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ERP System Customization In SMEs: A Multiple Case Study

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ERP SYSTEM CUSTOMIZATION IN SMEs: A MULTIPLE CASE STUDY

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Abstract

One of the biggest challenges for organizations implementing an Enterprise Resource Planning (ERP) system is to find the right fit between the processes embedded in the system and the existing organizational business processes. “Conventional wisdom” founded on studies from large enterprises holds that ERP systems should be implemented without customization. However, studies of ERP system implementations in small and medium-sized enterprises (SMEs) indicate that in these organizations ERP system customization is more common. The purpose of this study is to contribute to the scarce literature on identifying reasons for ERP system customization in SMEs. Based on a multiple case study of four SMEs, the study investigates reasons for ERP system customization with a focus on distinguishing characteristics of the SME context. The analysis identified eight various reasons for ERP system customization observed in the SMEs. Reasons specific to the SME context here include unique business processes, ownership type, and organizational maturity.

Keywords: ERP system customization, ERP implementation, SME, case study.
1 INTRODUCTION

Enterprise Resource Planning (ERP) systems can be characterized as packaged software developed to meet general needs of organizations (Brehm et al., 2001; Luo and Strong, 2004). Embedding standard business processes based on “best practice”, ERP systems in many cases will not meet the unique needs of a particular organization. Thus, finding the right fit between ERP systems and the business processes of the target organization is recognized as critical for successful ERP implementation (Hong and Kim, 2002). In the case of a misfit between the ERP system and the organization’s established practices, the organization can respond by two approaches: ERP system customization or organizational adaptation (Buonanno et al., 2005; Kholeif et al., 2007). An important decision is then the scale of ERP system customization and business process change that should be applied.

The ERP literature includes a number of studies exploring various aspects of these two approaches and their mutual combination in order to appropriately customize both the system and the organization. Many studies advocate that ERP systems should be implemented without customization (Davenport, 1998; Holland and Light, 1999; Nah et al., 2001; Somers and Nelson, 2001), as ERP customization is more risky and may increase costs and limit maintainability (Kholeif et al., 2007). Despite this, a number of studies have documented how ERP system customization may occur (Light, 2001; Pollock et al., 2003; Rothenberger and Srite, 2009; Soh et al., 2000). Reasons identified for this include resistance to change (Rothenberger and Srite, 2009), functional misfit (Brehm et al., 2001; Light, 2005), and cultural issues (Soh et al., 2000).

In particular, research on ERP system implementations in small and medium-sized enterprises (SMEs) indicates that for these organizations system flexibility is important (Bernroider and Koch, 2001; van Everdingen et al., 2000), and some studies report that SMEs may rather choose to adapt ERP systems to the business processes (Snider et al., 2009). However, there has been little research on ERP system customization in the context of SMEs.

As SMEs are considered fundamentally different compared to large enterprises (Welsh and White, 1981), studies on ERP implementations also argue that findings from large companies cannot be applied to SMEs (Buonanno et al., 2005; Mabert et al., 2003). SMEs are represented by a range of inherent characteristics which distinguish them from large enterprises, such as ownership type, structure, culture, market, etc. (Ghobadian and Gallear, 1997; Wong and Aspinwall, 2004). With regard to the issue of IT/IS adoption, SMEs have been found to be constrained by limited resources, limited IS knowledge, and lack of IT expertise (Cragg and King, 1993; Levy and Powell, 2000; Thong, 2001). It is important to recognize these distinguishing characteristics and consider how they may influence the ERP implementation issues faced by SMEs (Gable and Stewart, 1999). We thus presume that the specific characteristics of SMEs may also influence on the reasons for ERP system customization.

This study reports findings from a multiple case study of four SMEs where ERP system customization has been applied to match organizational businesses processes. The purpose of this article is to investigate reasons for ERP system customization in the case organizations. Moreover, we focus explicitly on how the decision for ERP customization has been influenced by contextual issues of the SMEs. Thus, the study is driven by two research questions: (1) What are possible reasons for ERP system customization in SMEs? (2) How does the SME context affect this approach?

