

# Assessments of Information Systems at Small and Medium-sized Enterprises in the Agri-food Sector

Miklós Herdon<sup>1</sup>, Tünde Rózsa<sup>2</sup>

<sup>1</sup>University of Debrecen, Hungary  
e-mail: herdon@agr.unideb.hu

<sup>2</sup>University of Debrecen, Hungary  
e-mail: Tunde.Rozsa@gmail.com

**Abstract.** Integrated information systems under large-scale company conditions have become widespread over the past decades. Information, data management and systematic information produced from these data and arranged according to needs, however, are required by not only large-scale companies but small- and medium-sized enterprises as well in the agri-food sector. The improvement of information and communication technologies continuously influence the development of information systems, the introduction of different solutions in architecture and the application of new business models. Our research goals was to analyse the evolution of ERP (Enterprise Resource Planning), functional analysing of SME's (Small and Medium-sized Enterprises) information systems and developing decision support tools for selection, comparison of ERPs and economical evaluation of ERP investment. This tools are partly developed and usable for SMEs in the agri-food sector.

**Keywords:** ERP, SME, agri-food, investment

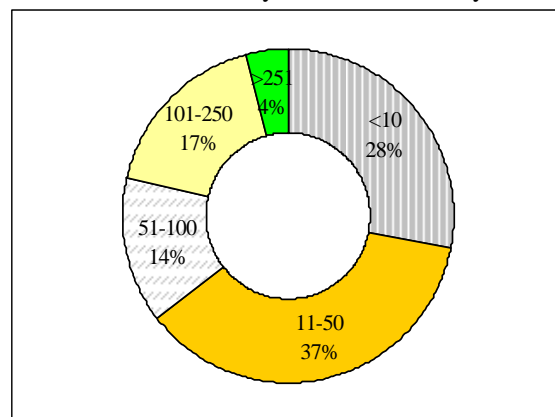
## 1 Introduction

As regards information system investments two big groups can be distinguished. In the first case the computerised information system itself is the means of production or provision (Herdon et al., 2007), whereas in the second one it contributes to the production process indirectly. Part of the computerised information systems applied by SME ventures belong to the first class mentioned above. However, it must be stated that the computerised information systems belonging to this class are applied by big companies or in special cases by medium-sized ventures. We can mention the food-processing industry as an example. In this case the assessment of the information system employed can be more easily performed because in such a case the income, profit growth as well as expenses, input decrease can be measured, assessed and checked up well. In the case when the computerised information system serves the venture's activity only indirectly the evaluating

procedure can be applied at such points, which can be linked to countable and assessable factors (Lau, 2005). In evaluating an ERP project it is not enough to apply traditional investment evaluation methods without changes. Based on a survey the objective was to work out a system of tools and recommendations that may be helpful to SMEs and those dealing in ERP in choosing and introducing these systems more efficiently.

## 2 Surveying the use of ERP in SMEs

At the beginning of 2007 a web-based survey was carried out in order to assess the use of ERP by small- and medium-sized enterprises. The request to fill in a form reached about 900 enterprises through the help, first of all, of Nemzeti Fejlesztési Ügynökség (National Development Agency), secondly of Hajdú-Bihar Megyei Iparkamara (Chamber of Commerce and Industry of Hajdú-Bihar County) and thirdly as a result of our own activities. The National Development Agency assisted us in forwarding our request to the applicants that were awarded funds as a result of the GVOP (Economic Competitiveness Operational Programme in Hungarian National Development Plan) application round. The County Chamber of Industry sent our request to fill in the form to its own members. Approximately 600 invitations to fill in the questionnaire were sent out by e-mail or by post. The rate of response to this request was 16%. 96 % of the respondents come from small- and medium sized businesses. The processing of the questionnaires sent back revealed that 45 % of the respondents used integrated ERP systems and 43 % of them indicated that they used standalone systems while the ratio of the ones using both integrated ERP and standalone systems as well was 4%. The remaining 12% do not use and do not plan to implement any information systems. 46% of the respondents said they had ERP systems or that the installation of such a system was underway.

