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EXPERIENCES OF ERP USE IN SMALL ENTERPRISES

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Abstract: This paper investigates the role of Enterprise Resource Planning (ERP) systems in the context of small and medium size enterprises (SMEs). The paper reports on research findings from a case study that has been conducted in 14 SMEs, operating in steel manufacturing and woodworking. By dividing the enterprises into three different groups; medium-sized, small, and micro enterprises, this study provides a richer understanding of enterprise size related issues in motivations, risks and challenges of ERP adoption.

1 INTRODUCTION

This paper investigates the role of enterprise resource planning (ERP) systems in the context of small and medium enterprises (SMEs). ERP systems are enterprise-wide software packages that provide fully integrated business processes with shared data and visibility, and thereby hold the potential of greatly enhancing organizational performance and establishing competitive advantage (Davenport, 1998).

This case study is carried out in 14 SMEs operating in steel manufacturing and woodworking. By dividing enterprises into three different groups; medium-sized, small, and micro enterprises, the study provides a richer understanding of enterprise size related issues in motivations, risks and challenges of ERP adoption. According to European Commission, medium-sized enterprises employ less than 250 persons and an annual turnover is not exceeding 50 M€, and/or an annual balance sheet total is not exceeding 43 M€; small enterprises employ less than 50 persons and an annual turnover

and/or an annual balance sheet total is less than 10 M€; and micro enterprises employ less than 10 persons and an annual turnover and/or an annual balance sheet total is less than 2 M€.

Most of large enterprises (LEs) worldwide have already adopted ERP systems and SMEs are increasingly following the suit (Bernroider and Koch, 2001). In 1998, 27 % of European midsize enterprises across all counties and industries had installed ERP software in one or more functional areas, and the ERP software penetration was estimated to rise to 56 % by the year 2000. The expected penetration rates were especially high in Northern European countries, as in Finland, where the rate was estimated to be about 70 % (Van Everdingen *et al.*, 2000).

There are some reasons for this trend, including a saturation of the LE market, increasing possibilities and need for the integration of systems between organizations, and the availability of relatively inexpensive hardware (Gable and Stewart, 1999). However, SMEs use ERP systems mainly for the finance/accounting functions and many advanced

features, such as production planning and scheduling, typically have not been explored (Muscattello *et al.*, 2003).

The ERP research has so far concentrated on LEs and the findings cannot easily be extended to SMEs because of their particular characteristics (Laukkanen *et al.*, 2007). The needs, operating requirements, logistics fulfillment and financial capabilities of SMEs are vastly different from that of LEs (Huin, 2004). Recently, the ERP research on SMEs has received more attention (e.g. Gable and Stewart, 1999, Van Everdingen, *et al.*, 2000; Bernroider and Leseure, 2005, Raymond & Uwizeyemungu, 2007). Also this study contributes to the ERP research in the context of SMEs and provides insights that may have been overlooked in previous research.

2 LITERATURE REVIEW

ERP systems, when successfully assimilated into an enterprise, can provide both operational and strategic benefits, and enforce a discipline of best practice and consultancy. ERP systems can significantly improve information flow, streamline processes and hence develop the enterprise's efficiency and its competitive advantage. (Van Everdingen, *et al.*, 2000; Bernroider and Leseure, 2005, Raymond & Uwizeyemungu, 2007)

The main motivations for ERP use are seen as the production of real-time data shared across the organisation and consequently the integration and automation of business processes (Gupta, 2000). According to Botta-Geboulaz and Millet (2005), technology motivations (system not Y2K compliant, disparate systems, poor quality/visibility of information, business process or system not integrated, difficult to integrate acquisitions and inability to support growth) and operational motivations (poor or uncompetitive business performance, cost structure too high, not responsive enough to customers or suppliers, complex, ineffective business processes, inability to support new business strategies, business becoming global, and inconsistent business processes) motivates enterprises towards ERP use. Overall, improving productivity, competitive advantage, and customer demands are the top three business drivers for companies with ERPs (Scott and Shepherd, 2002).

