

Laslo Šereš,
Đorđe Medaković

Embedding OLAP into ERP Systems from the View of User Adoption: The Example of Serbian SMEs

Article Info:

Received 10 January 2014
Accepted 25 January 2014

UDC 004.031:658

Recommended citation:

Šereš, L., Medaković, Đ. (2014). Embedding OLAP into ERP Systems from the View of User Adoption: The Example of Serbian SMEs. *International Scientific Journal of Management Information Systems*, 9 (1), 03-10.

Summary

ERP solutions are designed to integrate all the information flowing within the company. Although businesses recognize the wealth of information within ERP systems, these systems were not originally designed to provide real-time reports to massive users. The search for a solution that will provide a more flexible and efficient support of decision-making process has led to the emergence of Business Intelligence (BI). The integration of ERP system with the analytical capabilities of BI can be accomplished in several ways depending on the needs and available resources of specific organization. The resources available to small and medium-sized enterprises (SMEs) are modest and they usually do not have a separate BI system. To meet the analytical needs of SMEs providers of ERP systems are increasingly embedding OLAP technology into their solutions. In extending the standard ERP reporting capabilities the ERP/SME providers (especially local providers) usually rely on Open Source OLAP tools. The aim of this paper is to determine the extent to which ERP/SME providers embed OLAP technology into their solutions, and the level of ERP user adoption of embedded OLAP capabilities. The paper contains the results of empirical research conducted on a sample of 45 SMEs from Serbia.

Keywords

ERP, OLAP, adoption, SME

1. Introduction

The growing relevance of Enterprise Resource Planning (ERP) has raised much attention in the academic literature, business practice and media. Current literature and thought are primarily focused on two aspects of this phenomenon: the economic and organizational impact of the adoption of ERPs inside a firm, and the best way to manage that adoption. While these research questions are certainly critical, our aim stands upstream: recognizing the growing presence of ERP systems in SMEs, as well as the opportunities provided by the new trend of integration of BI technologies and ERP systems, we want to investigate how this affects the everyday practice of using ERP systems.

Enterprise Resource Planning (ERP) is identified as the essential platform upon which companies are building their competitive business process upgrades (Caruso, 2003). ERP software is a strategic tool, which equips the enterprise with the necessary capabilities to integrate and synchronize isolated functions into streamlined business processes. It also optimizes the resources available in order to gain a competitive edge in the turbulent business environment.

In the past, the utilization of ERP systems has almost exclusively been attributed to large organizations due to the nature of their business and complexity (Ahmad & Pinedo-Cuenca, 2013). As the most significant reasons hindering SMEs to adopt the ERP systems were identified the costs associated with ERP implementation and difficulties found in achieving management expectations. As the technology become more established and prices come down the implementation of ERP systems in SMEs is becoming more common (over the last decade or so). This is evident by the fact that a growing number of ERP vendors now focus primarily on SMEs, and also by noting that many of the large ERP vendors such as SAP, Microsoft, and others, are actively expanding their business activities to the SME sector (Pinedo-Cuenca et al., 2004), as illustrated by the continuous ERP market growth within SMEs. This growth is attributed to the fact that SMEs have realized the advantages of entirely integrating the information pertaining to all business processes into one system (Davenport, 2000); leading organizations have completely subsumed manufacturing into supply chain, and much of the interaction between customers and suppliers are carried out electronically (Ahmad & Pinedo-Cuenca, 2013).

ERP systems can indeed be a strategic weapon of SMEs. Not only does it provide a necessary infrastructure that forms the transactional system of record upon which a business is based, but it also serves as a source of cost savings and operational improvements, streamlining and accelerating business processes, allowing SMEs to compete on the same stage as larger companies (Jutras, 2010).

In the current business environment of Serbia, SMEs are increasingly sensitive to the competition of large corporation, so that applying cutting-edge technologies in monitoring and planning business operations is the prerequisite for survival and progress. Due to this it is not surprising that an increasing number of SME managers are recognizing the importance of efficient resource planning and management and ERP systems as an irreplaceable tool in this sphere.