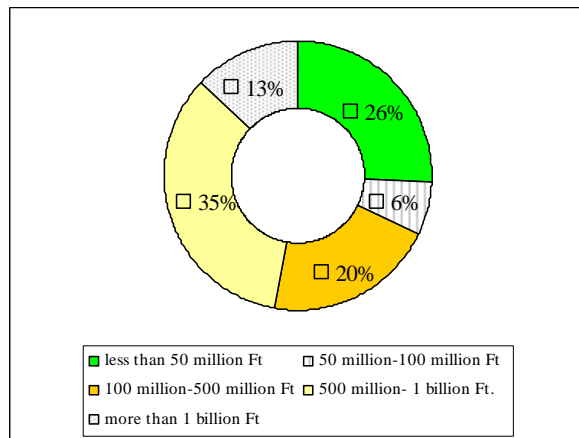


**Fig 1.** Distribution of respondents by number of employers

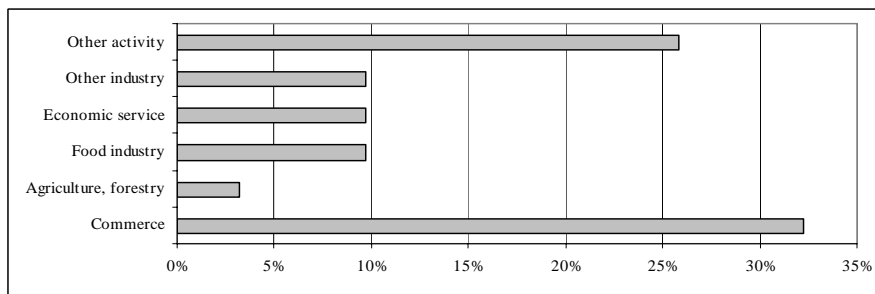
The distribution of the respondents by the numbers of their employees can be seen in Fig. 1. As regards their sales revenues they mostly belong to small- and medium-sized enterprises (Fig. 2.).

Considering their main activities (Fig. 3.) it becomes clear that the majority of the respondents are active in wholesaling.

Considering the experience gained, it is not surprising - though has a tremendous influence on economic efficiency - that in their choices of the ERP system most of the respondents obtained their systems on the basis of some recommendation.



**Fig. 2.** Distribution of respondents by annual revenue



**Fig. 3.** Distribution of responders by scope of business

Among the small- and medium-sized enterprises there was only one that spoke of purchasing its ERP system by way of a tendering procedure. 71.5% of the small- and medium-sized enterprises that responded had not applied an economic or financial evaluation linked to the introduction of the system. Apart from other facts this finding indicates that when implementing a system small- and medium-sized companies are unable to provide labour or financial resources to carry out the evaluation. It has remained a task for applied research or the ones dealing in the ERP system to provide easy-to-use evaluation procedures for managers of small- and medium-sized enterprises that can be adapted to and suitable for preparing for

making their decisions and verifying them in the course of implementing the ERP system.

### 3 Decision supporting tools for evaluating ERPs

The data from our survey revealed that recommendations, especially recommendations from people interested in the operation of the business, greatly influence the opinions of those wishing to implement ERP systems. In many cases it is these recommendations that mean the first selection. In our opinion the first selection should be done on the basis of the functionality of the different ERP systems. For this task we developed the ERP<sub>Select</sub> service.

#### 3.1 Services assisting pre-selection (ERP<sub>Select</sub>)

As part of our research a plan for an application supporting pre-selection was prepared for small- and medium sized enterprises.

At present the system stores the necessary data in four databases:

- Databases storing user data
  - Data of people making enquiries (people looking for something)
  - Data of those offering ERP solutions (suppliers)
- Databases linked to ERP systems
  - The database storing the system requirements of those looking for ERP systems
  - The database storing the data of the ERP systems on offer

The basis for the selection process is consists of a well-defined system of different criteria. As regards the ERP<sub>Select</sub> processes there are three different functions to be identified:

- Providing user data, registration (both supply and demand sides)
- Providing the considerations for the system (both supply and demand sides)
- Doing the selection, information on the results

From the point of view of the interested person, the person trying to find ERP solutions, the ERP<sub>Select</sub> operates in the following way:

- Registration and entry
- Giving the criteria in ten steps

After the data have been given the ERP<sub>Select</sub> selects the solutions that are the most favourable for the enquirer from the ERP database.

The involvement of ERP distributors is considered to be important in order that our database containing ERP systems and businesses selling ERP systems have as current information as possible and so be able to help small- and medium sized businesses with more up-to-date information with making their choices as regards selecting systems for themselves.

### 3.2 A decision supporting tool capable of evaluating ERP (ERP<sub>Compare</sub>)

The basis for the multifactor evaluating system is the creation of some multidimensional system of considerations or criteria, which in turn will give the basis for evaluating the system. The advantage of the system is that factors that are hard to quantify can also be included in the selection process or the evaluation, while its disadvantage is that there are no standards available for creating the system of criteria, these may change individually and the expertise of several specialists is necessary for comparing them.