Especially SMEs adopt ERP systems with the goal of replacing inefficient standalone legacy systems, increasing communications between business functions, increasing information processing efficiencies, improving customer

relations, and improving overall decision making (Cereola, 2008).

Laukkanen *et al.* (2007) indicate that significant differences exist between SMEs (medium-size, small, micro enterprises) and LEs in ERP adoption. Specifically, the findings suggest that SMEs experience more knowledge constraints than LEs in ERP adoption. Also, SMEs differ from LEs in important ways affecting their information-seeking practices that impact information and technology (IT) adoption. These differences include lack of information systems management, concentration of information-gathering responsibilities to a small number of individuals, lower levels of resources available for information-gathering, and in the quantity and quality of available environmental information (Buonanno *et al.*, 2005). Thus, SMEs need different characteristics from ERP systems. Today, some ERP vendors have taken up the gauntlet and have been moving their attention toward SMEs (Gable and Stewart, 1999) by offering simplified and cheaper solutions from both the organizational and technological points of view, pre-configured systems based on best-practices at a fraction of the cost originally required and promising short implementation times.

Poba-Nzaou *et al.* (2008) identifies six main dimensions of risk in ERP implementation, namely, organizational, business-related, technological, entrepreneurial, contractual and financial risks. Organizational risk derives from the environment in which the system is adopted. Business-related risk derives from the enterprise's post-implementation models, artefacts, and processes with respect to their internal and external consistency. Technological risk is related to the information processing technologies required to operate the ERP system – for example the operating system, database management system, client/server technology and network. Entrepreneurial or managerial risk is related to the attitude of the owner-manager or management team, while contractual risk derives from relations with partners and financial risk from cash-flow difficulties, resulting in an inability to pay license fees or upgrading costs, for example. (Poba-Nzaou *et al.*, 2008)

Also individuals' knowledge and skills may turn out problematic. When exploring change and uncertainty in SME environments with ERP, Koh and Simpson (2005) discover lack of knowledge and expertise in how modification, feedback and management should be made and organized to enable ERP systems to support production planning and control.

To minimize the risk of implementing ERP systems, Markus and Tanis (2000) have recommended the application of a risk management

plan at the implementation stage. Consequently, Bernroider and Leseure (2005) suggest that major mistakes are made in the early stages of the ERP, even prior to the implementation process. Kliem (2000), however, emphasizes the efficiency of risk management when it is introduced at the earliest possible opportunity in the life cycle of the system in question, when planning issues are most important and the criteria for system selection are determined.

3 ANALYSIS

3.1 Research setting

This case study was carried out in the SMEs operating in steel manufacturing and woodworking in the Raahe region, Finland during 6/2007–8/2008. A specific web questionnaire was designed to find out the current state of ERP use in SMEs. The survey was executed through the Webropol software (www.webropol.com). Besides the basic company information, the survey included questions related to organisational performance and business processes; problems in electronic data transfer; experiences of ERP use and challenges/risks to implement them. In addition, the survey included questions of change management and IT knowledge of the personnel. In this paper, the results of survey are divided into four theme areas of Motivation, Problems, Risks, and Challenges.

The return rate was 27.5%, in total, **14 enterprises** responded out of 51 industrial SMEs. The number of employees in the case enterprises varied from 5–9 to over 100, and the annual turnover between € 0.6–15 million. Four (28,5%) of the case enterprises were medium-size, four (28,5%) were small, and six (43%) were micro enterprises.

