

Summer 10-6-2011

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Recommended Citation

Zach, Ondrej, "EXPLORING ERP SYSTEM OUTCOMES IN SMEs: A MULTIPLE CASE STUDY" (2011). *ECIS 2011 Proceedings*.
7.
<http://aisel.aisnet.org/ecis2011/7>

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EXPLORING ERP SYSTEM OUTCOMES IN SMEs: A MULTIPLE CASE STUDY

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Abstract

The purpose of this paper is to investigate Enterprise Resource Planning (ERP) system outcomes in the context of small and medium-sized enterprises (SMEs). Most of the former research on ERP outcomes is based on data from large enterprises, and this study examines how the SME context affects the ERP system outcomes and the related evaluation practices. The paper reports findings from a multiple case study of ERP implementation in four SMEs. The case companies put more emphasis on system and information quality improvements from the ERP systems, compared to individual and organizational outcomes. This can be related to the lack of a strategic perspective on ERP implementation in these companies, with replacement of the legacy systems serving as the main motivation for the implementation projects. Moreover, the findings indicate that the identified lack of ERP system evaluation practice in these SMEs can be explained by ownership type, resource constraints, limited IT competence, and status of the IT legacy systems in SMEs.

Keywords: ERP system outcomes, ERP implementation, IT evaluation, SME, case study.

1 Introduction

Enterprise Resource Planning (ERP) system implementations are substantial and long-term investments, expected to yield significant positive outcomes for organizations undertaking this endeavor. Organizations thus need to assess whether they have achieved the intended contribution from their investment, and the ERP literature includes several studies investigating ERP system outcomes in organizations (e.g., Gable et al., 2003; Shang and Seddon, 2002; Staehr, 2007; Velcu, 2007; Wieder et al., 2006; Williams and Schubert, 2010). While it could be argued that return on investment is even more critical for small and medium-sized enterprises (SMEs), for whom ERP system implementations constitute a comparatively larger investment than for large enterprises (Mabert et al., 2003), there has yet been limited focus on the evaluation of ERP outcomes in the SME context.

The majority of existing measurement frameworks have been developed based on data from large enterprises. Only a few studies have tried to explore this phenomenon within the SME context. The research on ERP implementation argues that findings from large companies cannot be applied to SMEs since they represent a fundamentally different environment (Buonanno et al., 2005; Mabert et al., 2003). This also applies to the evaluation of ERP impact. Large organizations have been reported to receive more benefits compared to small organizations (Sedera et al., 2003), and several differences in areas benefited from ERP systems between companies of different sizes have been recognized (Mabert et al., 2003). For example, organizational size has been identified as a moderator of ERP impact on SMEs' productivity (Bohórquez and Esteves, 2008).

Compared to large organizations, SMEs have been reported to be constrained by limited resources and limited IS competence (Levy and Powell, 2000; Thong, 2001). Besides this, SMEs are represented by a spectrum of inherent characteristics which distinguish them from their big counterparts, such as structure, ownership, culture, decisional specificity, etc. (Blili and Raymond, 1993; Wong and Aspinwall, 2004). These aspects of the SME context are likely to determine the way in which these organizations conduct ERP system implementations and in turn their evaluation as well. There exist various definition of SMEs, and this study adopts the EU definition of SME as an enterprise with fewer than 250 employees and annual turnover less than 50 million euro (Eurostat, 2008).

The purpose of this paper is to contribute to the scarce literature on evaluation of ERP system outcomes in SMEs. The study is based on two research questions: (1) *What are the ERP system outcomes perceived by SMEs?* (2) *How does the SME context affect the ERP system outcomes?* The empirical basis for this exploratory research is a multiple case study of ERP implementation in four SMEs in the Czech Republic. Based on a cross-case analysis, a list of the ERP system outcomes perceived by the case SMEs is presented. Further, the paper discusses how characteristics of the SME context may influence on the evaluation practice.

The rest of the paper is organized as follows. Section 2 briefly presents relevant literature on ERP outcomes, with particular focus on SMEs. Section 3 describes the research methodology applied in this study. Section 4 introduces the case companies and presents findings from the cross-case analysis. Section 5 discusses the effect of the SME context on the ERP system outcomes and ERP system evaluation practice in SMEs. Finally, section 6 presents conclusions and implications.