Most businesses today have more data than they know how to use. And getting at that data and then presenting it in a useful manner for serious analysis are two tasks that typically haunt organizations. BI tools have reached a level of maturity which can elevate executives from the depth of the details, bringing them to a higher operating level where they can add strategic value to the organization. Regardless of whether BI tools are embedded in ERP solution, tightly integrated or bolted on after-the-fact it's easy to notice that there is a synergistic relationship between ERP and BI.

To meet the needs of large organizations well-known ERP vendors offer serious BI solutions as analytical extensions of their standard ERP systems (e.g. SAP HANA). However, such solutions are not suitable to small businesses with more modest financial and other resources. In addition, the amount of data held by SMEs is much lower compared to the databases of large organizations. Therefore, vendors of ERP systems designed for SMEs usually opt for embedding OLAP technology in order to secure additional analytical capabilities.

In the last decade the ERP market in Serbia is characterized by the growing participation of well-known international ERP providers (SAP, Oracle, Microsoft) especially when it comes to large organizations (many of which have lately received foreign owners). Therefore, the domestic ERP providers are increasingly turning to SMEs. Encouraged by the emergence of a number of open source OLAP solutions, the Serbian ERP providers have started to integrate segments of BI

into their ERP solutions. For now, this applies mainly to the OLAP technology which has undoubted advantages comparing to report generators used earlier for analytical purposes. Embedding OLAP technology in ERP systems aims to enable users much greater autonomy in defining ad-hoc queries and generating new reports as needed. To the extent that users take advantage of opportunities OLAP the ERP suppliers are relieved of tasks related to user requirements concerning the creation of new reports. Theoretically, this integration should lead to higher ERP user satisfaction with lower engagement of ERP supplier resources.

Starting from these theoretical assumptions, our intention was to investigate the actual state of ERP/BI integration and users attitude to this new trend. The research questions we address in this paper are as follows:

RQ1. To what extent are BI solutions integrated into ERP systems?

RQ2. To what extent are ERP system users familiar with the possibilities of using OLAP technology?

RQ3. What is the extent of use of OLAP solutions with integrated OLAP technology by ERP system users?

RQ4. What do users identify as an obstacle to more successful use of OLAP solutions within their ERP systems?

For the purpose of obtaining answers to these questions, a survey was conducted which included a representative sample of SMEs in the Serbian Province of Vojvodina.

2. Literature overview

An ERP system is a set of managerial tools enabling balance between supply and demand within a business, providing a complete supply chain from suppliers to end users, using well-established business processes for decision making and providing a high degree of integration of all business processes within the enterprise. Thus, and ERP system enables the management to operate towards high-quality client support and productivity, reducing at the same time operation and resource utilization costs (Wallace & Kremzar, 2001).

There are many studies that points to the expanding use of ERP systems in SMEs and examine the specificities of ERP adoption in these organizations (Van Everdingen et al., 2000; Loh & Koh, 2004; Buonanno et al., 2005; Bharathi et al.,

2012). Chan (1999) asserts that many SMEs either do not have sufficient resources or are not willing to commit a huge fraction of their resources due to the long implementation times and high fees associated with ERP implementation. The resource scarcity, the lack of strategic planning of information systems (Cragg and Zinatelli, 1995; Levy and Powell, 2000), the limited expertise in IT (Levy and Powell, 2000) and also the opportunity to adopt a process-oriented view of the business are among the factors that strongly influence, either positively or negatively, ERP adoption by SMEs.

ERP systems are used to collect, store, manage and interpret data from many business activities, including finance, marketing and sales, inventory management, HR management, etc. ERP systems contain significant amount of data about current business transactions, but their real value can be revealed only after the deployment of a BI system.

Stackowiak et al. (2007) define BI as the process of taking large amounts of data, analyzing that data, and presenting a high-level set of reports that condense the essence of that data into the basis of business actions, enabling management to make fundamental daily business decisions. (Cui et al, 2007) view BI as way and method of improving business performance by providing powerful assists for executive decision maker to enable them to have actionable information at hand. BI tools are seen as technology that enables the efficiency of business operation by providing an increased value to the enterprise information and hence the way this information is utilized.