Totally, ten (72%) case enterprises had an ERP system in function, half of which were off-the-shelf software packages and half company-specific, tailored systems. However, only one of these enterprises had a fully functioning system and five informed that they have serious difficulties in ERP use. All medium-size enterprises had either an ERP system in function or an ERP development project ongoing. Two small enterprises had an ERP system in function; however, with problems. One small enterprise had an ongoing ERP development project. Other small enterprises aim to start an ERP development project within two years. Two micro enterprises had an ERP system; however, one of them had problems with the implementation. One micro enterprise aimed to start an ERP development project within two years. Three micro enterprises stated that acquiring ERP is not a current issue or

that they do not need one at all. These enterprises were all small companies with 5–9 employees, and they saw that compared to the costs, the benefits of the system would remain small.

All case enterprises were subcontractors. Also, almost all of them had their own subcontractors. Typically, SMEs had outsourced distribution (including transport), production, marketing, maintenance, and repair and support operations. Also, financial management and accounting services were often purchased or leased.

All case enterprises worked in the global markets, directly or through the focal company's value chain. Over 75% of case enterprises had large customers, also international customers. Over 60% of enterprises had SMEs customers, also international customers.

3.2 Motivation for ERP use

In the questionnaire, the enterprises were expected to choose out of 19 alternatives the most significant factors they require from ERP systems. They were also asked what motivations for change and expectations and development targets they had for ERP systems. The alternatives were assessed on the scale 'insignificant', 'some significance', 'significant' and 'very significant'. Based on the replies, there were six alternatives to which ten companies answered 'significant' or 'very significant'. Of these alternatives, integrating operations, eliminating unproductive work and enhancing process monitoring are related to increasing cost-effectiveness.

Factors related to quality and quality improvement was considered as the primary development target. Process monitoring, and sourcing and sharing information were also raised as significant development targets of ERP. Insignificant factors as regards the development of ERP were change and improving change management, reducing the time-to-market, reducing the number of terms, expanding the product range, and reducing the costs of product development.

The enterprises were also asked, what central development operations they were going to execute in the near future (1-2 years) or later. In the near future, all of the enterprises were planning to execute development operations to improve production quality. They expected ERP systems to provide assistance in their quality improvement processes. Another important development target for the near future was to improve machinery and tools. According to most of the respondents, management development projects would take place later.

