ERP PACKAGE EVALUATION, THE CASE OF SMEs KAVALA's REGION

S. Valsamidis[1]
A. Mandilas[2]
M. Nikolaidis[3]
P. Polychronidou[4]

ABSTRACT: In this paper we want to examine how enterprise resource planning (ERP) systems effects on small and medium-sized enterprises (SMEs) Kavala's region. We consider several SMEs of our region, we use data from each SME and we form a questionnaire to secure more data from the enterprises. We weight up the factors that affect the choice of ERP. Also, we relate these factors with basic characteristics of the specific SMEs of our region. Flexibility and functionality are the most important criteria of choosing an ERP system. Surprisingly, the cost is one of the less important criteria. Also, minor effects have criteria such as brand, name and position of the vendor. Finally, we indicate issues for future research.

Keywords: ERP, SMEs, criteria evaluation

JEL codes: C8

Introduction

Nowadays, enterprises are in pressure to perform as efficiently and effectively as possible to compete in the market. The integration of an information system is important for organising all the departments and functions of an enterprise. Until the 90s, each department in an enterprise would most likely have its own computer system, data and database. Many of these systems could not be able to communicate with one another to make it possible for cross computer system communication.

Enterprise Resource Planning (ERP) systems have been considered an important development in the corporate use of information technology, enhancing organizational efficiency and effectiveness, through the seamless integration of all the information flowing through an enterprise [5, 14]. The 11th edition of the APICS Dictionary [4] defines ERP as a "framework for organizing, defining and standardizing the business processes necessary to effectively plan and control an organization, so the organization can use its internal knowledge to seek external advantage". Once an ERP system is in place, usually all aspects of an enterprise can work in harmony, instead of every single system needing to be compatible with each other.

Implementing an ERP system is not an easy task to achieve, in fact it takes lots of planning, consulting and time. It will ultimately require significant changes on staff and work practices. The costs needed for the effort to implement these systems are usually very high and also very hard to

[1] Department of Accountancy, Kavala Institute of Technology, Agios Loukas, 65404, Kavala, Greece, svalsam@teikav.edu.gr
[2] Department of Accountancy, Kavala Institute of Technology, Agios Loukas, 65404, Kavala, Greece, smand@teikav.edu.gr
[3] Department of Accountancy, Kavala Institute of Technology, Agios Loukas, 65404, Kavala, Greece, mnikol@teikav.edu.gr
[4] Department of Accountancy, Kavala Institute of Technology, Agios Loukas, 65404, Kavala, Greece, polychr@sdo.teikav.edu.gr

estimate. In every case, there is a great uncertainty in the begging while at the end is only a minor uncertainty [8].

In planning phase, the most important decisions will affect the future of the enterprise. It would be very helpful if a method would exist that could predict the effort required for implementing the ERP within reasonable boundaries. It should not be too complex and should be quick. Therefore, after deciding that ERP is appropriate for the enterprise, the evaluation of the ERP package and provider is important in choosing the right one. In this direction, several criteria have been determined for evaluating ERP. Additionally, enterprises interview a few vendors and assemble a team to provide the best ERP solution.

In this research, we aim to weight up the criteria that affect the evaluation of ERP focusing at several small and medium-sized enterprises (SMEs) of our region. Initially, we chose the criteria based on previous academic researches. The final list of criteria is established by interviewing a single informant of each enterprise according to the enterprise's situation and needs. Also, we wish to relate these criteria with basic characteristics of the specific SMEs.

Literature review

In order to start our research, we looked through the previous literature in the area of ERP systems. To begin with the brief history of ERP, in [6] major ERP vendors are discussed as well as the major impact of developments in computer industry.

Choosing which ERP to use is a complex decision that has significant economic consequences, thus it requires a multi-criterion approach. There are sufficient papers studying ERP evaluation, such as [1, 2, 11, 12, 16]. Most of them weight up what criteria are used in ERP selection process and what are the most important for enterprises, considering practical experience.

The implementation of an ERP system is an important investment for an enterprise, which is characterized also by a high degree of risk. Selecting the most appropriate system is a necessary condition for a successful implementation. In this direction there are substantial studies [3, 7, 10, 14, 15, 17]. Efforts are made to understand the environment that enables effective knowledge transfer between consultants and the clients, and whether more effective knowledge transfer would lead to an ERP system better matched with the client's process requirements. Most of the authors build on the findings of their regions' enterprises to investigate into the assessment and optimisation of ERP performance.

