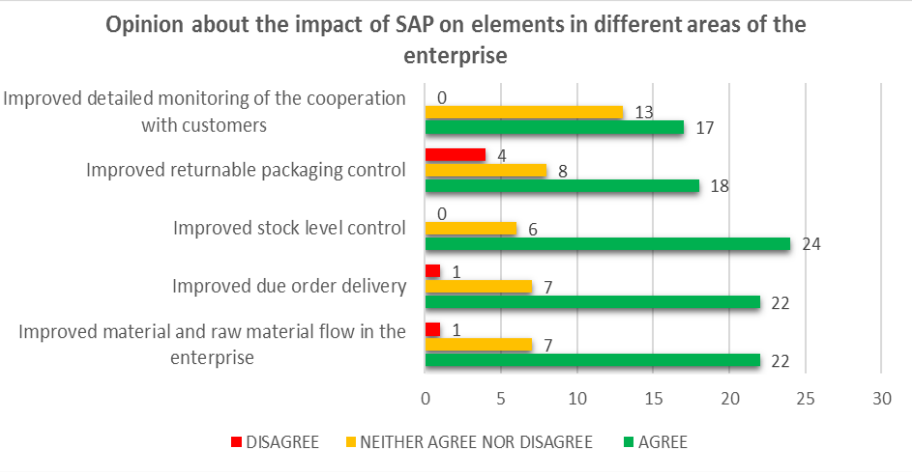

Fig. 3. Opinion about the impact of SAP on elements in different areas of the enterprise

SAP is a tool performing planning and scheduling of production, maintaining control over its profitability and controlling lots of semi-finished products and finished goods. The system aggregates data about the finished goods, such as the total number of pieces, according to storage, location, or other features of goods. The information about the storing location is immediately accessible, which has a positive effect on planning, coordination, and control of logistic processes involved in the goods flow. Customers regularly update their order schedules, which are instantly processed by SAP ERP to ensure that the current stock levels correspond to the customer order needs.

The key question asked in the survey required the respondents to reflect on the level of satisfaction with the SAP system. 70% of those who were interviewed confirmed that they were satisfied with the system, whereas 27% were neither for nor against the system, and one respondent expressed their disappointment with the work with the system. The results indicate that the system is positively perceived by the employees and that it fulfils its role in aiding the enterprise management. As this question allowed short commentary, some of the respondents shared their ideas on which areas of their work in the system could benefit from change. The major focus was predominantly ascribed to the interface, which was described as outdated and overloaded with information, containing excessive amount of transactions (commands), which furthermore frequently multiply the information.

4. STUDY CONCLUSIONS

The results obtained from the exploratory interview, the observations and analysis of documentation obtained from the enterprise lead to the formulation of several conclusions. SAP system is an indispensible tool, which organises the day-today work activities of the enterprise. This may be inferred from the answers of the respondents, the vast majority of whom expressed their positive opinion of the system. ERP software is attracting an increased amount of attention from production/distribution companies, which consider it as an indispensible tool at work. Characterised by high complexity and tremendous production or distribution data storage capacity, the SAP ERP system is equipped in data filtering and configuration solutions, by means of transactions (commands), which significantly shorten the analysis preparation times. The considerable variety of transactions allows formulation of high-complexity analyses and purpose-specific datasets, which furthermore are the proof of high flexibility of the system.

Apart from the indisputable advantages of the system, its interface is regarded as outdated and overloaded with information. The former causes problems remembering the transactions, which could be resolved by a greater flexibility of the system in editing and customising the interface (i.e. the list of transactions) as per particular user needs. From the technical perspective, the change could consist in creating a "Most used" folder in the main menu, which would hold the list of transactions of greatest relevance to a particular employee, his position and expertise. This solution would prevent errors in entering transaction codes and shorten the time required to find the desired command. The reduced list of available options would enable instant access to key transactions, whereas the user would not be required to memorise the transaction codes. Moreover, the outdated interface indicates the need to implement a systematic update that would elevate the interface to current visual standards.

Furthermore, the SAP ERP system could become more accessible if the mobile version of the application were introduced and installed on company smartphones. Such apps increase the flexibility of employees and ensure a significantly faster reaction to unexpected failures, which are not uncommon in the analysed industry. The mobile application would allow the employees/users to access the system data at any given time, including off work. In critical situations a member of the logistics team would not have to appear at the company to e.g. correct the documentation, and would be able to perform any actions remotely from home. This solution could prove particularly useful in emergency, which is an everyday occurrence in transport and logistics.

The drawbacks of the system discovered in the process, are far from outweighing the benefits of the solution, such as reduction in the data processing times, in reporting and production analysis. The logistics team members could devote the time saved by the automation of SAP ERP system to other burning issues in other areas of company operation, rather than to multiplying the existing data entries in spreadsheets or files.

The results from this study indicate that ERP systems in modern enterprises may prove irreplaceable and are crucial to their smooth daily operation. The wide array of potential applications and modules enables adjusting the system to various enterprises and their specific needs. Together with relieving employees of certain daily duties, the system is an effective tool in shortening the time necessary to create various production analyses. The system provides support to workers and the source of various information. Over 70% of the respondents claim that their work would be virtually impossible without the aid of the ERP system. This indicates that the system is highly useful and is regarded as an indispensible element of everyday work.