2 Related Research

Over the years various approaches to ex-post evaluation of ERP system outcomes have been developed. This research includes studies employing ERP success assessment tools (Gable et al., 2003; Ifinedo, 2006; Tan and Pan, 2002), ERP benefit frameworks (Shang and Seddon, 2000, 2002; Staehr, 2007; Williams and Schubert, 2010), and ERP balanced scorecard frameworks (Chand et al., 2005; Uwizeyemungu and Raymond, 2009; Velcu, 2007).

A significant contribution in this area is the multidimensional model for Enterprise Systems¹ Success (ESS) measurement developed by Gable et al. (2003). This model builds upon the models by DeLone and McLean (1992) and Myers et al. (1997), with the success dimensions and measures revised in order to meet the ERP characteristics. In total the model involves 27 measures of ERP success distributed into four dimensions: information quality, system quality, individual impact, and organizational impact. *Information quality* is a measure of the quality of the information the ERP system produces. *System quality* includes measures of the ERP system performance from a technical and design perspective. *Individual impact* measures the extent to which the ERP system has influenced the capabilities and effectiveness of workers. The extent to which the ERP system has promoted improvements in organizational results and capabilities is captured by the *organizational impact* dimension (Gable et al., 2008).

Petter et al. (2008) in their thorough literature review found the ESS model to be the most comprehensive tool for IS success measurement. The instrument captures the multidimensional and complex nature of ERP success. One of its strengths is that it avoids overlap between the constructs and measures (Petter et al., 2008). The ESS model is selected as an underlying framework for investigation of ERP outcomes in this study.

Former research has recognized the effect of organizational size on ERP outcomes. A study conducted by Bohórquez and Esteves (2008) identified organizational size as a moderator of ERP impact on productivity in SMEs. Sedera et al. (2003) confirmed the proposition that organizational size contributes to differences in achieving benefits of ERP systems. The findings indicate that large organizations received higher positive outcomes compared to small organizations. By applying the ESS assessment model (Gable et al., 2003) the results showed that larger organizations gained higher mean values for all the constructs within the four dimensions. This has been supported by Mabert et al. (2003) who found several differences in areas benefited from ERP systems between companies of different sizes. Small companies reported higher benefits in inventory management and procurement, while large companies reported more benefits in financial and personal management.

A limited number of studies have focused on ERP system outcomes in SMEs. As an example, Esteves (2009) conducted a survey to investigate ERP benefits realization in SMEs. The author applied the ERP benefit framework by Shang et al. (2000). The study determines a link between the benefits and the point in time when the various benefits are expected to materialize, resulting in a benefit realization road-map for ERP usage in SMEs.

Another attempt of ERP outcome assessment within SMEs was reported by Federici (2007, 2009). The author aimed at a post-introduction assessment of ERP outcomes in SMEs with regard to factors influencing the outcomes. The study adopted a list of the five most cited benefits that were promised to large companies by ERP adoptions. The results of the survey of 50 SMEs showed that the most common benefits were procedure simplification, easier information retrieval, improved performance management and production efficiency improvements. The factors observed to mostly affect the benefits are depth of organizational change and type of chosen ERP producer.

Recently, Kale et al. (2010) investigated performance evaluation of ERP implementation in Indian SMEs. The study employed a survey of 130 SMEs. The ERP performance was studied through a list of 19 ERP benefits. The findings indicate that SMEs benefited mainly in reducing the need for support, improving customer services and improving communication.

Although these studies utilized data from SMEs they did not examine the specificity of this environment. By basing the studies only on existing frameworks or lists of ERP outcomes, the studies lose the potential to identify and explore new outcomes which might be specific for SMEs. Thus, while these studies present quantified measures of the listed ERP outcomes, they include limited discussion regarding how the SME context may influence these outcomes or the evaluation practice itself.

¹ The terms enterprise system and ERP have been used interchangeably. The authors investigated implementations of the SAP system.

3 Research Methodology

The review of studies on ERP outcomes in SMEs showed that the quantitative research approach is dominant. While these studies provide measurements of ERP outcomes, they do not explore the particularities of the SME context and its effect on the outcomes. Qualitative research can thus bring new light to this domain (Ballantine et al., 1998; Jones and Hughes, 2001; Uwizeyemungu and Raymond, 2009). As the purpose of this research is to identify new insights within the SME context, a qualitative research approach employing a multiple case study method is applied. Case studies allow collection of rich data and are appropriate to study a contemporary phenomenon within its natural setting (Yin, 2008).

