Identifying Reasons for ERP System Customization in SMEs: A Multiple Case Study

Abstract

Purpose - The purpose of this article is to investigate possible reasons for ERP system customization in small and medium-sized enterprises (SMEs), with a particular focus on distinguishing influential factors of the SME context.

Design/methodology/approach - An exploratory qualitative research approach was employed, as the study aims to identify new insights within the SME context. A multiple case study of four SMEs was conducted. Data were collected through 34 qualitative interviews with multiple informants across the four cases.

Findings – The study reports findings from four SMEs where ERP customization has been applied to match organizational needs. First, the level and type of ERP system customization applied by the case organizations were investigated. Then, the reasons for ERP system customization were explored. The analysis identified seven possible reasons leading to ERP system customization, classified according to two phases of the ERP life-cycle (prior to "going-live", after "going-live"). Reasons specific to the SME context include unique business processes, ownership type, and organizational stage of growth.

Research limitations/implications - The study is based on four cases only. Further research is needed to investigate the applicability of our findings in different contexts.

Practical implications - The study findings are believed to be valuable for organizations about to implement an ERP system as well as for ERP vendors. By identifying the reasons leading to ERP system customization and investigating the effect of the SME context, the study contributes to better understanding of ERP system implementation in SMEs.

Originality/value – The article contributes to the scarce literature on reasons for ERP system customization in SMEs. By classifying the reasons into two phases of the ERP life-cycle, the study also contributes by exploring ERP system customization practice in different phases of the ERP life-cycle.

1   INTRODUCTION

Enterprise Resource Planning (ERP) systems can be characterized as packaged software developed to meet general needs of organizations (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 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/or business process change that should be applied.

The ERP literature includes a number of studies exploring the issue of ERP system customization. Many studies advocate that ERP systems should be implemented with minimal customization (Somers and Nelson, 2001; Upadhyay et al., 2011), as ERP customization is problematic 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, 2005; Pollock et al., 2003; Rothenberger and Srite, 2009). Reasons identified for this include resistance to change (Rothenberger and Srite, 2009), functional misfit (Brehm et al., 2001; Light, 2005), and cultural differences (Soh et al., 2000; Amida et al., 2012).

In recent years, with the market for large enterprises mostly saturated (Morabito et al., 2005), ERP vendors have begun to target the small and medium-sized enterprises (SME) market, and many midrange and less complex ERP systems have been developed (Koh and Simpson, 2007). However, despite existence of pre-configured low cost solutions designed especially for SMEs, ERP system implementation remains a challenge for many SMEs (Malhotra and Temponi, 2010; Olson and Staley, 2011). Research on ERP system implementation in SMEs indicates that system flexibility is important for these organizations (Bernroider and Koch, 2001; van Everdingen et al., 2000), and that SMEs may rather choose to adapt ERP systems to the business processes (Quiescenti et al., 2006). Recent studies report cases of ERP customization in SMEs (e.g., Poba-Nzaou and Raymond, 2011; Snider et al.,

2009). Despite the importance of ERP customization being recognized by former studies, there has been little research exploring this issue further. Several questions remain unanswered, with a core question being: why do SMEs seem to favour ERP system customization?

SMEs are considered fundamentally different from large enterprises on several aspects and studies on ERP implementations also argue that findings from large companies cannot be applied to SMEs (Buonanno et al., 2005; Laukkanen et al., 2007; Mabert et al., 2003). Examples of distinguishing characteristics of SMEs include ownership type, structure, culture, and market orientation (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 (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.

The purpose of this article is to investigate reasons for ERP system customization in SMEs. The article reports findings from a multiple case study of four SMEs where ERP system customization has been applied to adapt the system to the organization's business processes. We focus explicitly on how ERP system 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 ERP system customization?*

The next section 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 discusses the findings in light of former research and demonstrates the contribution of the paper. Section 6 presents conclusions and implications of the study.

2 RELATED RESEARCH

2.1 The concept of ERP system customization

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), to fill the potential gap between ERP functionality and organizational requirements. Different conceptualizations of ERP system customization in former research include related terms such as tailoring (Brehm et al. 2001), modification (Rothenberger and Srite, 2009) and functional alignment (Hong and Kim, 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, bolt-ons and system change. By selecting appropriate system components and setting parameters, an organization may configure a system to its needs. Since this may not accommodate all existing business needs, an organization may implement bolt-ons (or third-party packages) that supplement the ERP functionality, or build custom features on top of the ERP platform. Lastly, the ERP system code may be modified to fit the business needs (Rothenberger et al., 2009). We do not distinguish further between these forms of customization in this section. However, in the empirical part of this paper (section 4) we will further define the view on customization guiding our study.