When the model was developed the evaluation considerations were arranged according to hierarchical subordination. On this basis the model includes main considerations, considerations and sub-considerations. Within the model itself there are three main considerations differentiated, namely:

- User main consideration
- Economic main consideration
- Main consideration related to the evaluation of suppliers

Fig. 5. contains a diagram which illustrates the considerations pertaining to user main considerations in the case of an A and a B project. The evaluation remains simple as long as either one of the two projects is dominant. Looking at considerations “Supplier undertakings following system implementation” and “Functionality” in Fig. 4 the question as to which consideration is worth more can be asked. The evaluation according to sub-considerations may be helpful in making this decision.

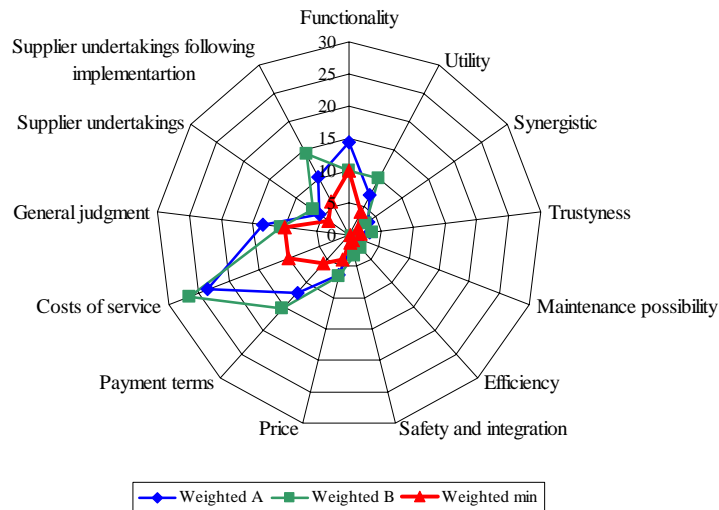
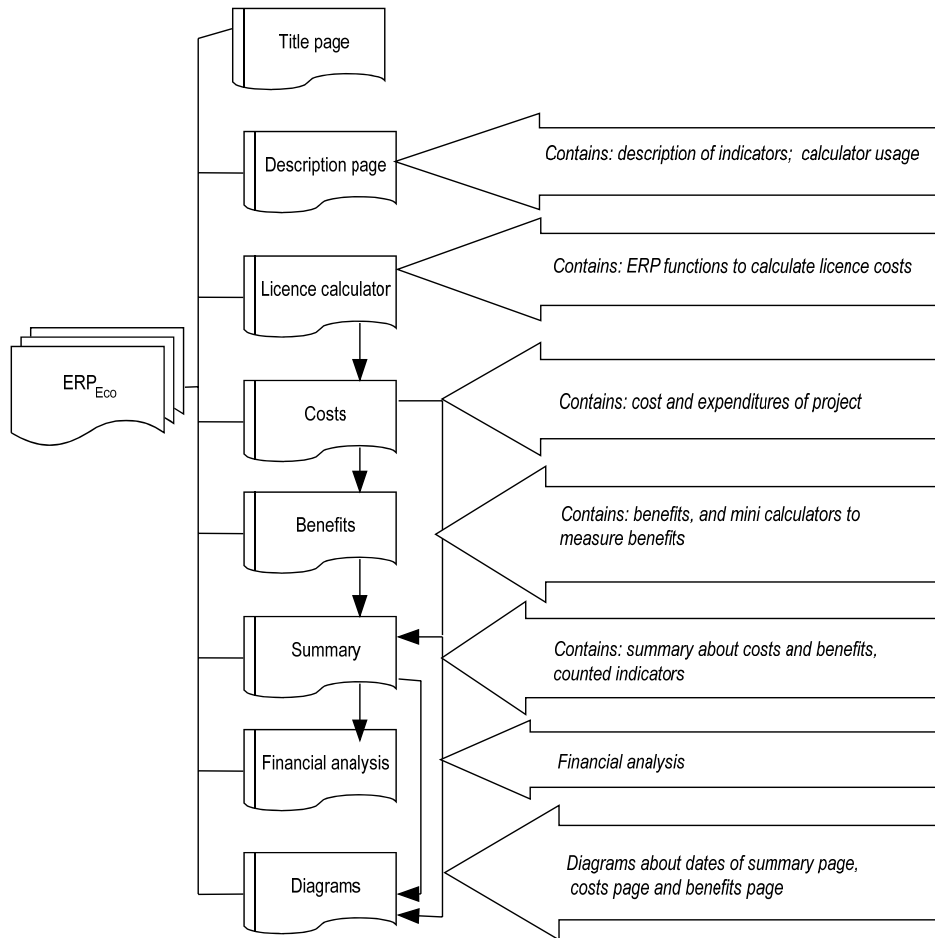


Fig. 4. Evaluation according to user main considerations in the ERP<sub>Compare</sub> model

### 3.3 The decision supporting tool (ERP<sub>Eco</sub>) developed for the evaluation

The structure ERP<sub>Eco</sub> represented in Fig 5. The system counts financial pointers, like ROI (return on investment), TCO (total cost of ownership), NPV (net present value), payback period and some others metrics.