The rest of the paper is organized as follows. Section 2 briefly reviews relevant literature on ERP system customization, with particular focus on SMEs. Section 3 describes the research methodology applied in this study. Section 4 presents the case companies and findings from the cross-case analysis. Section 5 elaborates on the identified reasons leading to ERP system customization in the SMEs. Section 6 presents conclusions and implications of the study.
The primary goal of ERP system customization is to achieve a fit between an ERP system and the business processes of the organization (Luo and Strong, 2004). In other words, ERP customization serves to fill the gap between ERP functionality and organizational requirements. There exist different conceptualizations of ERP system customization in former research, including related terms such as tailoring (Brehm et al. 2001), modification (Rothenberger and Srite, 2009) and functional alignment (Hong et al., 2002) of the system. For example, based on a review of the ERP literature, and complemented by fieldwork and interviews with ERP vendors and consultants, Brehm et al. (2001) developed a framework of ERP tailoring options. The framework distinguishes between 9 different types of ERP package tailoring, ranging from “light” configuration up to “heavy” package code modification. When implementing an ERP system, an organization can choose to modify an ERP system by using almost any combination of the tailoring types (Brehm et al., 2001). The framework was further modified by Rothenberger et al. (2009) who grouped ERP modification options into three areas: configuration/selection, system change, and bolt-ons. Some authors also consider module selection as a part of ERP customization (Liang and Xue, 2004; Luo and Strong, 2004). We do not distinguish further between these forms of customization in the literature review. However, in the empirical part of this paper (section 4) we will further define the view on customization guiding our study.

The concept of ERP system customization has been widely discussed in the ERP literature. A minimal ERP customization has been recognized as one of the critical factors contributing to ERP implementation success (Nah et al., 2001; Somers and Nelson, 2001), and some studies have documented failed ERP customization projects (e.g., Kholeif et al., 2007). On the other hand, ERP system customization has also been identified as one of the factors that positively influence ERP benefits (Chou and Chang, 2008; Hong and Kim, 2002).

A frequently mentioned reason for ERP system customization is a functional misfit (Brehm et al., 2001; Light, 2005) between the standard ERP system functionality and existing business processes. The study by Light (2005) went deeper and discussed further potential reasons for ERP package customization. Besides the functional misfit, several reasons for ERP system customization rooted in the influence of diverse social groups have been proposed. For example, ERP system customization may be performed because of a consultant’s lack of knowledge about a product or its context, insufficient development work from the vendor, or as an act of safeguarding a working position by internal information systems personnel (Light, 2005). Further, based on a multiple case study of eight organizations, Rothenberger and Srite (2009) identified customization drivers and explored their relationship to customization. The findings suggest that ERP system customization is affected by: ERP knowledge at the beginning of the project, experience of the implementation team, reliance on consultants, organizational project motivation, organizational culture, involvement of operational departments, ERP project acceptance, and fear of personal disadvantage from change. Both these studies (Light, 2005; Rothenberger and Srite, 2009) are based on cases of large enterprises.

The research on ERP system implementations in SMEs has indicated that ERP system customization might be adequate for these organizations. The ERP system flexibility and adaptability have been found to be among the most important selection criteria in SMEs (Bernroider and Koch, 2000; van Everdingen et al., 2000). Liang and Xue (2004), exploring how vendor activities can improve ERP implementation success in the context of Chinese SMEs, suggested that ERP systems should be customizable at a variety of levels with a minimal business process reengineering needed. This has been supported by Quiescenti et al. (2006), who concluded that ERP systems should be customized according to business processes, and not vice versa. In addition, the studies by Mabert et al. (2003) and Snider et al. (2009) reported cases of ERP system customization in SMEs. Olsen and Sætre (2007a; 2007b) went even further and proposed that developing proprietary software is the best alternative for many SMEs.

The former research on ERP system customization in SMEs indicates a need to accommodate the unique business processes. For SMEs their unique business processes often provide their strength, and changing or removing these could then threaten the very existence of the companies (Quiescenti
et al., 2006). In a similar vein, Snider et al. (2009) stated that SMEs rather chose to adapt ERP systems according to business processes because they were considered strategic. Also, Bernroider and Koch (2001) mentioned preservation of unique business processes as the reason for preferring system adaptability. However, there is still limited research investigating the reasons for ERP system customization within the context of SMEs. The purpose of this study is thus to contribute to fill this knowledge gap.