2.2 Reasons for ERP system customization

Minimal ERP customization has been reported as one critical success factor for ERP implementation (Nah et al., 2001; Somers and Nelson, 2001; Upadhyay et al., 2011), and some studies have documented how ERP projects applying customization have failed (Hawari and Heeks, 2010; Kholeif et al., 2007). On the other hand, several studies have reported how ERP system customization has been applied by organizations (e.g., Light, 2001; Pollock et al., 2003; Rothenberger and Srite, 2009;

Soh et al., 2000), also documenting positive results from this (Chou and Chang, 2008; Hong and Kim, 2002).

A frequently mentioned reason for ERP system customization is a functional misfit between the standard ERP system functionality and existing business processes (Brehm et al., 2001; Light, 2005). The study by Light (2005) discussed further potential reasons for ERP package customization. Besides functional misfit, several reasons for ERP system customization rooted in the influence of diverse social groups were identified. 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 work position by internal information systems personnel (Light, 2005).

Based on a multiple case study of eight organizations, Rothenberger and Srite (2009) studied how a high level of customization occurs. The study investigated interrelations between various factors leading to ERP system customization. The results indicate that high customization may occur due to resistance to change based on low ERP project acceptance, organizational culture, or fear of personal disadvantage from change. Further, unnecessary redevelopment of functionality available in the standard version of ERP system may also lead to system customization. This is argued to be related to the experience of the implementation team and the ERP knowledge available at the beginning of the project. Also, insufficient weight given to the implementation team's recommendations and the implementation team's lack of opposition to customization requests may affect the level of ERP system customization applied. Both the aforementioned studies (Light, 2005; Rothenberger and Srite, 2009) are based on cases of large enterprises.

2.3   ERP system customization in SMEs

Research on ERP system implementation in SMEs has indicated that ERP system customization might be adequate for these organizations, with system flexibility and adaptability being among the most important ERP selection criteria in SMEs (Bernroider and Koch, 2000; van Everdingen et al., 2000). Several studies also report cases of ERP customization in SMEs (Poba-Nzaou and Raymond, 2011; Quiescenti et al., 2006; Snider et al., 2009). For example, exploring how vendor activities can

improve ERP implementation success in the context of Chinese SMEs, Liang and Xue (2004) suggested that ERP systems should be customizable at a variety of levels with minimal need for business process reengineering. Olsen and Sætre (2007a; 2007b) went even further and proposed that in-house development of ERP is the best alternative for many SMEs. In a similar vein, Olson and Staley (2012) reported that open-source software ERP is suitable for SMEs, as it provides the needed flexibility through modifying the open software code.

For SMEs, unique business processes may often provide their competitive strength, and changing or removing these could then threaten the very existence of the companies (Quiescenti et al., 2006). Thus, former research on ERP in SMEs indicates a need to adapt to the existing business processes for strategic concerns (Bernroider and Koch, 2001; Snider et al., 2009). However, there is still scarce research on ERP system customization in SMEs. Particularly, the reasons for ERP system customization within the context of SMEs have received very limited attention. The purpose of this study is thus to contribute to fill this knowledge gap. Through investigation of new insight on ERP customization in the SME context, the study attempts to identify the reasons for ERP system customization, as well to explore the influences of the SME context on this endeavor.

3 RESEARCH METHODOLOGY

Since the aim of this study is to identify new insights on ERP customization in the SME context, an exploratory qualitative research approach employing a multiple case study design was applied. Case studies allow collection of rich data and are appropriate to study a contemporary phenomenon within its natural setting (Yin, 2009). Moreover, an exploratory approach prevents limiting the research to only confirming previously identified findings (Rothenberger and Srite, 2009). Case studies have also been widely used in ERP research (Schlichter and Kraemmergaard, 2010). The main reason for choosing a multiple case study was to enable a cross-case comparison of the reasons for ERP. A multiple case study approach has been applied in a number of recent ERP studies (e.g., Poba-Nzaou and Raymond, 2011; Snider et al., 2009). For example, Rothenberger et al. (2009) investigated customization in ERP system implementation based on a multiple case study of eight organizatons. Our study falls into this research stream of employing a multiple case study research method.

Four SMEs were studied. This number is believed to provide sufficient empirical grounding for generating theory (Eisenhardt, 1989). The case selection was based on a mixture of opportunistic, stratified purposeful, snowball, and theory based sampling strategies (Miles and Huberman, 1994). All case organizations are operating within the private sector in the Czech Republic. In addition, the variety between the cases was desired, with particular emphasis on business type. To ensure anonymity the organizations are labeled as CompA, CompB, CompC, and CompD. Table 1 provides an overview of the studied cases.