BI tools and solutions offer the possibility of in-depth data analysis, identifying trends and patterns, forecasting and planning the forthcoming business steps, all based on operative data gathered from ERP systems. BI system helps in consolidating, analyzing and providing vast amounts of data for business decision making (Phan & Vogel, 2010) and has a potential for shortening the time required for gathering relevant information and enabling their efficient use.

As stated by Codd et al. (1993), OLAP is the name given to the dynamic enterprise analysis required to create, manipulate, animate, and synthesize information from exegetical, contemplative, and formulaic data analysis models. Thanks to the multidimensional approach underlying OLAP the users have the ability to customize and change their views of data to suit their specific needs and enable users to perform any type of analysis within the database. OLAP

tools make it easy to uncover the root causes of problems, identify trends and compare performance across groups. OLAP tools can be immensely helpful for data mining projects, business process management (BPM) applications, budgeting, forecasting, planning and more. In fact, OLAP is a critical part of all BI systems.

For many years, the enterprise data was split into OLTP and OLAP. OLTP is the necessary prerequisite for OLAP, however only with OLAP companies are able to understand their business and come to conclusions about how to steer and change course. When planned data and actual data are matched, business becomes transparent and decisions can be made. While centralized warehouses also handle the integration of data from many sources, it is still desirable to have OLTP and OLAP capabilities in one system which could make both components more valuable to their users (Plattner, 2009).

Integration of ERP and BI enables the enterprise management to make decisions by using the analytical abilities of BI systems and the possibility of processing a huge amount of data in the ERP system. This concept, therefore, results in optimized utilization of both ERP and BI components of the enterprise's resource management system (Chou et al., 2005).

As far as developing and maintaining of separate BI systems is connected with significant costs (and especially their afterwards integration with ERP system) it is not surprising that an increasing number of ERP vendor opt for embedding BI capabilities into their ERP systems (Ortiz, 2002), which is particularly apparent in the case of ERP systems designed for SMEs. This trend is enabled by the continuous enhancement of BI technologies followed by significant fall in prices, which is making them more available. Embedding OLAP technology into ERP systems enables users to create reports that are more knowledge-oriented than mere listing of data. Giving an infinite set of data views - with varying levels of granularity - OLAP tools enable ERP users to reveal information that would otherwise be difficult to attain. Embedding OLAP into ERP system maximizes the data-analysis potential of users.

Nofal & Yusof (2013) pointed to different criteria and factors when examining the exploitation of ERP and BI systems in developed and developing countries. They also pointed out that the largest amount of research was conducted in developed countries, and that these results

cannot be applied uncritically to developing countries as well. Serbia is in a specific position, as investment in IT are below the standards for European countries, so that the authors regard the research results authentic, and the latter should be verified in the further research in countries of similar degree of economic and informatics development.

3. Research methodology

The research steps including conducting literature overview on ERP & BI integration, instrument development, data collection and data analysis is shown in Figure 1.

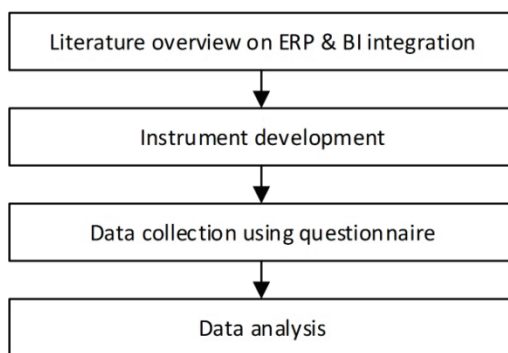


Figure 1 Research steps

A. Literature overview on ERP & BI integration

One of the most well-established methods to integrate research findings and assess the cumulative knowledge within a domain is a qualitative literature review. This method allows a researcher to analyze and evaluate both quantitative and qualitative literature within a domain to draw conclusions about the state of the field.