REFERENCES

Costin, B., & Cojocaru, D. (2017). Integration of metrology applications in the calibration reservoir suites using SAP Fiori, portal and cloud. A study case. *2017 21st International Conference on System Theory, Control and Computing (ICSTCC)* (pp. 297–302). Sinaia: IEEE. doi:10.1109/ICSTCC.2017.8107050

Gattiker, T., & Goodhue, D. (2005). What Happens after ERP Implementation: Understanding the Impact of Interdependence and Differentiation on Plant-Level Outcomes. *MIS Quarterly, 29*(3), 559–585. doi:10.2307/25148695

Grabot, B., Mayere, A., Lauroua, F., & Houe, R. (2014). ERP 2.0, what for and how? *Computers in Industry, 65*(6), 976-1000. doi:10.1016/j.compind.2014.02.017

Huang, Y. Y., & Handfield, R. (2015). Measuring the benefits of ERP on supply management maturity model: a "big data" method. *International Journal of Operations & Production Management, 35*(1), 2–25. doi:10.1108/IJOPM-07-2013-0341

Jenko, A., & Roblek, M. (2016). A Primary Human Critical Success Factors Model for the ERP System Implementation. *Organizacija, 49*(3), 145–160. doi:10.1515/orga-2016-0014

Johansson, B., & Ruivo, P. (2013). Exploring Factors for Adopting ERP as SaaS. *Procedia Technology, 9*, 94–99. doi:10.1016/j.protcy.2013.12.010

Kahraman, C., Beskese, A., & Kaya, I. (2010). Selection among ERP outsourcing alternatives using a fuzzy multi-criteria decision making methodology. *International Journal of Production Research, 48*(2), 547-566. doi:10.1080/00207540903175095

Kale, V. (2000). *Implementing SAP™ R/3: The Guide for Business and Technology Managers* (1 ed.). Indianapolis: Sams Publishing.

Kilic, H. S., Zaim, S., & Delen, D. (2015). Selecting "The Best" ERP system for SMEs using a combination of ANP and PROMETHEE methods. *Expert Systems with Applications, 42*(5), 2343–2352. doi:10.1016/j.eswa.2014.10.034

Kłosowski, G. (2013). Cloud Manufacturing Concept as a Tool of Multimodal Manufacturing Systems Integration. *Foundations of Management, 4*(1), 17–42. doi:10.2478/fman-2013-0002

Kumar, V., Maheshwari, B., & Kumar, U. (2003). An investigation of critical management issues in ERP implementation: emperical evidence from Canadian organizations. *Technovation, 23*(10), 793–807. doi:10.1016/S0166-4972(02)00015-9

Lambert, S., Calvasina, R., Bee, S., & Woodworth, D. (2017). Assembly FG: An Educational Case on MRP II Integrated within ERP. *Accounting Perspectives, 16*(1), 43–46.

Mahendrawathi, E., Zayin, S., & Pamungkas, F. (2017). ERP Post Implementation Review with Process Mining: A Case of Procurement Process. *Procedia Computer Science, 124*, 216–223. doi:10.1016/j.procs.2017.12.149

Mishra, A., & Mishra, D. (2011). ERP Project Implementation: Evidence from the Oil and Gas Sector. *Acta Polytechnica Hungarica, 8*(4), 55–74.

Missbach, M., & Anderson, G. (2016). *SAP w 24 godziny.* Gliwice: Helion.

Ngai, E., Law, C., & Wat, F. (2008). Examining the critical success factors in the adoption of enterprise resource planning. *Computers in Industry, 59*(6), 548–564. doi:10.1016/j.compind.2007.12.001

Olson, D., Johansson, B., & De Carvalho, R. (2018). Open source ERP business model framework. *Robotics and Computer-Integrated Manufacturing, 50*, 30–36. doi:10.1016/j.rcim.2015.09.007

Panorama Consulting Solutions. (2017a). *Report on ERP Systems & Enterprise Software.* Greenwood Village: Panorama Consulting Solutions.

Panorama Consulting Solutions. (2017b). *Top 10 ERP Systems Rankings Report.* Greenwood Village: Panorama Consulting Solutions.

Parthasarathy, S., & Sharma, S. (2016). Efficiency analysis of ERP packages – A customization perspective. *Computers in Industry, 82*, 19–27. doi:10.1016/j.compind.2016.05.004

Perçin, S. (2008). Using the ANP approach in selecting and benchmarking ERP systems. *Benchmarking, 15*(5), 630–649. doi:10.1108/14635770810903196

Ruivo, P., Oliveira, T., & Neto, M. (2015). Using resource-based view theory to assess the value of ERP commercial-packages in SMEs. *Computers in Industry, 73*, 105–116. doi:10.1016/j.compind.2015.06.001

Sudhaman, P., & Thangavel, C. (2015). Efficiency analysis of ERP projects–software quality perspective. *International Journal of Project Management, 33*(4), 961–970. doi:10.1016/j.ijproman.2014.10.011

Sun, H., Ni, W., & Lam, R. (2015). A step-by-step performance assessment and improvement method for ERP implementation: Action case studies in Chinese companies. *Computers in Industry, 68*, 40–52. doi:10.1016/j.compind.2014.12.005