[Table 1 here]

The data were collected through personal interviews, with a total of 34 interviews conducted across the four organizations. The main data collection took place in the period from February to October 2010. To collect different perspectives in the ERP system implementation, the interviews were conducted with multiple stakeholders representing different positions in each organization (ref. Table 1). The emphasis was to collect data from informants involved in the ERP implementation projects, while also end users were included in the interviews. Furthermore, vendors or consultants involved in the ERP implementation were also interviewed. This approach enabled to collect viewpoints from various roles within the ERP implementation projects and thus improve validity of the findings.

The interviews were semi-structured, following the guidelines by Myers and Newman (2007). Apart from two telephone interviews with the vendors in CompA and CompD, all interviews were conducted face-to-face at the companies' locations. The interviews lasted from 20 to 100 minutes, with an average of one hour. 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, 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.

The interviews were supplemented by documents provided by the organizations, company presentations, company web pages, and web pages of the vendors. E-mails and telephone communication were also used for clarification of some issues. With regard to the issue of ERP system customization, a follow-up e-mail was sent 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). The purpose was mainly to provide additional information about the applied level of ERP system customization and its reasons.

All interviews were recorded and the parts covering issues related to ERP system customization were transcribed in full and coded using NVivo 9 software. 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 in 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. Figure 1 illustrates the research design.

[Figure 1 here]

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 selection of these characteristics is grounded in the literature on ERP implementation. The characteristics have

been identified by previous studies as factors affecting ERP implementation, with potential implications for ERP system customization.

[Table 2 here]

The time perspective plays an important role in ERP implementation, as different phases of the ERP life-cycle are characterized by different activities, key players, and problems typical for particular phase (Markus and Tanis, 2000). 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.

A functional misfit between an ERP system and existing business process has been reported as a common reason for ERP system customization (e.g., Brehm et al., 2001; Light, 2005). Therefore, the type of ERP system and the scope of modules implemented are important characteristics of the implementation project. All four companies selected domestic ERP systems, and 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 provide similar functionality. In all four companies the selection of the ERP system was carried out by an appointed selection team. Naturally, 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.

Compatibility of the ERP system with legacy IT solutions and work practices has been identified as crucial to ERP system adoption in SMEs (Chang and Hung, 2010). The status of legacy information systems may also influence on the motivation for ERP system implementation (Rothenberger and

Srite, 2009). 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 used.

The role of the implementation partner and implementation team is essential in the ERP system implementation projects. Lack of experience of the implementation team, as well as a consultant's lack of knowledge about a product or its context, may lead to unnecessary system customization (Light, 2005; Rothenberger and Srite, 2009). 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. Selection of the implementation partner was influenced by their willingness for ERP system customization changes, and their accessibility in the companies' region. The size of the implementation teams varied from 4 to 10 internal employees.

Further, 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. Some authors also consider module selection as a part of ERP customization (e.g., Liang and Xue, 2004; Luo and Strong, 2004). However, in line with former studies (Light, 2001; Rothenberger and Srite, 2009), we do not consider configuration as part of customization, as configuration does not imply significant changes of the ERP system.

We distinguish further 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 life-cycle: 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.

[Table 3 here]

As can be observed from Table 3, all four organizations have applied some form 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 characteristics 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.

4.2 Reasons for ERP system customization

The identified reasons for ERP system customization are 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 their processes 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 in the companies studied. 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 was 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."[…]"It was one of our initial requirements during the selection process that we did not want a software or vendor which would press us into their standardized solution. That would ruin us."* (Project leader, CompA). A very similar situation was observed in the other cases, where 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.

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 policies in all case companies. In CompC and CompD the pricing mechanisms of warehouse items 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. Furthermore, both CompA and CompB produce according to a Make-To-Order (MTO) production strategy, which affects their pricing policy. They do not work with

"standard" pricing lists, instead they operate by offer-demand tenders. However, this functionality was not available in the standard ERP system solutions.

Ownership type. Another identified reason for ERP system customization 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 owner-managers 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 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 required 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.

Motivation for the ERP implementation. 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. The lack of strategic motivation observed in the case organizations might influence the level of ERP system customization, as better strategic planning might potentially increase utilization of ERP system functionality in its standard version.

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."

Stage of growth. 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 are more dynamic. This characteristic is likely to influence their requirements for ERP system customization. All four companies applied substantial customization also in the further stages of the ERP

implementation. We argue that this is related to the nature of their business activities. As agile organizations which are continuously growing they experience many changes over time, and the ERP systems need to be modified to accommodate these changes.

However, this does not imply changing the core business processes discussed in the previous section. Rather, it denotes 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 stage of growth 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 less sophisticated 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 company's 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 argue that the maturity level of the selected ERP systems required a high level of customization.

5   RESEARCH SYNTHESIS

The previous section presented reasons for ERP system customization identified in the four case SMEs. In this section, we discuss the findings in relation to literature and elaborate on the question of

how the SME context affected ERP system customization. As 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.