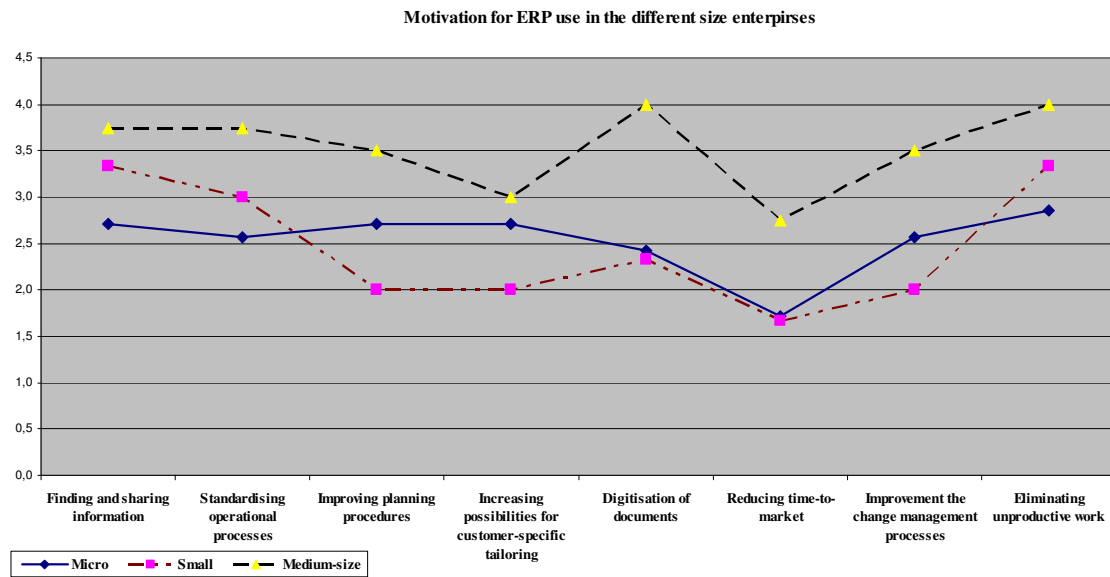


Figure 1: Motivation for ERP use

The respondents viewed customer relationship management important, and ten of them considered it as a near-future development target. When comparing the near-future development targets of different-sized companies, it could be noted that the small enterprises had stronger pressures for product development than the larger ones. This could also be seen in the enterprises' motivation to improve planning procedures and customer-specific flexibility. The medium-size enterprises were more interested in goals and strategies as well as internal information flow. Organizing production and staff cooperation were development targets in the near future for most of the enterprises. Several companies also mentioned staff competence as one of their development targets.

The survey revealed that motivation for ERPs are about the same regardless of the size of the enterprise. Figure 1 illustrates responses to eight issues related with pressures and expectations for EPRs, namely, 1) Finding and sharing information in a dispersed environment; 2) Standardizing operational processes; 3) Improving planning procedures; 4) Increasing customer-based tailoring; 5) Digitalization of documents; 6) Reducing the time-to-market; 7) Managing and decreasing costs of change processes; and 8) Eliminating unproductive work. The highest line displays motivation of medium-size enterprises, and, respectively, the two crossing lines show responses from small and micro enterprises. The lines expose that the larger the enterprise is, the more significant motivation for ERP use is.

Digitalising documents was perceived important in medium-size enterprises whereas the smaller enterprises did not value it much. Moreover, eliminating unproductive work was found significant in all enterprises.

3.3 Risks of ERP use

The case enterprises had several different and different-aged IT systems in function. New ERP systems were often expensive, and enterprises wanted to receive all possible benefits that even a poor system could produce. New IT/ERP systems were usually acquired as off-the-shelf software packages, which were often purchased from different suppliers, that meant that they included multiple, overlapping system modules that performed the same tasks.

This could be clearly seen also in the answers of the surveyed enterprises. Utilising same information and same database in different IT systems could successfully be done only in two case enterprises. The other enterprises could not utilise the information in different systems at all, or that they could do it only partially. Different IT/ERP systems or modules had similar properties, and they partly overlapped in 45.5% of enterprises. None of the case enterprises had automatic information exchange between them and their subcontractors' or clients' systems, and only one enterprise had partial exchange.

The greatest problems of current operational mode and information processing aroused from data transfer. In 33.3% of enterprises, the necessary information was not transferred between various

IT/ERP systems. In addition, the enterprises reported the lack of the users' knowledge/education. Maintaining the various systems was also seen as a reasonable problem in nine (64%) case enterprises.

The main problems of ERP use were as follows: the lack of adequate planning information, ineffective project steering systems, piled-up work, up-to-date load information, material-related operations, the lack of a functioning ERP system, material resource planning, up-to-date information exchange/relevance between planning and production, changes in delivery times made by customers, and availability of material resources.

The enterprises were asked to assess the level of risks produced by ERP solutions to their business processes on the scale 'great', 'reasonable' and 'small'. Ten (71%) of case enterprises considered the impacts of system breakdowns and malfunctions on their customers as the greatest risks. Six (43%) enterprises considered operation failures resulting from technical difficulties as a great risk.

The enterprises viewed as small risks chaining of production, dependence on other enterprises, and losing a contract because they had a wrong kind of a IT system or they did not have one at all. The aforementioned risks as well as other risks resulting from cooperation relationships were typical in subcontracting enterprises.

Another risk factor was the lack of IT competence. Often, users and developers did not have time or competence to implement an ERP system. This risk was actualized in one of the respondent enterprises. Resistance to change was also a risk factor. The existence of change resistance was acknowledged in the case enterprises and could clearly be seen in the survey.