After an ERP is installed in an enterprise, there is a gap between the system and the requirements of the enterprise. In [13] it is presented an approach for solving that gap and aligning the system to the needs of the enterprise. This approach provides a systematic support for the alignment process in both standard enterprises and unique ones. It benefits for reuse on the basis of the enterprise requirements, without being restricted by a predefined set of criteria and standard solutions. In [9] it is examined the long-term financial performance effects of ERP system change/revisions for enterprises that have previously reported ERP adoptions. It empirically examines the extent to which discrete changes to ERP systems over a post-implementation time-frame impact on enterprises' ability to deliver long-run financial performance. It further examines whether the timing and nature of system transformation during the post-implementation period presents a significant moderating condition of ERP performance outcomes. A study about the key-user satisfaction in ERP environments is presented in [18]. It is elicited that it is multidimensional and is closely related to perceived system success.

Research methodology

In this paper we examine how the enterprise resource planning (ERP) effects on small and medium-sized enterprises (SMEs) of Kavala's region. We consider the 40 biggest SMEs of our region that are able to use ERP, according to Kavala chamber of commerce and industry. For the Greek standards, the size of a SME depends on the sales, revenue, number of employees and total

value of assets. The first aim of this paper is to weight up the factors that affect the choice of an ERP. Through an extensive literature review and initial interviews with the enterprises' agents, 15 selection criteria for the ERP selection process were identified.
These criteria are the following: functionality of the system, technical support offered by the supplier, cost of the system, service and support that the supplier provides, supplier's name (reputation), system's reliability, compatibility with other systems, adjustment (ease of customisation), supplier's position at the market, better fit with organisational structure (match), domain knowledge of the supplier, reference of the supplier, implementation time of the system, methodology proposed by the vendor and consultancy offered by the supplier to facilitate the selection and the implementation process. For an extensive exposit of these criteria see [1, 2, 11, 12, 16].

The second aim of this paper is to relate the above criteria with basic characteristics of the specific SMEs. We use a single informant for each enterprise, either a senior IS executive, or a MS manager of the ERP project teams. In this direction, we use data from each SME and we form a questionnaire to secure more data from the enterprises. The questionnaire uses 15 selection criteria, with a five-point Likert scale (1=very low, 2=low, 3=medium, 4=high, 5=very high) to measure the importance of the criteria. The research took about one year. The questionnaire was sent by email to each enterprise. The number of the companies that responded to us, either by email either with personal interview or by phone, was 32.

The basic characteristics of the SMEs of our research are the following. Table I presents the industry activities. It indicates that more than half are mixed (57%). Mixed are the enterprises that are in manufacture and trade as well. Also, the majority of the companies (a rate of 90%) include divisions within them, such as the financial, human resources, selling and manufacture division. Table II presents the years of the enterprises' operation. Half of the enterprises operate for more than 15 years. Table III presents the annual revenue of the enterprises participating in our research. From these rates, it can be concluded that 64% of the enterprises have annual revenue more than 1.300.000 euro. Table IV presents the number of employees in each enterprise. Almost half of the enterprises (42%) have more than 40 employees. To summarize, the majority of the companies are large (for Greek standards) with more than one million euro annual revenue, a sufficient number of employees and are, generally, in high financial position.

Table I

Industry activities

Industry activities	%
Mixed	57
Trade	28
Manufacture	12
Rendering of services	3

Table II

Years of run

Years	%
0-5	22
6-10	13
11-15	15
>15	50

Table III

Annual revenue

Annual revenue (in euro)	%
0-300.000	4
300.001-800.000	16
800.001-1.300.000	12
1.300.001-1.600.000	26
>1.600.000	42

Table IV

Number of employees

Number of employees	%
0-20	14
21-40	6
41-70	28
71-100	16
>100	26

According to the ERP that the enterprises use, we mention the following. As it is presented in Table V, the majority of the SMEs (a rate of 53%) use the ERP that they finally bought after a trial period of less than 6 months. Surprisingly, 29% of the SMEs didn't make use of a trial period. In reference to the information system that the enterprises use regarding the cost of the installation and the primary function of an ERP, see Table VI, 38% of the enterprises said that the cost of the ERP they use is more than 25.000 euro. Finally, in reference to the change of the number of employees, Table VII, 54% of the SMEs maintain all their staff. To summarize, the majority of the SMEs use an expensive ERP, after a trial period of a few months, without changing the number of their employees.