**Fig. 5.** The architecture of ERP<sub>Eco</sub>

The ROI - Return on Investment is the most important and frequent metric to use for evaluating an information technology investment. ROI can be used for prioritizing projects within SME companies too (NucleusResearch, 2005). With ROI, it is possible to get an in-depth look at how much a unit of money spent will yield in returns (Greenbaum, 2005). The Payback Period determines the time needed for benefits returned to equal the initial cost of a project, thereby quantifying the project's risk. Technology solutions with a payback period of less than a year are

considered optimal to a risk-averse investor (Internet 1, 2007). The NPV - Net Present Value: quantifies the value of the ongoing benefits discounted back to the present year. This traditional textbook metric takes into account the time value of money when assessing benefits but does not examine the ratio of costs to benefits (Brealey, 1991). The TCO - Total Cost of Ownership (Wouters, 2004) is useful for budgeting concerns because it provides a holistic sense of the long-term financial resources required to undertake an investment.

The licence module contains the most important functions included in a module system. If the proposals are made according to these modules, the calculator can be easily used to make decisions concerning implementations or even to evaluate the effects of later extensions.

The  $ERP_{Eco}$  operates by using certain basic financial data, such as:

- Expected returns
- Discount rate
- Average tax bracket

An important step in the evaluation of ERP systems is the thematic collection of the data necessary to calculate the indicators. Two important groups were defined in this respect:

- Expense
- Earnings

Expenses mean all the economic activities linked to paying out any sums of money that may be related to the ERP investment.

The definition of the earnings is a little bit more complex. Any incomes and savings directly or indirectly related to the introduction of the ERP system are listed here. After the Expenses and earning have been quantified the necessary values are totalled in the module “sum total” and the preset calculable indicator figures are computed.

#### **4. Conclusions**

Investment, which is the basis for choosing the ERP and the investment decision itself. As regard evaluation models and methods we can say that the calculations based on the two methods do not provide adequate and safe bases for decisions. In order to make right decisions it is necessary to use ERP evaluation analysis methods that provide adequate indicators for deciding the problem on hand.

As regards the results and findings of this research the following practical utilities are to be highlighted.

The multifactor evaluation model suitable for comparing ERP systems, which was developed within the framework of this research, can be used in practice by small- and medium sized businesses for comparing two or more ERP systems judged according to their functions to be functionally suitably so that all the systems could be judged according to the same objective criteria.

The usefulness of the calculator system developed was proved through the case studies. In practise, the calculator system is suitable for economic evaluations of ERP systems both before and after implementation. This calculator is available in an Excel

file format at this moment but there are plans for developing an operation program variant and a simplified internet format with a web version.

The surveys, the case studies and the conclusions drawn can be made use of for distributor and user businesses alike

## References

1. Brealey, R., Myers S. (1991) Principles of Corporate Finance. International Edition, McGraw-Hill, Inc
2. Greenbaum, J. (2005) Beyond ROI: Enterprice Payback. EAC Report
3. Herdon, M., Eckert, B. (2007) E-work and IT for developing rural areas in Hungary. Information Systems in Agriculture and Forestry XII European Conference. 15<sup>th</sup> and 16<sup>th</sup> May 2007, Prague. CD-ROM Proceeding
4. Internet 1: Rate of return. [http://en.wikipedia.org/wiki/Return\\_on\\_Investment](http://en.wikipedia.org/wiki/Return_on_Investment)
5. Lau, L. (2005) Managing Business with SAP: Planning Implementation and Evaluation. Idea Group Publishing, London
6. NucleusResearch (2005) ROI Evaluation Report. <http://www.nucleusresearch.com/>
7. Wouters, M., Anderson, J. C., Finn, W. (2004) The adoption of total cost of ownership for sourcing decisions—a structural equations analysis. Accounting, Organizations and Society. [www.elsevier.com/locate/aos](http://www.elsevier.com/locate/aos)