3.4 Challenges of ERP use

The enterprises chose out of six alternatives the greatest challenges that ERP systems caused for their business processes. The alternatives were assessed on the scale 'small', 'reasonable', 'great'. Seven (50%) enterprises viewed as their greatest challenge in implementing an ERP system the change it induced in their operational practices. Six (43%) enterprises considered the staff's readiness and willingness to learn new things challenging as regards implementing an ERP system. In addition, enterprises found actualizing and measuring the benefits of an ERP project challenging. Three enterprises saw them as great and one enterprise as reasonable challenges.

Increase in the interdependence between different operations and difficulties in pinpointing the problem areas were considered as reasonable

challenges. However, the small companies with less than 20 employees considered them greater challenges than the companies with over 20 employees did. The large companies were more challenged by changes in operational practices than the companies with less than 20 employees were.

From the surveyed enterprises, seven (50%) enterprises considered the lack of skills in using ERP systems as the most significant problem as regards electric data transfer. Four (28,5%) enterprises saw development of the systems and lack of experience related to it as problematic. Lack of standards, however, was not brought up in any enterprises. Some enterprises were unsure of the system's usefulness and their own IT competence. Most problems in the data transfer between interest groups, customers, subcontractors, prime contractors, and network partners resulted from incompatibility of different systems. In addition, the companies saw the problems in the connection speed and connection breaks as problematic. Furthermore, the staff's willingness and readiness to adopt new systems and resistance to change related to it were also strongly emphasized.

The benefits of electric data transfer were most visible in a dispersed environment where the producers and the users of product information were physically far apart each other. Six case enterprises operated under one roof, which meant that in almost half of the respondents' cases, the knowledge producers and users were physically close to each other. In the rest eight case enterprises, different operations were physically in different places: in different departments, buildings, industrial areas, geographical locations, and even countries.

4 CONCLUSIONS

In this study, the focus was to investigate the role of ERP systems in (SMEs. To correspond to the focus, a case study of 14 SMEs was carried out.

The findings of the study response to the suggestion by Laukkanen *et al.* (2007) about not considering small and medium-sized enterprises as one homogenous group, but acknowledging the differences between these two groups of companies in future research. This study showed that among SMEs, smaller enterprises valued more product development than medium-size enterprises did in relation to ERP systems. Further, small and micro enterprises were more motivated to improve planning procedures and customer-specific flexibility whereas medium-size companies were more interested in goals and strategies as well as internal information flow.

Regarding to the size of enterprises, some differences were found in the motivations and expectations for ERPs, too. In overall, medium-size enterprises perceived the measures more significant than the smaller ones. Especially digitalising documents was perceived more important in medium-size enterprises compared to the smaller ones.

Differing from prior research (e.g. Davenport, 1998; Scott & Shepherd, 2003; Botta-Geboulaz & Miller, 2005), the respondents in the study assessed factors related to quality and quality improvement as the primary development targets. An interesting finding was the importance of IT competence, and especially communication skills of the system vendor's expert when choosing a new ERP system, while the maintenance price that forms more than half of the total cost of the system was not considered a decision factor at all. On the other hand, the enterprises tried to stick with old systems and receive all the possible benefits that even a poor system could produce. When purchased, the new ERP system was usually an off-the-self software package without any tailoring and often from different suppliers, thus causing overlapping system modules and producing problems with information relevancy between different systems.

Lack of knowledge was perceived problematic in all but one case enterprise. This verifies findings of Koh and Simpson (2005), which highlighted problems with scarce knowledge especially in SMEs.

In all, one can conclude that the need of ERP systems is understood in SMEs but ERP adoption is not yet as penetrated as it is in LEs. Furthermore, to noticing differences between SMEs and LEs, the research highlighted differences also in the SMEs .

As such, the current study offered interesting new knowledge concerning current status of utilisation of ERP in SMEs. While this empirical study also showed existing differences in the group of SME, it serves as a prior study for future research on later ERP penetration in SMEs.

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