Table V

Trial period

Trial period (in months)	%
0	29
0-6	53
7-12	16
>12	2

Table VI

Cost

Cost (in euro)	%
0-4.000	6
4001-8.000	6
8.001-12.000	19
12.001-16.000	15
16.001-20.000	13
20.001-25.000	3
>25.000	38

Table VII

Fluctuation of the employees

Fluctuation	%
Increase	12
Decrease	34
Maintain	54

Conclusions

As we mentioned above, the first aim of this paper is to weight up the factors that affect the choice of an ERP. Table VIII (see Appendix) presents the rates and the mean ranking for the ERP selection criteria. The conclusions are the following. The most important criteria of choosing an ERP system is flexibility (adjustment) and functionality of the ERP, as most of the enterprises wish to realize as less changes as possible to the way that they already operate. Also, the reliability and the service support of the supplier are very high in the preferences of the SMEs. This is justified because most of the SMEs operate for more than 15 years, thus they have high expectations of the information system they buy. Surprisingly, the cost is one of the less important criteria, despite the fact that most of the enterprises have spent more than 25.000 euro for the ERP they use. Consequentially, the enterprises are interested more in the results of the ERP application, than its cost. That means that, they regard it as an investment, a fact that explains the high significance of all the other criteria, except of the cost. Also, minor effects have criteria such as supplier's name, brand and position, without being neglected.

The second aim of this paper is to relate the afore-mentioned criteria with basic characteristics of the specific SMEs of our region. First, we relate the criteria with the industry activities of the enterprises. As it appears in Table IX (see Appendix), the cost of an information system is the less important criterion for all the companies. All the companies consider the functionality, the technical support, the service support, the reliability and the adjustment as the most important criteria. It is remarkable that consultancy is an important criterion for the companies with mixed activities in contrast to the other enterprises.

Secondly, we relate the criteria with the annual revenue of the SMEs. As it appears at Table X (see Appendix), the most important criteria are again adjustment, reliability and functionality. The cost is once more the less important criterion. It's worth noticing that as the annual revenue of the enterprises increases, the cost is less important. However, for the enterprises with low annual revenue, cost is more important. This is justified from the fact that these enterprises have minor needs and expect the results in shorter time.

Thirdly, we relate the criteria with the years that the SMEs operate. According, to Table XI (see Appendix), the newest established enterprises give more importance to technical support, functionality and time, because they require fast and efficient solutions. The enterprises that operate for more years than others consider sufficiently the cost, because they have already invested enough money.

Fourthly, we relate the criteria with the trial period of the ERP. As it appears in Table XII (see Appendix), as short is the trial period, so important are all the criteria. This is because the enterprises can not put the ERP to the test, so they are more careful at its evaluation. On the contrary, as the trial period is extended, the importance of the criteria is getting smaller.

Finally, we relate the criteria with the ERP's cost, see Table XIII at Appendix. Obviously, as the cost is bigger, the importance of the criteria is higher. It is remarkable, that even when the cost is low, the criteria remain high. This is because, the low-cost ERP are chosen by enterprises with low annual revenue. As we saw above, these enterprises require an information system that will have good results.

Further research

This work was realised with 32 SMEs. This is because in our region do not operate lots of big enterprises that use ERP. We want to expand our research to many regions of Greece and European countries as well and to other types of industries. We wish to gather all the necessary information, in order to have a complete proposal to the suppliers of the ERP and to the enterprises as well.

Appendix

In this section we indicate the complete Tables of our research results.

Table VIII

Rates and mean ranking for the ERP selection criteria

Criteria	Very low (%)	Low (%)	Medium (%)	High (%)	Very high (%)	Mean
Functionality	3	0	13	44	40	4,19
Technical Support	3	3	16	41	37	4,06
Cost	9	9	35	35	12	3,31
Service & support	0	2	17	38	43	4,22
Supplier's name	7	7	12	40	34	3,91
Reliability	0	0	12	53	35	4,22
Compatibility	7	10	18	25	40	3,84
Adjustment	0	0	10	39	51	4,42
Supplier's position	6	6	25	27	35	3,75
Match	4	9	25	31	31	3,78
Supplier's knowledge	3	3	26	28	40	3,87
Supplier's reference	4	6	31	31	28	3,75
Time	3	3	26	31	37	3,97
Methodology	3	3	25	38	31	3,91
Consultancy	9	7	19	25	40	3,53