In total, four organizations were studied. All of them are SMEs operating within the private sector in the Czech Republic. The case companies differ in terms of organizational characteristics (e.g., size, business type, industry) as well as ERP project characteristics (e.g., brand of ERP system, number of implemented modules). In order to ensure anonymity, the organizations are labeled as CompA, CompB, CompC, and CompD. Table 1 provides an overview of the studied organizations.

Personal interviews were utilized as the primary data collection technique. Recognizing the importance of a multiple stakeholder perspective while conducting ERP system evaluation (Jones and Hughes, 2001; Sedera et al., 2004; Sedera et al., 2007), interviews with various respondents within each organization were conducted. The interviewed respondents represented different positions, including top and middle management, IT responsible persons, end users, etc. While these different stakeholders may represent different perceptions on outcomes (Sedera et al., 2004; Sedera et al., 2007), the focus in this analysis was mainly on what could be interpreted as the common view in each company. In addition, vendors or consultants who have been involved in the ERP implementation were also interviewed. In total, 34 interviews were conducted across the four organizations. More information about the number of interviews and participants in each of the companies is presented in Table 1.

	CompA	CompB	CompC	CompD
Industry	Fiber optic components	Electronic components	Cosmetics	Agriculture machinery
Business type	Manufacturer	Distributor/Manufacturer	E-shop	Manufacturer
# of employees	220	100	50	200
# of interviews	14	7	4	9
Participants	Project leader (production manager), project leader assistant, CEO, financial/technology managers, IT/IS administrators, end users, vendor's CEO.	Project leader assistant, financial/technology/sales managers, IT/IS administrator, end user, consultant.	Sales manager (responsible for the IS), wholesale manager, end user, vendor.	Project leader (purchasing manager), economic/warehouse/technology /production manager, IT/IS administrator, payroll clerk, end user, vendor.

Table 1. Overview of the case companies

The interviews were semi-structured and face-to-face, following Myers & Newman's (2007) guidelines for conducting qualitative interviews. With regard to the issue of outcomes evaluation the respondents were asked to answer an open-ended question: *What are the outcomes of the ERP system?* The participants were asked to name as many outcomes as possible, while they were provided sufficient time for reflection. When an interviewee had problems with answering the question, probing questions were asked: e.g., *What is the impact of the ERP system on the company/yourself? What improvements were gained through the ERP system? What changes are caused by the ERP system?*

How do you perceive the system quality? How do you perceive the quality of information provided by the ERP system?

To enrich our understanding of the case projects, different material served as supplementary data sources: documents provided by the organizations, company presentations, company web pages, web pages of the vendors. In addition, follow-up e-mails and telephone communication were used for clarification of some issues. The data collection was carried out during the period from February to October 2010. The interviews were conducted on-site at the companies, usually in meeting rooms. On average the interviews lasted for one hour, varying between 20 to 100 minutes. The interviews were recorded and relevant parts were fully transcribed and coded using NVivo 9 software. The codes represented particular ERP system outcomes mentioned by the interviewees. While the four dimensions of the ESS model (Gable et al., 2003) were used as an underlying framework, the analysis also identified additional outcomes emerging from the interview data.

4 Findings and Analysis

The qualitative interviews provided rich data about the ERP system implementation projects in the studied organizations. The following section gives a brief overview of the four cases. Then a cross-case analysis of the ERP system outcomes is presented.

4.1 The case overview

Table 2 lists key characteristics of the ERP implementations in the four companies. The case companies represent different phases in the ERP-life cycle, varying between 11 months (CompA) up to 5,5 years (CompD) of experience with an ERP system at the time of data collection. According to the life-cycle stages modelled by Esteves and Pastor (1999), three of the companies (CompA, CompB, and CompC) were in the “use and maintenance” phase, while CompD was in the “evolution” phase, as they extended the ERP system with a Business Intelligence module in 2010.