To find research that has been published on ERP systems generally and ERP & BI systems integration especially full-text searches in numerous online databases were performed using multiple keywords. The search term for appreciable publications was “ERP & BI”, “OLAP & ERP” and “reporting” in combination with “ERP” or “OLAP”. Every result was analyzed through a review of the abstract. Papers that have passed this selection were further analyzed as well as other publications close to the research topic founded in the references of the analyzed publications.

B. Instrument development

A 26 items questionnaire has been developed by consolidating information and knowledge about aspects of the ERP & BI integration gathered

through literature review. The questionnaire can be divided into four parts. The questions in the first section are aimed at determining the profile of the surveyed enterprise. The next unit consists of questions that gathered information about the ERP system used in the organization (ERP provider, modules used, duration of use, number of users, and other details). In the third section we checked the extent to which respondents are familiar with the meaning of the term OLAP and whether the ERP solution they use contains embedded OLAP capabilities. In the fourth section, which is completed only by respondents with embedded OLAP, questions were related to the degree of user adoption of embedded OLAP capabilities and the determination of the main obstacles to a greater level of adoption.

C. Data collection and sample size

The target of this study was SMEs from the territory of the Serbian Autonomous Province of Vojvodina (with about 2 million inhabitants). First, using a database one of the leading regional IT company (dealing in information technologies but not developing or selling any kind of information systems) we gathered contact information of the SMEs; second, the authors asked them to participate in the study; third, the electronic questionnaire (created by using the Google Forms tool) was sent to them, and finally, they filled and replied the questionnaires. Totally, 100 questionnaires were sent to same number of SMEs, 45 questionnaires were gathered and 45 usable questionnaires were used for the analysis (response rate: 0.45).

D. Data analysis

The analysis was performed using Microsoft Excel 2013 spreadsheets and included basic statistical methods.

4. Research results

A. General features of surveyed businesses

According to the number of employees, the structure of surveyed SMEs is shown in Figure 2. As it can be seen most of the surveyed enterprises fall into the category of small businesses, though in Serbia even the companies with over 50 employees are often treated as medium-sized.

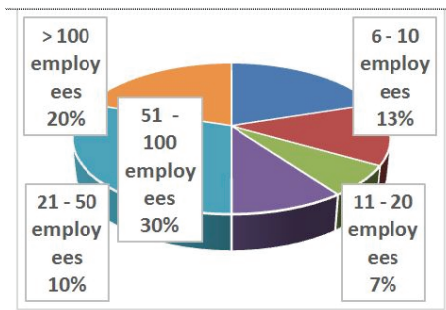


Figure 2 Share of surveyed SMEs by staff numbers

By the businesses' core activities, the survey participants were predominantly trade and manufacturing enterprises, as shown in Figure 3.

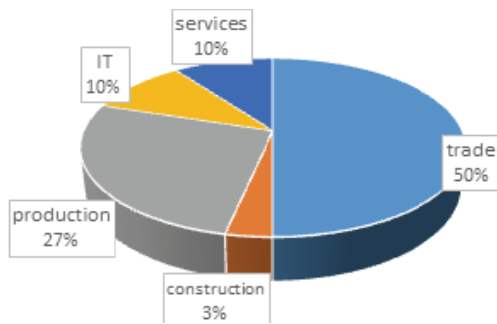


Figure 3 Structure by SMEs core activities

B. ERP-related results

Thirty of the 45 surveyed SMEs stated that they use some kind of ERP solution. This gives a much higher percentage of ERP using SMEs than stated in the official report of the Serbian National Statistical Institute for 2013 (SNSI, 2014). According to SNSI around 10% small and over 20% of medium-sized enterprises are using ERP. The difference between official indicators and indicators obtained in the survey can be explained by the fact that the indicators of enterprises with headquarters in the area covered by the sample are generally above the state average, as well as by the fact that respondents were taken from the database of a renowned IT company (SMEs that do not use ERP, usually cooperate with less reputable IT firms that are providing lower quality of services for less money).