3 RESEARCH METHODOLOGY

The literature review presented in the previous section identified some reasons for ERP system customization. As the purpose of this study is to identify new insights within the SME context, an exploratory qualitative research approach employing a multiple case study design is applied. Case studies allow collection of rich data and are appropriate to study a contemporary phenomenon within its natural setting (Yin, 2008). Moreover, an exploratory approach prevents limiting the research to only confirming previously identified findings (Rothenberger and Srite, 2009).

In total, four organizations were studied. All of them are SMEs operating within the private sector in the Czech Republic. In order to maximize the variety between the cases, the organizations 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). The case selection was based on a mixture of opportunistic, stratified purposeful, snowball, and theory based sampling strategies (Miles and Huberman, 1994). In order to ensure anonymity, the organizations are labeled as CompA, CompB, CompC, and CompD. Table 1 provides an overview of the studied cases.

<table>
<thead>
<tr>
<th>Industry</th>
<th>CompA</th>
<th>CompB</th>
<th>CompC</th>
<th>CompD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business type</td>
<td>Manufacturer</td>
<td>Distributor/Manufacturer</td>
<td>E-shop</td>
<td>Manufacturer</td>
</tr>
<tr>
<td># of employees</td>
<td>220</td>
<td>100</td>
<td>50</td>
<td>200</td>
</tr>
<tr>
<td># of interviews</td>
<td>14</td>
<td>7</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Participants</td>
<td>Project leader (production manager), project leader assistant, CEO, financial/technology managers, IT/IS administrators, key users, end user, vendor’s CEO.</td>
<td>Project leader assistant, financial/technology/ sales managers, IT/IS administrator, end user, consultant.</td>
<td>Sales manager (responsible for the IS), wholesale manager, end user, vendor.</td>
<td>Project leader (purchasing manager), IT/IS administrator, economic/warehouse/ technology/ production managers, payroll clerk, end user, vendor.</td>
</tr>
</tbody>
</table>

Table 1. Overview of the case companies

Personal interviews were utilized as the primary data collection technique. The interviews were conducted with multiple stakeholders involved in the ERP implementation projects. This approach yielded different perspectives in order to enrich the findings. The respondents represented different positions within each organization, including top and middle management, end users, IT responsible persons, etc. Vendors or consultants involved in the ERP implementation were also interviewed. In total, 34 interviews were conducted across the four organizations. The data collection was carried out during the period from February to October 2010. Apart from two telephone interviews with the vendors in CompA and CompD, all interviews were conducted face-to-face at the companies’ locations (usually in meeting rooms). The interviews lasted from 20 to 100 minutes, with an average of one hour.
The interviews were semi-structured, following the guidelines by Myers and Newman (2007) for conducting qualitative interviews. As this study is part of a larger research project investigating ERP systems implementation in SMEs, the questions covered various issues of ERP system implementation through the entire ERP life-cycle (Esteves and Pastor, 1999; Markus and Tanis, 2000), including issues such as ERP implementation motivation, selection process, implementation team activities, critical success factors, user training, ERP system usage, ERP outcomes, maintenance, etc. A recurring topic in the interviews was the need for ERP system customization as a way of reaching fit between the ERP system and organizational business processes. Additional information about the applied level of ERP system customization and its reasons was collected through a follow-up e-mail to one representative per case, considered to be the most competent informant for the customization topic (project leader in CompA, consultant in CompB, certified agent in CompC, and vendor in CompD). E-mails and telephone communication were also used for clarification of some issues. The case material was further supplemented by documents provided by the organizations, company presentations, company web pages, and web pages of the vendors.

The interviews were recorded and the parts covering issues related to ERP system customization were transcribed in full. The data analysis concentrated on identifying reasons for ERP system customization emerging from the interview data. First, within-case analysis was conducted in order to well understand the individual cases (Eisenhardt, 1989). This provided a preliminary list of reasons contributing to ERP system customization within each case. Then, a cross-case analysis was conducted, looking for similarities and differences between the cases. The reasons identified in former literature were used as underlying constructs during the analysis. As will be reported in the following, while some of the findings corroborate results from former research in large companies, we also identified new reasons for ERP system customization in the SME context.