	CompA	CompB	CompC	CompD
Time of ERP implementation	April 2009	October 2006	August 2007	January 2005
Time since “going-live”	11 months	3,5 years	3 years	5,5 years
ERP system	Helios Green	ABRA G4	ABRA G3	ALTEC Aplikace
Implemented modules	FI, CO, LO, PC	FI, CO, LO, PC, AM, HR	FI, CO, LO, AM, HR, CRM (limited)	FI, CO, LO, PC, AM, HR, MRP, PP, BI (extension in 2010)
Legacy information systems	4 separate DOS-based systems (accounting, production control, payroll, time attendance system)	2 separate DOS-based systems (accounting, production control)	DOS-based accounting system	2 separate DOS-based systems (accounting, production control)
Implementation partner	Certified agent	Vendor	Certified agent	Vendor

Table 2. The case ERP project characteristics

All four companies selected domestic ERP solutions. Helios Green is developed by the largest Czech ERP vendor, Asseco Solutions. ABRA is offered by the second largest Czech ERP vendor, ABRA Software. ALTEC Aplikace is an ERP system developed by a smaller Czech ERP vendor, ALTEC. While these systems basically cover the same functionality, different selections of modules were implemented in the four companies. The following three modules were implemented in all projects: FI–Finance (including accounting), CO–Commerce (purchase and sale), and LO–Logistics (warehouse). In addition varying combinations of the following modules were implemented: PP–

production Planning, AM-Asset Management, HR-Human Resources, CRM-Customer Relationship Management, MRP-Material Resource Planning, BI-Business Intelligence.

The companies' legacy systems replaced by the ERP system varied in terms of areas covered. All the case companies were using DOS-based information systems that were not integrated. In addition, several Excel sheets, and other software tools were utilized.

Two of the organizations selected a local IT company as their implementation partner operating as a certified agent of the ERP vendors. CompB and CompD used a vendor directly. The implementation projects were conducted by implementation teams consisting of 4 to 10 employees. Only CompB used a consultant as a member of the implementation team. None of the implementation projects involved any form of evaluation of the ERP system outcomes.

4.2 ERP system outcomes

This section presents the results of a cross-case analysis of the ERP system outcomes. The findings are based fully on the conducted interviews, as no relevant documentation about outcome evaluation existed in the case companies. Table 3 lists the ERP outcomes perceived by the four organizations. The outcomes are grouped according to the four dimensions in the ESS model (Gable et al., 2003). The identified ERP system outcomes partly correspond to the measures from the ESS model, those matching are marked by a superscript (*) in Table 3. About half of the outcome measures defined in the ESS model were not brought up in the interviews, indicating that these were perceived to be less relevant by the SME companies. Further, as indicated in Table 3, almost half of the identified ERP system outcomes represent complementary measures in the four dimensions of the ESS model.

In general, the ERP outcomes were most often reported in relation to system quality. All the four companies perceived various system quality improvements. Most importantly the ERP systems provided integration of data within the companies. As expressed by the technology manager in CompB: *"It [data] is at one place, I can see several things at once, [...]. That was more difficult before. I had to call particular people, now I can find it in the system."* The data integration contributed toward data transparency: *"The main benefit is that everything has become transparent. Every activity across the company is reflected in the system and thus all divisions can see what is happening."* (Purchase manager, CompD). Most of the companies reported that the ERP systems improved controlling and data analysis options. Furthermore, system extensions and changes have become easier, and the ERP system provided easier data import and export. Some companies also reported improved system sustainability, security, and stability as positive outcomes. For example, as stated by the project leader from CompA: *"The old system sometimes even broke down, so we were also afraid about our data. [...] The new system is definitely more stable."* In some cases the ERP system also offered a communication channel and facilitated user interface changes.

The organizations also perceived improvements in terms of information quality. The ERP systems significantly increased information accuracy and its availability. The sales manager from CompD reported: *"For me it is important to quickly get the information I need for my job. Now, I do not need to search for the information for long time, [...]. I know where to find it."* Another perceived outcome of the ERP system was that the information became more timely. For example, as expressed by the wholesale manager from CompC: *"We are able to change the price for the whole range of goods within a couple of minutes according to currency rates, so the price is always updated."* In addition, due to the ERP system it became possible to track information back in history.

Interviewees across all the four organizations mentioned that the ERP system affected their work tasks. Most often they claimed that their work routine has become simpler. One aspect of the simplification is that the system has reduced manual work, which again has increased work efficiency: *"Before, when the director called and asked for some price, it took me some time to calculate it from the papers. Now it is only about six clicks away."* (Technology manager, CompD). Interestingly, two of the companies perceived improved substitutability of workers to result from the ERP system implementation: *"When somebody is suddenly missing anybody else can substitute."* (Technology manager, CompB).