The grouping of these 30 SMEs by the criteria of ERP solution provider gave the following summary data (Figure 4): 2 SMEs are using Microsoft solutions, 5 of them have chosen Pantheon ERO solutions (Slovenian ERP provider), while the rest of SMEs are using domestic (Serbian) ERP solutions, among which Navigator has proved to be the most common provider (with 15 SMEs).

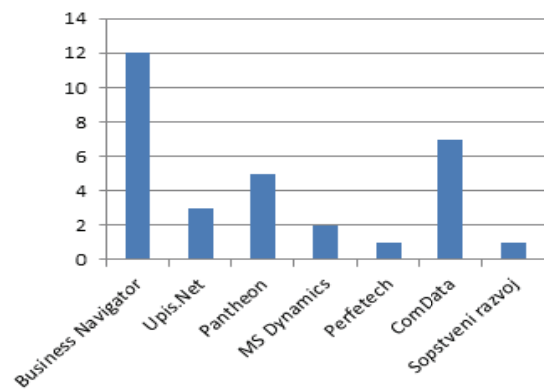


Figure 4 Share of ERP solutions used in surveyed SMEs

The most represented areas of application of ERP solutions are finance, sales and purchase. Only three companies have implemented ERP in the majority of their business processes (Figure 5). Assessing the type of business organization only four respondents declared that they are using process-oriented approach. Eleven of them deem that the approach is "mixed", and the others deem it as function-oriented.

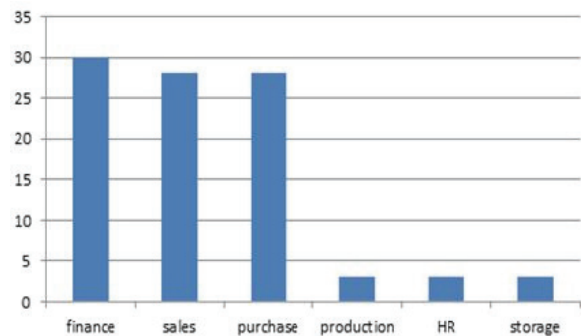


Figure 5 Business processes covered by ERP

C. OLAP-related results

Twenty seven out of 30 ERP solution users confirmed that they are familiar with the purpose and significance of OLAP technology. Still, only 20 SMEs use OLAP technology (Figure 6).

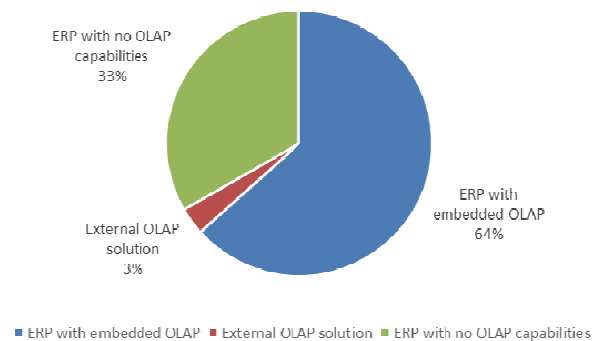


Figure 6 The ratio of SMEs using ERP with or without OLAP capabilities

Such a high ratio of SMEs with ERP solutions containing embedded OLAP is partly due to the fact that Navigator, as a most common among covered by ERP solutions with 15 implementation, offers embedded OLAP as a standard functionality. All other ERP solutions used by our respondents offer OLAP capabilities as optional. Nevertheless, it should be noted that out of 15 companies that had OLAP as an option, 5 of them (33%) decided to use this functionality, despite the additional costs.

Only 3 of the 19 SMEs using ERP solutions with embedded OLAP capabilities received within the ERP more than 10 predefined OLAP reports, most of them (10 SMEs) received up to 10 reports, while 6 SMEs has got less than 5. Of course, the number of predefined reports is largely influenced by the number of ERP modules implemented in individual SMEs. However, it appears that ERP providers could invest much more effort in terms of number of predefined OLAP reports.

D. User adoption-related results

Analysis of the number of OLAP users in individual SMEs showed that in 2 SMEs only one employee uses OLAP, up to five employees in 12 businesses, and more than 5 employees use OLAP in 6 SMEs (Figure 7).