4 ANALYSIS AND FINDINGS

The data collection provided rich information about the ERP system implementation projects in the case organizations. First, we provide the results from the cross-case comparison of ERP system customization in the four companies. Second, we present the identified reasons for ERP system customization.

4.1 Cross-case comparison

Table 2 lists key characteristics of the ERP implementation projects in the four cases. The case companies represent different phases in the ERP-life cycle, varying from 11 months (CompA) up to 5.5 years (CompD) of experience with the 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.

The selection of the ERP system was carried out by appointed selection teams. Naturally, in all the cases the companies’ owners were involved in the final decision phase. Besides the financial and functional requirements, openness of the system for modifications according to the companies’ needs was one of the main selection criteria in all the cases. All four companies selected domestic ERP systems. 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. The following three modules were implemented in all projects: finance (including accounting), commerce (purchase and sale), and logistics (warehouse). Apart from this, different module selections were implemented in the four companies. While particular modules differ between these ERP systems, they basically provide the same functionality.

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.
The selection of the implementation partner was also influenced by their willingness for ERP system customization changes. Another considered criterion was their accessibility in the companies’ region. Two of the organizations selected a local IT company operating as a certified agent of the ERP vendors. CompD selected a vendor whose headquarters is located in the company’s region. CompB did not select a local vendor, but they used a local consultant as a member of the implementation team. The size of the implementation teams varied from 4 to 10 internal employees.

<table>
<thead>
<tr>
<th>Time of ERP implementation</th>
<th>CompA</th>
<th>CompB</th>
<th>CompC</th>
<th>CompD</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 2009</td>
<td></td>
<td>October 2006</td>
<td>August 2007</td>
<td>January 2005</td>
</tr>
<tr>
<td>Time since “going-live”</td>
<td>11 months</td>
<td>3,5 years</td>
<td>3 years</td>
<td>5,5 years</td>
</tr>
<tr>
<td>ERP system</td>
<td>Helios Green</td>
<td>ABRA G4</td>
<td>ABRA G3</td>
<td>ALTEC Aplikace</td>
</tr>
<tr>
<td>Legacy information systems</td>
<td>4 separate DOS-based systems (accounting, production control, payroll system, attendance system)</td>
<td>2 separate DOS-based systems (accounting, production control)</td>
<td>DOS-based accounting system</td>
<td>2 separate DOS-based systems (accounting, production control)</td>
</tr>
<tr>
<td>Implementation partner</td>
<td>Certified agent</td>
<td>Vendor</td>
<td>Certified agent</td>
<td>Vendor</td>
</tr>
</tbody>
</table>

Table 2. ERP implementation project characteristics

Our cross-case analysis focuses on two forms of customization, building on the work of Brehm et al. (2001) and Rothenberger and Srite (2009). First, businesses may employ programming of additional applications on top of the ERP platforms (add-ons), without changing the ERP source code. This can be done by using the ERP system programming language or standard programming languages. Second, companies can change the ERP source code to fit organizational needs. This requires a substantial development effort using the ERP system programming language or standard programming languages. In line with Rothenberger and Srite (2009), we do not consider configuration as part of customization, as configuration does not impose significant changes of the ERP system.

Further, we distinguish between three levels of usage (not used, low, and high) to indicate the scope of the customization (Brehm et al., 2001). Finally, to be able to focus on ERP system customization practice in different phases of the project, we distinguish between two phases of the ERP system lifecycle: prior to “going-live” and after “going-live”. Table 3 presents the results of our cross-case comparison, applying the two ERP system customization types, level of usage, and the two life-cycle phases.

As can be observed from Table 3, all four organizations have applied some kind of ERP system customization. Usually the companies employed a higher level of programming of add-ons, while ERP source code modification was applied to a comparatively lower level. Yet, any source code modification imposes significant changes to the ERP systems. CompD applied a higher level of ERP source code modification than programming of add-ons. This was explained by the characteristic of the ERP system in this case, as any change of the system requires modifications of the source code. The findings also indicate that ERP system customization did not end by the ERP system “going-live”, but was further employed during the usage and maintenance phase. Surprisingly, CompC and
CompD applied even higher levels of both customization types after “going-live.” In the following section we elaborate on the reasons behind applying the high level of ERP system customization in the case organizations.