ERP system outcomes	CompA	CompB	CompC	CompD
System Quality				
Controlling	X		X	X
Communication possibilities			X	
Data analysis	X		X	X
Data import/export	X	X		X
Data integration *	X	X	X	X
Data transparency	X	X	X	X
Data security	X			
System extensions/changes *	X		X	X
System stability *	X		X	
System sustainability	X			X
User interface flexibility *	X			X
Information Quality				
Information accuracy *	X	X	X	X
Information availability *		X	X	X
Information back tracking	X			X
Information timeliness *			X	X
Individual Impact				
Substitutability		X		X
Increased work efficiency *	X	X	X	X
Work simplification	X	X	X	X
Organizational Impact				
Administration expenses reduction *			X	
Better inventory overview			X	X
Business process improvements *	X	X	X	X
E-commerce *			X	
Increased capacity *			X	
Overall productivity *			X	
Production planning improvements				X
Staff requirements reduction *			X	

Table 3. ERP system outcomes identified in the four cases

With regard to the organizational impact, business process improvements were perceived as the main outcome of the ERP system. All the four organizations reported improvements in their business processes, e.g.: “We have optimized our processes due to the system.” (Project leader, CompA). CompC and CompD perceived improvements in inventory overview, and CompD also recognized improvements in production planning practice. However, besides this, only CompC stated other organizational impacts of the ERP system. For example, the ERP system resulted in reduction of administrative expenses and also enabled increased utilization of E-commerce in the company. Moreover, the ERP system contributed to higher overall productivity and resulted in an increased capacity to manage a growing volume of activities. As reported by the sales manager: “Because we implemented the system we could improve and develop our portfolio and volume of the business.” The ERP system also reduced the need for further staff hiring since more operations can be managed by the system without requiring additional human resources: “We were able, compared to competitors, to grow the same size in terms of sales without burdening the company with new staff.” (Wholesale manager, CompC).

5 Discussion

The former section presented the ERP system outcomes identified in the four case SMEs. This section elaborates on the question of how the SME context affects the ERP outcomes and the ERP system evaluation practice.

5.1 ERP system outcome measures

In general, the study demonstrates how the four measurement dimensions defined by Gable et al. (2003) are also applicable in the SME context, as all the identified ERP outcomes could be related to one of the dimensions. The following section discusses how the SME context has been found to affect the ERP outcomes related to each of these dimensions.

System and information quality. The results showed that the case organizations reported a substantial number of ERP outcomes within the system and information quality dimensions, compared to the individual and organizational impact dimensions. This might be influenced by the lack of a strategic perspective on the ERP system implementation in the studied SMEs. In all four cases the main reason for implementing an ERP system was to replace the legacy system. The legacy systems were so unsatisfactory that their replacement was necessary for continuing the companies' operations. In all four SMEs the legacy systems were old DOS-based solutions, functionally and technically insufficient for further utilization. Thus, the motivation for the ERP system implementation was mainly technically driven (Chand et al., 2005; Velcu, 2007). The technically driven motives for ERP system implementations are also related to the lacking of an IT strategy in the case companies. In fact, only CompC had a partial IT strategy, as the ERP system was seen as a solution enabling further growth of the firm. Otherwise, the ERP system implementations were not associated with the companies' overall business strategy plans. The motivation has an implication for the ERP outcomes. Since the companies did not intend to improve their business as such through ERP system implementations, they do not seek for the effect of ERP systems on their operations. Therefore, more emphasis is put towards the systems' functionality and information quality provided by the systems, captured by the system quality and information quality dimensions in Table 3.

Individual impact. An interesting issue arose about the relevance of the individual impact outcomes. While interviewees across all the case organizations reported that the ERP system simplified and speeded-up their individual work, several interviewees reported that this is not so "black and white." Since the ERP systems offer far higher functionality compared to the legacy systems, they also require more work to provide sufficient data. Moreover, the companies have started to place emphasis on data correctness and accuracy, and compared to the previous practice it can take more time to provide required information into the system: "*At the expense of speed we have clearer, more accurate data*" (Project leader assistant, CompA).

The findings also identified some outcomes which seem to be specific for the SME context. One of the ERP outcomes identified by CompB and CompD is that the ERP system increased substitutability of workers. In general, compared to large enterprises, the employees' roles and responsibilities in SMEs are poorly defined and employees often perform various tasks. Therefore, they can not be easily substituted by other employees. It is even further constrained by the limited number of employees in SMEs. By data integration and transparency the ERP systems simplified substitutability of workers, for example in case of their absence.