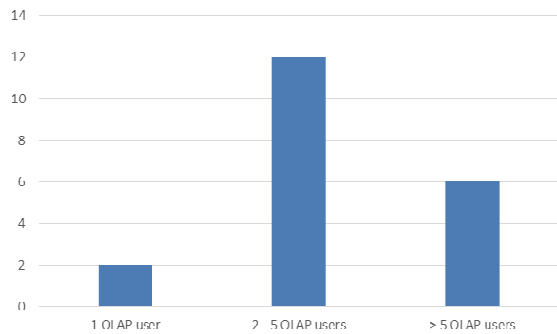


Figure 7 The share of SMEs by number of employees using OLAP capabilities

Regarding the duration of OLAP usage in most cases the OLAP has been in use as long as the ERP system, i.e. over 3 years (16 respondents).

Most of the respondents (9 of them) uses OLAP on a daily basis, 4 on a weekly basis, and 7 use it monthly.

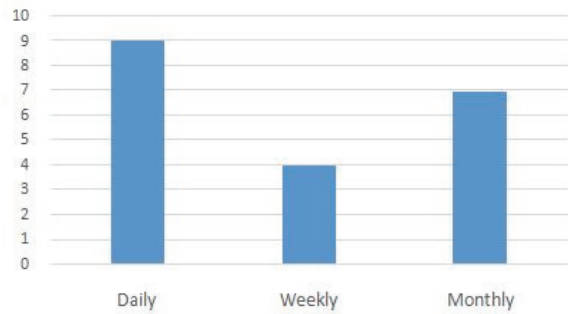


Figure 8 The share of SMEs according to frequency of use of the OLAP capabilities

Given the skills in terms of using OLAP capabilities most of the SMEs use only the predefined reports (16 SMEs), while only 1 SME has the practice of creating new OLAP reports (Figure 9).

This stunning picture is somewhat mitigated by the fact that Navigator, as a most common ERP in our sample of SMEs, does not offer the ability to create entirely new OLAP reports, but only a slight modification of existing reports. On the other hand, Navigator’s approach raises the question of the purpose of embedding OLAP into ERP solution.

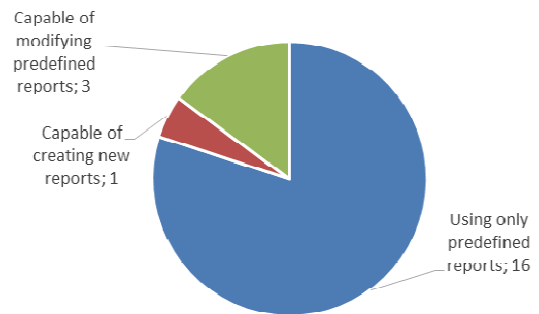


Figure 9 The share of SMEs according to frequency of use of the OLAP capabilities

The fact that most SMEs use only predefined reports does not mean that the predefined reports originally obtained with ERP fully satisfy their needs. Quite naturally, the users have new information requirements, but, instead of using OLAP capabilities, they prefer the option to ask their ERP suppliers to produce new reports (Figure 10.)

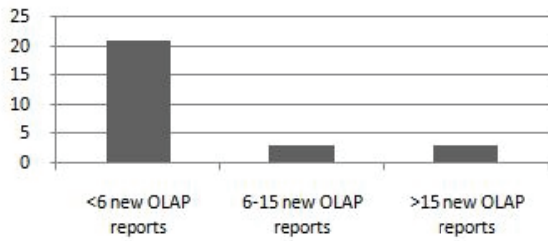


Figure 10 The share of SMEs according to number of new OLAP reports

The research has shown that users are not adequately trained for using OLAP reports. In 13 SMEs the users did not have any training, in 4 SMEs the position is that the training was insufficient, and only 3 SMEs rated the training as satisfactory (Figure 11.).