Table IX

Criteria in comparison with the industry activities of the enterprises

Criteria	Manufacture	Commerce	Rendering of services	Mixed	Total Mean
Functionality	4,25	4,22	5	4,11	4,19
Technical Support	3,75	4,33	5	3,94	4,06
Cost	2,75	3	3	3,61	3,31
Service & support	4,25	4	5	4,28	4,22
Supplier's name	3,5	3,78	4	4,06	3,91
Reliability	4,25	4,22	5	4,17	4,22
Compatibility	4	3	4	4,22	3,84
Adjustment	4,5	4,13	5	4,5	4,42
Supplier's position	3,25	3,44	4	4	3,75
Match	3,75	3,11	5	4,06	3,78
Supplier's knowledge	4,25	3,78	4	3,83	3,87
Supplier's reference	4	3,22	4	3,94	3,75
Time	3,25	3,89	5	4,11	3,97
Methodology	3,5	3,78	4	4,06	3,91
Consultancy	3	3,11	1	4	3,53

Table X

Criteria in comparison with annual revenue of the enterprises

Criteria	0-300.000	300.000-800.000	800.000-1.300.000	1.300.000-1.600.000	> 1.600.000	Total Mean
Functionality	5	4,8	3,5	3,88	4,31	4,19
Technical Support	5	4,6	3,25	4	4,08	4,06
Cost	2	4,2	2,25	3,63	3,23	3,32
Service & support	2	4,4	4,5	4,25	4,23	4,23
Supplier's name	2	4	4,75	3,88	3,69	3,87
Reliability	4	4,4	4,5	4,13	4,15	4,23
Compatibility	4	4,2	3	4	3,85	3,84
Adjustment	4	4,6	4	4,5	4,46	4,42
Supplier's position	3	4,4	4,5	3,63	3,31	3,71
Match	3	4,2	3	3,5	4,08	3,77
Supplier's knowledge	5	4,2	4	3,88	3,69	3,9
Supplier's reference	3	3,8	3,75	3,38	4	3,74
Time	3	5	3,5	3,75	3,92	3,97
Methodology	4	4,6	3,75	3,63	3,85	3,9
Consultancy	4	4,4	3,5	3,38	3,23	3,52

Table XI

Criteria in comparison with the years that the enterprises operate

Criteria	0-5	6-10	11-15	>15	Total Mean
Functionality	4,71	3,75	3,6	4,25	4,19
Technical Support	4,57	4,25	4	3,81	4,06
Cost	3,71	2,75	4	3,06	3,31
Service & support	4,14	4,5	4,4	4,13	4,22
Supplier's name	3,86	4	4,2	3,81	3,91
Reliability	4,57	4,25	4,2	4,06	4,22
Compatibility	3,86	3	4,6	3,81	3,84
Adjustment	4,57	4,50	4,60	4,27	4,42
Supplier's position	3,86	3,75	4,2	3,56	3,75
Match	3,86	2	4,2	4,06	3,78
Supplier's knowledge	4,29	3,75	4	3,69	3,87
Supplier's reference	3,86	2,75	3,8	3,94	3,75
Time	4,57	3,50	3,8	3,88	3,97
Methodology	4,71	3	4	3,75	3,91
Consultancy	3,43	3,25	4,2	3,44	3,53

Table XII

Criteria in comparison with the trial period of the ERP

Criteria	0	0-6	6-12	>12	Total Mean
Functionality	4,44	4,12	4	4	4,19
Technical Support	4,33	3,88	4,2	4	4,06
Cost	3,89	3,29	2,40	3	3,31
Service & support	4,44	4,18	4	4	4,22
Supplier's name	4,11	3,82	4,4	1	3,91
Reliability	4,22	4,18	4,4	4	4,22
Compatibility	4,56	3,47	4	3	3,84
Adjustment	4,44	4,5	4,2	4	4,42
Supplier's position	3,78	3,59	4,6	2	3,75
Match	3,89	3,94	3,2	3	3,78
Supplier's knowledge	4,11	3,88	4	1	3,87
Supplier's reference	4	3,76	3,6	2	3,75
Time	4,11	4,24	3,4	1	3,97
Methodology	4,22	4	3,4	2	3,91
Consultancy	3,22	3,65	3,8	3	3,53