Organizational impact. The findings revealed a difficulty in relating the ERP system to overall business measures such as cost reduction, overall productivity improvements, increased capability, etc. (the organizational impact dimension in the Gable et al. framework). A number of interviewees expressed limited relevance of assessing these general measures in relation to an ERP system implementation. This was explained by the dynamic environment of the case companies. All of them are continuously growing and experience many significant changes (e.g., widening assortment, new division opening, etc.) which have more significant influence on the overall business measures than an ERP system implementation. Thus, it was perceived too complex to evaluate the effect of an ERP system because there are many other influencing factors taking part. To conclude, the dynamic environment of SMEs may impede evaluation of ERP system organizational impact.

The results show that CompC reported more organizational impact outcomes compared to the rest of companies (see Table 3). This corroborates the findings by Staehr (2007) who concluded that companies with primarily technical reasons for implementing an ERP system achieve few strategic business benefits, in the sense of outcomes that support business growth and competitive advantage. In

general, the results support former literature recognizing how the motivation for implementing ERP systems may influence on ERP outcomes (Staehr, 2007; Velcu, 2007).

Former research presented that ERP systems provide labour cost savings (Gable et al., 2003; Shang and Seddon, 2000). None of the four organizations reported any HR lay offs as a result of the ERP system. This might be related to the nature of work positions in SMEs. In large enterprises there are usually several employees working in the same position. When work routine gets more efficient and speeded-up by an ERP system, lay offs in large enterprises are more likely. In SMEs, since there are not precisely defined employees' roles and responsibilities, ERP system implementations are not expected to bring significant HR cost reduction. Only CompC reported a reduced need for future labour costs (staff requirements reduction). In contrast, the ERP system implementation in CompA imposed a need for more IT staff. This was caused by the specific situation in that company. The company operates under a make-to-order (MTO) production strategy which requires many further configuration changes and development requirements for the implemented ERP system (Zach and Olsen, 2011). The company decided for further internal development of the ERP system because this was seen to be a faster and cheaper solution than to use a vendor for all the required work. At the time of the interviews the company was in the process of hiring one additional programmer to handle this job.

5.2 ERP system evaluation practice in SMEs

Even though the ERP system implementation projects in all the four organizations were considered successful, no evaluation of the ERP outcomes has been conducted by any of the companies. None of the companies explicitly defined any evaluation criteria in the beginning of the projects as a set of outcomes which were expected to be fulfilled. There existed some general expectation from the ERP system (e.g., system integration, improved information quality), however these were not formally stated. Neither has any ex-post evaluation of ERP outcomes been carried out by the case companies. The lack of IS evaluation practice in SMEs has been discussed by Ballantine et al. (1998), and the findings from this study show that this phenomenon is still prevailing.

One of the reasons explaining this might be related to the ownership type in the studied organizations. As is typical for SMEs, the case companies were privately owned businesses, where the main owner also is the CEO (in CompC there were two owners/CEOs). In all four companies the CEOs were actively involved in the operating business. Thus, they were in contact with the system on a daily basis and got feedback on this all the time. Therefore, they were able to perceive the effect of the ERP system and recognize ERP outcomes based on the practice. There was no perceived need for identifying and evaluating outcomes in order to justify its success. Thus, the ownership type of SMEs may influence the ERP system evaluation practice.

Another reason for not conducting the ERP system evaluation mentioned during the interviews was an obviousness of the outcomes. Since the legacy systems in the studied companies were functionally limited and insufficient, 'everything' has improved by implementing an ERP system. As stated by the wholesale manager from CompC: *"It is not comparable with the old system, [...]. The improvement is in everything."* Since the ERP outcomes are perceived obvious and apparent, there is no need for their evaluation. Thus, the status of legacy IT solutions in SMEs may influence the evaluation of ERP system outcomes.

Compared to large organizations, SMEs have been found to be constrained by limited resources and limited IS competence (Levy and Powell, 2000; Thong, 2001). These aspects are likely to affect IS/ERP implementation projects as well as their evaluation. Since the ERP outcomes evaluation was not part of any implementation project in the studied organizations, it would require additional resources. Thus, it would take resources away from the primary business activities, which would be seen as improper. SMEs, restricted by limited resources, might therefore not be able to assign sufficient resources for conducting the ERP system outcomes evaluation.