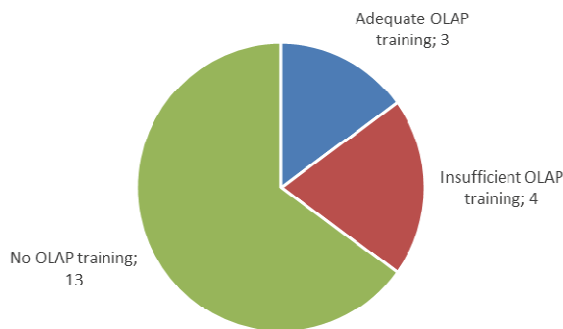


Figure 11 The share of SMEs according to evaluation of OLAP training sufficiency

E. Summary of results

The research has shown that an unexpectedly large proportion of respondents have the possibility of using OLAP technology as an embedded feature of their ERP solution. Although ERP systems with OLAP capabilities are supplied with predefined OLAP reports, in some SMEs employees do not use these reports. The situation is even worse if we consider the number of users performing ad-hoc analysis using OLAP. The causes of such state were identified in insufficient training of users for the use of OLAP technologies and insufficient recognition of the importance of this technology by the SMEs’ top management.

5. Conclusion

The main conclusion is that OLAP technologies are fairly represented in ERP solutions used by SMEs included in this study, but at the same time there is a low level of use of these technologies in everyday practice of ERP users. The main identified causes of this disappointing level of use

concern inadequate user awareness on the significance and inadequate training level for using OLAP tools and techniques.

SMEs increasingly use ERP systems. The survey conducted in this research has shown that many ERP systems designed for SME users offer them the possibility to meet their analytical needs with integrated solutions from the domain of business intelligence. The fact that that the respondents mostly used domestic ERP solutions testify that domestic software industry is keeping pace with current technologies despite the low level of investment in information technologies.

Despite being available, solutions from the domain of business intelligence integrated in ERP systems are often not recognized by users as significant, so that the actual application level of OLAP technology in SMEs in Autonomous Province of Vojvodina cannot be regarded as satisfactory.

In addition to underdeveloped users’ awareness of the significance of applying OLAP technology, the second identified cause of such a state is insufficient user training in the use of OLAP.

The fact that there are ERP solutions that are not integrated with some OLAP solutions also testifies that even some producers of ERP systems fail to recognize the benefits that their users would have from such an approach, or a lack of commercial interest for developments of this sort.

Research results point to the conclusion that it is necessary to act towards raising top managers’ awareness of the possibilities offered by advanced data analysis technologies, such as OLAP, and enhance their ability to understand business processes and interpret the obtained results appropriately.

It is also necessary to conduct a systematic training course with analytical skill requirements, so as to enable then to submit to top management high-quality information that they can interpret.

ERP solution producers in Serbia should pay more attention to promoting their integrated OLAP solutions, as this is one of the ways to create loyal clients and attract new ones, who recognize value added in comparison with classical ERPs.

Thanks to the new generations of employees who have been able to familiarize themselves with BI technologies through their higher education, interest and user pressure in this direction is likely to grow in the future. Even more ERP provider therefore likely to integrate OLAP technologies into their solutions.