<table>
<thead>
<tr>
<th>Cases</th>
<th>Level of usage prior to “going-live”</th>
<th>Level of usage after “going-live”</th>
<th>ERP system customization type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not used</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>CompA</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>CompB</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>CompC</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>CompD</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>

Table 3. Cross-case comparison of ERP system customization

4.2 Reasons for ERP system customization

The identified reasons for ERP system customization are here presented according to the two phases of the ERP life-cycle, i.e. prior to “going-live” and after “going-live”. However, it should be noted that the issues are often interrelated.

4.2.1 Reasons for ERP system customization prior to “going-live”

Resistance to change. In all four cases, openness of the ERP system for modifications was one of the key selection criteria. All of the companies had decided that they did not want to adapt to the ERP system, but wanted the system to adapt according to the organizational needs. The project leader assistant from CompB stated, “We did not want to modify the company procedures according to the system.” All the organizations were characterized by a high resistance to change. For example, the vendor from CompC reported, “I think it is very strict here, there was zero tolerance and willingness for any kind of adaptation to anything. Thus, it was clear that the system had to be able to adapt to everything they required.” Resistance to change could thus be identified as an overall reason for ERP system customization. However, to provide more explanatory power we need to dig deeper into the possible reasons behind ERP system customization.

Unique business processes. The main reason for ERP system customization emerging from the interviews is that the companies wanted to keep their existing business processes because these were perceived as unique for their operations. In fact, keeping the idiosyncratic processes was reported as critical for the further functioning of the business: “we knew that our processes are not standard and the system had to be customized a lot to suit our processes.” The organization also observed in other cases. The organizations wanted to keep their idiosyncratic processes which were perceived to be working well. The business processes have evolved over time and closely reflect the structure of the companies. For example, in the case of CompA the specific organizational structure was mentioned as one of the reasons for ERP system customization. The company consists of several production divisions which differ in terms of the manufactured product as well as the employed technologies. Another example was observed in CompB. The organization has a need for extensive information exchange between the production and sales departments. This was not accommodated by the ERP system in the standard version and it caused a need for customization.

Functional misfit. The unique business characteristics caused a functional misfit between the ERP systems and established business processes which in turn required ERP system customization. As an example, the functional misfit was observed regarding the pricing policy of warehouse items. In both
CompC and CompD the pricing mechanisms embedded in the ERP systems did not correspond to calculations required by the companies. In CompC there was a need for customized calculation of average stock price, while in CompD the need for customization was related to the pricing of unfinished products. Another functional misfit was observed regarding pricing policy in CompA and CompB. Both companies produce according to a Make-To-Order (MTO) production strategy, which affects their pricing policy. They do not work with “usual” pricing lists, instead they operate by offer-demand tenders. However, this functionality was not available in the standard ERP system solutions.

Ownership type. Another possible reason affecting ERP system customization observed in the case organizations is the ownership type. Typically for SMEs, all four case companies are privately owned businesses, where the main owner is also the CEO (in CompC there are two CEOs). The owners have a substantial power and are able to enforce their opinions and decisions. As one of the interviewees characterized CompD, “it is a company of more or less one man.” Naturally, the CEOs significantly influenced the ERP system requirements and their selection. The need for ERP system customization partly originated from their initial decision that they did not want the organization to change. This has been decided from the very beginning of the projects and was very difficult to alternate. An illustrative example can be a decision of data transfer in CompB. The CEO’s requirement was that all data from the legacy system needed to be transferred to the ERP system. As the consultant reported, this decision was difficult to negotiate and its solution was very complicated, since he had to develop a converse bridge between the two systems.

Project motivation. The motivation for the ERP system implementation is among the potential reasons for ERP system customization in the case organizations. In all four cases the projects were mainly technically motivated. The main reason for implementing an ERP system was to replace the unsatisfactory legacy systems. Thus, the lack of strategic motivation observed in the case organizations might influence the level of ERP system customization.