An exception to the lack of perceived need for ERP evaluation was observed in CompA. The project leader and his assistant here expressed a desire for ERP outcomes evaluation and recognized its importance, stating that the effect of the system contribution would need somehow to be highlighted.

However, the evaluation was expressed to be difficult to conduct. The project leader was dissatisfied with the fact that they did not designate any parameters for ERP outcome assessment. This might be caused by limited IT competence in the company, typical for SMEs.

6 Conclusion

This study has explored ERP system outcomes in SMEs. The aim was to improve our understanding of this phenomenon through focusing on distinguishing characteristics of the SME environment. The findings indicate that the SME context has implications on the ERP outcomes as well as on the ERP system evaluation practice.

The cross-case analysis provided a list of ERP outcomes perceived by the case organizations. In the individual impact dimension, the ERP systems simplified work and increased work efficiency. In addition, the ERP systems improved substitutability of workers, which may seem to be specific for SMEs due to the nature of work positions in these organizations. Furthermore, the study shows how the SMEs perceived it to be difficult to relate the ERP system to overall business outcomes as defined in the organizational impact dimension. The dynamic environment of SMEs has been observed as the main constraint for evaluation of ERP system organizational impact. In particular, the labour cost savings might be limited by the nature of work positions in SMEs. The case companies reported more emphasis on the system and information quality improvements provided by the ERP systems. This was observed to be affected by the lack of IT strategy in these companies and their motivation for the ERP system implementation being limited to replacing legacy systems. To sum up, the study findings show that the nature of work positions, dynamic SME environment, lack of IT strategy, and motivation for the ERP system implementation are among the issues that may affect the ERP outcomes in SMEs.

The study documents a lack of ERP system evaluation practice in the SMEs. The characteristics of the SME context such as ownership type, resource constraints, limited IT competence, and status of the legacy IT solutions in SMEs were recognized as factors constraining the evaluation. Nevertheless, it may be argued that recognition of the ERP outcomes could increase utilization of the systems and help in its further development.

The study has identified major ERP system outcomes in the SME context and thus contributes to the research on ERP system implementation projects in SME. The findings indicated that the ERP system implementations in the case SMEs were mostly perceived as technical replacement of the legacy systems, limiting the focus on more overall organizational outcomes of the ERP systems. As demonstrated by CompC, a more strategic approach enables organizations to gain more organizational outcomes from the ERP implementation. Thus, SMEs should align the ERP system implementation projects with their overall business strategy plans in order to better utilize the ERP system potential.

Naturally, the study has several potential limitations. First of all, the interpretation of the results might be influenced by the author's biases. The motivation of this study was to enhance understanding of the outcomes of ERP system implementation projects in SMEs, and thus contribute to improve evaluation practice in these organizations. This applied perspective might shape my interpretation of the findings.

Furthermore, all four case companies selected local ERP systems which could be characterized as less complex compared to "standard" ERP systems such as SAP. This might be considered as a limitation of the study's scope as the selected systems might provide comparatively less outcomes. However, since the literature supports our findings that SMEs are likely to choose systems provided by small national vendors (Federici, 2009; Yeh, 2006), it is believed that the findings can be generalized to ERP implementations in other SMEs.

In addition, the date of the case ERP implementation varies between 2005 to 2009. Considering the fast pace of technology advancements, in these four years the experience of ERP vendors regarding the problems and challenges with ERP implementations might have an impact on the system quality and information quality of the ERP system. This may raise differences in the perception of the ERP system outcomes among the four companies.

Finally, all case companies are characterized as continuously growing and dynamic organizations, undergoing many changes in their business processes over time. While these are often reported characteristics of SMEs, there might also be more mature, stable SMEs, working with traditional business processes. Therefore, the applicability of the results to other types of SMEs needs to be investigated by further research.

The presented analysis demonstrated the applicability of the four ESS model dimensions (Gable et al., 2003) in the SME context. However, the identified ERP system outcomes only to some extent matched with the measures from the ESS model, and a number of additional ERP system outcomes were also reported. The discrepancy identified in this study could form the basis for further research on validation of the ESS model in the SME context. Another possibility for further research would be to apply a longitudinal approach to relate the ERP system outcomes to different stages in the ERP implementation in SMEs (Shang and Seddon, 2004).

Acknowledgements

I am grateful to the informants in the four case companies for sharing their valuable experience. I also thank Professor Bjørn Erik Munkvold for providing constructive comments to the various drafts of this paper.

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