References

- Ahmad, M., & Pinedo-Cuenca, R. (2013). Critical success factors for ERP implementation in SMEs. *Robotics and Computer-Integrated Manufacturing*, 29 (3), 104-111.
- Bharathi, S. V., Vaidya, O., & Parikh, S. (2012). Prioritizing and Ranking Critical Success Factors for ERP Adoption in SMEs. *AIMS International Journal of Management*, 6 (1), 23-40.
- Buonanno, G., Faverio, P., Pigni, F., Ravarini, A., Sciuto, D., & Tagliavini, M. (2005). Factors affecting ERP system adoption: A comparative analysis between SMEs and large companies. *Journal of Enterprise Information Management*, 18 (4), 384-426.
- Caruso, D. (2003). *The world class challenge: six critical issues midmarket manufacturers must address*. Boston: AMR Research Inc.
- Chan, R. (1999). *Knowledge management for implementing ERP in SMEs*. Paper presented at the 3rd Annual SAP Asia Pacific, Institute of Higher Learning Forum, Singapore.
- Chou, D. C., Tripuramallu, H. B., & Chou, A. Y. (2005). BI and ERP integration. *Information Management & Computer Security*, 13 (5), 340-349.
- Codd, F., Codd, S. B., & Salley, C. T. (1993). *Providing OLAP (Online Analytical Processing) to User-Analysts: An IT Mandate*. Calif: Codd EF & Associates.
- Cragg, P. B., & Zinatelli, N. (1995). The evolution of information systems in small firms. *Information & Management*, 29 (1), 1-8.
- Cui, Z., Damiani, E., & Leida, M. (2007). Benefits of Ontologies in Real Time Data Access. *Digital Ecosystems and Technologies Conference, DEST '07* (pp. 392-397). London: IEEE.
- Davenport, T. (1998). Putting the enterprise into the enterprise system. *Harvard Business Review*, 76 (4), 121-131.
- Jutras, C. (2010). *ERP in SME: Fueling Growth and Profits. An Aberdeen Group Research*. Retrieved August 15, 2014 from Velocity: <http://www.velocitydev.com/Aberdeen%20-%202010%20ERP%20in%20the%20Mid-Market%20Benchmark%20Report,%20ERP%20in%20SME.pdf>
- Levy, M., & Powell, P. (2000). Information systems strategy for small-medium-sized enterprises: an organizational perspective. *Journal of Strategic Information Systems*, 9 (1), 63-84.
- Loh, T. C., & Koh, S. C. (2004). Critical elements for a successful enterprise resource planning implementation in small-and medium-sized enterprises. *International Journal of Production Research*, 42 (17), 3433-3455.
- Negash, S. (2004). Business Intelligence. *Communications of the Association for Information Systems*, 13 (1), 177-195.
- Nofal, M. I., & Yusof, Z. M. (2013). Integration of Business Intelligence and Enterprise Resource Planning within Organizations. *Procedia Technology*, 11, 658-665.
- Ortiz, S. (2002). Is business intelligence a smart move? *In Computer*, 35 (7), 11-14.
- Phan, D. D., & Vogel, D. R. (2010). A model of customer relationship management and business intelligence systems for catalogue and online retailers. *Information & management*, 47 (2), 69-77.
- Pinedo-Cuenca, R., Shaw, T., Ahmad, M., & Abbas, A. (2004). Adoption of ERP systems in SMEs. *Proceedings of Conference on Flexible Automation and Intelligent Manufacturing (FAIM) 2004* (pp. 1240-1247). Toronto: FAIM.
- Plattner, H. (2009). A common database approach for OLTP and OLAP using an in-memory column database. *Proceedings of the 2009 ACM SIGMOD International Conference on Management of data* (pp. 1-2). New York: ACM.
- Ranjan, J. (2009). Business intelligence: concepts, components, techniques and benefits. *Journal of Theoretical and Applied Information*, 9 (1), 60-70.
- Republički zavod za statistiku. (2014). *Upotreba informaciono-komunikacionih tehnologija u Republici Srbiji*. Retrieved August 10, 2014 from Republički zavod za statistiku: <http://webzrs.stat.gov.rs/WebSite/repository/documents/00/01/14/03/PrezIC T2011.pdf>
- Stackowiak, R., Rayman, J., & Greenwald, R. (2007). *Oracle Data Warehousing and Business Intelligence Solutions*. Indianapolis: Wiley Publishing, Inc.
- Van Everdingen, Y., Van Hillegersberg, J., & Waarts, E. (2000). Enterprise resource planning: ERP adoption by European midsize companies. *Communications of the ACM*, 43 (4), 27-31.
- Wallace, T. F., & Kremzar, M. H. (2001). *ERP: making it happen: the implementers' guide to success with enterprise resource planning*. New York: John Wiley & Sons.

Laslo Šereš

University of Novi Sad
Faculty of Economics in Subotica
Segedinski put 9-11
24000 Subotica
Serbia
Email: laci@ef.uns.ac.rs

Đorđe Medaković

Positive doo
Danila Kiša 5
21000 Novi Sad
Serbia
Email: djordje.medakovic@gmail.com