4.2.2 Reasons for ERP system customization after “going-live”

In this section we elaborate on the identified reasons leading the case organizations to continue with ERP system customization also after “going-live.”

Organizational maturity. The business in all the case organizations can be characterized as dynamic, agile, and growing, with a resulting need for further flexibility in the business processes. This is also closely related to the age of the companies. All of them are quite young organizations with only 9 to 19 years of existence, and compared to more mature and larger enterprises their business processes can be characterized as more dynamic. This characteristic is likely to influence their requirements for ERP system customization. All the organizations applied substantial ERP system customization also in the further stages of the ERP implementation. We argue that this is related to the nature of their business activities. As they are agile organizations which are continuously growing and experience many changes over time, the ERP systems need to be modified to accommodate these changes too.

However, this does not refer to changing the core business processes discussed above. Rather, it denotes to adding new ERP functionality as the companies grow and develop new business processes. For example, in CompA a new production division of optoelectronic components started three months after the ERP system “going-live”, which required substantial modifications of the ERP system and development of a new module for production rendering. The effect of organizational growth was also mentioned by the vendor in CompC: “The company has such dynamics that we still implement further.” The growth of the company causes new requirements which have radical influence on the behavior of the system. The scope of the system in terms of user licenses has increased almost ten times during three years, since the ERP system implementation in 2007. Thereby, we postulate that the maturity level of the case SMEs affected the level of ERP system customization applied after “going-live”.

Maturity of ERP systems. The maturity level of the ERP systems is another potential reason for applying a high level of ERP system customization after “going-live.” All the selected systems can be considered quite young and immature compared to the more established and comprehensive ERP systems such as SAP. The interviews indicated that some modules were not offered at the time of
implementation and they were further developed after the implementation projects. Some modules were immature as they did not offer the required functionality, and had to be further developed based on the requirements. This was especially the case in CompD. The organization collaborated intensively with the vendor on further development of the system also after the implementation project and even became a testing partner of the ERP system. To conclude, we postulate that the maturity level of the selected ERP systems required a high level of customization.

**Shift in user expectations.** Another issue identified to affect ERP system customization after “going-live” is an increase in user requirements emerging after some time. As the users explored the new system over time, they got familiar with its philosophy and capabilities. After some time they were more capable of understanding its potential and they started to have more requirements for its modifications in order to improve their operations. This experience has been reported by interviewees in all four case organizations. We propose that the shift in user expectations from an ERP system affected the level of ERP system customization applied after “going-live”.

5 DISCUSSION

The previous section presented the reasons for ERP system customization identified in the four case SMEs. In this section we discuss the findings in relation to former research and elaborate on the question of how the SME context affected ERP system customization.

The finding of the need to accommodate SMEs’ unique business processes as one of the main reasons for ERP system customization corroborates former literature (Bernroider and Koch, 2001; Quiescenti et al., 2006; Snider et al., 2009). This is closely related to the finding of functional misfit as another identified reason for ERP system customization. The need for keeping unique business processes may be related to maintaining competitive advantage as a differentiator (Brehm et al., 2001; Vilpola and Kouri, 2005). As ERP systems are generic products, it might be preferred to apply ERP system customization in order to differentiate from the mainstream (Holland et al., 1999; Light, 2005). Thus, the resistance to change observed in the case companies might also be related to fear of losing a competitive advantage. The unique business processes were reported as critical for the further functioning of the business, considered typical for SMEs which usually gain their competitive advantage by excellence within some niche market.

In all four cases the main owner was also the CEO with a substantial power. This is typical for small companies where the owners are often managers who oversee all aspects of the business operations (Wong and Aspinwall, 2004). This implies that if the owners decide that they do not want to change their organizations because of the ERP system implementation, their decision is difficult to negotiate. Thereby, the ownership type can significantly affect the level of ERP system customization.

Primarily technical motivation for ERP system implementation by replacing the legacy system has been observed to result in reluctance to business process change (Rothenberger and Srite, 2009). Also, Robey et al. (2002) found that a lack of strategic motivation resulted in high ERP system modifications. Companies which are able to recognize the business benefits of an ERP system are more likely to be willing to adopt the standard processes of the system (Rothenberger and Srite, 2009). Thus, as the projects in the case organizations were mainly technically motivated, the lack of strategic motivation might contribute to higher level of ERP system customization.