Table XIII

Criteria in comparison with the cost of the ERP

Criteria	0-4.000	4.001-8.000	8.001-12.000	12.001-16.000	16.001-20.000	20.001-25.000	> 25.000	Total Mean
Functionality	4,5	4	4,5	4,2	4	5	4	4,19
Technical Support	4,5	4	4,33	4,2	4,25	5	3,67	4,06
Cost	4	4	3,33	4	2,75	3	3	3,31
Service & support	4	5	4	4,2	4,5	4	4,17	4,22
Supplier's name	4,5	4	3,83	4,4	4	3	3,67	3,91
Reliability	4	4,5	4,17	4,4	4,5	4	4,08	4,22
Compatibility	4,5	5	4,33	4	2,75	5	3,5	3,84
Adjustment	4	4,5	4,33	4,6	4,5	5	4,33	4,42
Supplier's position	5	4	4,17	4,2	4	3	3,08	3,75
Match	4,5	3,5	4	4	2,5	5	3,83	3,78
Supplier's knowledge	3,5	4,5	4	4,6	3,75	4	3,5	3,87
Supplier's reference	4	4,5	3,83	3,8	3	3	3,83	3,75
Time	4,5	3,5	4	4,4	3,75	5	3,75	3,97
Methodology	4	5	3,83	4,4	2,75	5	3,83	3,91
Consultancy	4	4	3,5	4	3,25	4	3,25	3,53

References

1. Alanbay, O., 2005. ERP selection using expert choice software. ISAHP, Honolulu, Hawai, July 8-10.
2. Baki, B., Cakar, K., 2005. Determing the ERP package-selecting criteria. The case of Turkish manufacturing companies. J. Business Process Management, 11, pp. 75-86.
3. Botta-Genoulaz, V., Millet, P.A., 2005. A classification for better use of ERP systems. Computers in Industry, 56, 573–587.
4. Blackstone Jr., J.H., Cox, J.F., 2005. APICS Dictionary. 11th ed., APICS: The Association for Operations Management.
5. Davenport, T.H., 1998. Putting the enterprise into the enterprise system. Harvard Business Review, 76, 4, pp. 121-131.
6. Jacobs, F.R., Weston Jr, F.C., 2007. Enterprise resource planning (ERP)-A brief history. Journal of Operations Management, 25, pp. 357-363.
7. Liao, X., Li, Y., Lu, B., 2007. A model for selecting an ERP system based on linguistic information processing. Information Systems, 32, pp. 1005-1017.
8. Meredith, J.R., Mantel, S.J.J., 2003. Projectmanagement: a managerial approach. John Wiley and Sons Inc., 5th ed.
9. Nicolaou, A. I., Bhattacharya, S., 2006. Organizational performance effects of ERP systems usage: The impact of post-implementation changes. International Journal of Accounting Information Systems, 7, pp. 18– 35.
10. Quattrone, P., Hopper, T., 2006. What is IT? SAP, accounting, and visibility in a multinational organization. Information and Organization, 16, pp. 212–250.
11. Rittammanart, N., Wongyued, W., Dailey, M.N., 2008. ERP Application Development Frameworks: Case Stude and Evaluation. ECTI-CON, 1, pp. 173-176.
12. Shyur, H.J., 2003. A semi-structured process for ERP systems evaluation: applying analytic network process. Journal of e-business, 5, 1, pp. 33-49.
13. Soffer, P., Golany, B., Dori, D., 2005. Aligning an ERP system with enterprise requirements: An object-process based approach. Computers in Industry, 56, pp. 639–662.
14. Somers, T.M., Nelson, K.G., 2004. A taxonomy of players and activities across the ERP project life cycle. Information and Managment, 41, pp. 257-278.
15. Sun, A.Y.T., Yazdani, A., Overend, J.D., 2005. Achievement assessment for enterprise resource planning (ERP) system implementations based on critical success factors (CSFs). Int. J. Production Economics, 98, pp. 189–203.
16. Uta, A., Intorsureanu, I., Mihalca, R., 2007. Criteria for the selection of ERP software, Informatica Economica. 2, 42, pp. 63-66.
17. Wang, E.T.G., Lin, C.C.L., Jiang, J.J., Klein, G., 2007. Improving enterprise resource planning (ERP) fit to organizational process through knowledge transfer. International Journal of Information Management, 27, pp. 200-212.
18. Wu**,** J.H., Wang, Y.M., 2007**.** Measuring ERP success**:** The key-users viewpoint of the ERP to produce a viable IS in the organization. Computers in Human Behavior, 23, pp. 1582–1596.s