Different levels of organizational maturity reflect different business imperatives and thus different needs while implementing ERP systems. However, limited attention has been given to the importance of the stages of growth among studies on ERP implementation (Liang and Xue, 2004). Usually companies have been treated as equal without attention to their maturity level. Liang and Xue (2004) offer an explanation that it might be caused by the fact that most of the past ERP studies were based on cases of large enterprises, usually being in the mature stage. However, the businesses in the case organizations were characterized as continuously growing, undergoing many changes in their business processes over time. These changes needed to be captured by the ERP system and caused a need for the system’s customization after “going-live”. Thus, the often immature stage of SME businesses might influence requirements for ERP system customization.
The maturity level of ERP systems is identified as another issue affecting ERP system customization. All four case companies selected domestic ERP systems. Furthermore, the companies selected less mature ERP systems compared to “standard” ERP systems such as SAP. As the selected systems did not offer all required functionality at the time of implementation, it provided a requirement for their further customization according to organizational needs after “going-live”. This would be difficult to conduct in the case of mature ERP systems. In turn, the maturity level of ERP systems influenced the level of applied ERP system customization.

As all the ERP systems selected by the case organizations are characterized as smaller in scope and with lower functionality than more complex systems such as SAP, this might be considered a limitation of the study’s scope. However, other studies also found that SMEs are likely to choose systems provided by smaller national vendors (Federici, 2009; Yeh et al., 2006). Due to their ability to meet special requirements and support the flexibility and speed of SMEs, local vendors are considered better capable of supporting SMEs (Yeh et al., 2006). Furthermore, local ERP vendors were found to have greater ability to accommodate contextual factors such as history, culture, social value, and management style of SMEs (Liang and Xue, 2004). In the light of these findings we believe that our findings can be generalized also to ERP implementations in other SMEs.

In line with the general shortage of IT competence in SMEs (Cragg and King, 1993; Fink, 1998; Levy and Powell, 2000), it could be expected that lack of knowledge or experience with ERP systems could be a potential reason for ERP system customization in the case organizations. However, this was not supported by our results, as the case organizations were reported by their implementation partners to be knowledgeable and were characterized by careful attention to the implementation projects. Thus, the case SMEs seem not to be significantly constrained by lack of ERP knowledge or limited experience.

Nevertheless, the recognized shift in user requirements might be related to the issue of knowledge of the ERP system. As the users lacked knowledge about the new system capabilities, it took some time before they became familiar with the system and started to have further customization requirements after “going-live”. This is recognized in the literature as a process of organizational learning (Robey et al., 2002). Because ERP systems are complex, the organizations need to engage in practices that give their employees time to absorb and share their knowledge gained through experience (Robey et al., 2002).

6 CONCLUSION

The aim of this study was to identify reasons for ERP system customization in SMEs. Based on the cross-case analysis of four SMEs, eight reasons for ERP system customization were identified. The findings corroborate former research on ERP implementation in large companies, while also identifying new reasons for ERP system customization specific for the SME context, such as ownership type and organizational maturity level. By classifying the reasons into two phases of the ERP life-cycle, prior to “going-live” and after “going-live”, the study also contributes by providing evidence of how a high level of ERP system customization is also applied in the later phase. This is assumed to be related to the maturity level of SMEs and characteristics of the selected ERP systems.

By identifying the reasons for ERP system customization and investigating the effect of the SME context, the study contributes to better understanding of ERP system implementation in SMEs. The study documents that ERP system customization may be favoured by SMEs. This might be a valuable finding for organizations about to implement an ERP system and for ERP vendors in particular, showing a need to understand better the reasons for ERP system customization.

All four case companies in this study are characterized as continuously growing and dynamic organizations, undergoing many changes in their business processes over time. This setting might be in contrast to more mature and stable SMEs without a need for further expansion, working with established business processes. The market area, industry, and size of the SME can also be expected to influence on the practice related to ERP customization. Thus, further research is needed to investigate the applicability of our findings for other types of SMEs.
References