The unique business processes were reported as critical for the further functioning of the business in the case companies, considered typical for SMEs which usually gain their competitive advantage by excellence within some niche market. This was thus identified as one of the main reasons for ERP system customization, in corroboration with former studies (Bernroider and Koch, 2001; Quiescenti et al., 2006; Snider et al., 2009; Vilpola and Kouri, 2005). This is closely related to the finding of functional misfit identified as another reason for ERP system customization. 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.

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.

The primarily technical motivation for ERP system implementation in the case companies was found to be a driver for customization. This is in line with former studies reporting that a lack of strategic motivation resulted in a reluctance to business process change and a high level of ERP system modifications (Robey et al., 2002; Rothenberger and Srite, 2009). 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). While this finding has also been reported in studies of large enterprises, we argue that this lack of strategic motivation is more frequent in SMEs.

In line with the general shortage of IT competence in SMEs (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, the implementation teams were

reported by their implementation partners as knowledgeable and as giving careful attention to the implementation projects. Thus, lack of ERP knowledge or limited experience was not identified as a direct reason for customization. However, it could be argued that the lack of strategic focus in the implementation projects also partly resulted from a limited knowledge about the potential of the system, and thus indirectly influenced the level of customization applied.

Limited attention has been given to the importance of the growth stages among studies on ERP implementation, as most of the former ERP studies were conducted based on cases of well established large enterprises typically being in a mature (stable) stage (Chen, 2009; Liang and Xue, 2004). Our findings showed that the growth aspect of the case companies influenced ERP system customization. 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 the ERP system itself is identified as another issue affecting customization. All four case companies selected domestic ERP systems offering less sophisticated 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". Thus, while the selected ERP systems did not offer all the functionality needed, they allowed for required modifications. The case SMEs thus preferred to have a customizable system with limited functionality that could be further developed, rather than a mature ERP system which did not fit their business processes. It could be argued that the more limited functionality of the ERP systems implemented in the case organizations represent a limitation of the relevance of our findings. However, previous studies have also reported that SMEs prefer smaller ERP systems provided by local vendors (Federici, 2009; Yeh et al., 2006). Due to their ability to meet special requirements and support the flexibility and dynamics of SMEs, local vendors are considered better capable of supporting SMEs (Yeh et al., 2006). Furthermore, local ERP vendors have greater ability to accommodate contextual factors such as history, culture, social value, and

management style of SMEs (Liang and Xue, 2004). In light of this we believe that our findings can be generalized also to ERP implementations in other SMEs.

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, seven reasons for ERP system customization were identified. By identifying the reasons for ERP system customization and exploring the effect of the SME context, the study contributes to better understanding of ERP system implementation in SMEs. 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.

The study provides several implications for further research on the issue of ERP system customization in SMEs, by demonstrating the potential effect of the SME context.

- In addition to unique business processes in SMEs discussed in former studies, ownership type and stage of growth of the SMEs were identified as reasons for customization which have not been covered in extant research.

- 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 applied also in the later phase. This is assumed to be related to the growth stage of the SMEs and characteristics of the selected ERP systems.

- Further research is needed to investigate the applicability of our findings for other types of SMEs. All four case companies in this study were 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. Moreover, since all the case companies are from one country, the relevance of the findings for other counties needs be investigated.

- The findings may also form the basis for further studies of the reasons for ERP system customization, based on both qualitative and quantitative research. The study presented in this article demonstrates how in-depth qualitative case studies are suitable for identifying underlying reasons for system customization.

The study documents that ERP system customization may be a preferred option for SMEs under particular circumstances. This is a relevant finding for organizations about to implement an ERP system and for ERP vendors in particular, showing a need to better understand the reasons for ERP system customization.

Adequate internal IS knowledge and support from a local implementation partner were identified as important success factors for ERP system customization in the cases studied. However, selection of ERP systems from local vendors offering less functionality compared to more expensive solutions, may also result in a need for further customization after "going-live" that incurs increased costs for system maintenance and further development. Thus, it could be argued that the SMEs should rather consider investing in a more complete system to avoid the need for extensive further development. Yet, for SMEs in an early stage of growth that experience many changes over time, ERP system customization after "going-live" may appear to be unavoidable and thus needs to be taken into consideration when planning the ERP system implementation.

In particular, the vendors need to consider the SME context while implementing an ERP system in such organizations. Besides their unique business processes, the study showed that the SMEs' owner-managers significantly influence the level of ERP system customization. Therefore, vendors should assure that the owner-managers are fully engaged in the ERP implementation projects. Furthermore, they need to take into account the level of organizational stage of growth, as it significantly influences on further system development after "going-live".

For SME managers, the findings can be useful for increasing their understanding of the concerns related to ERP system implementation. Better strategic planning of IS in SMEs may increase utilization of ERP system functionality in its standard version, and thus reduce the level of ERP system customization required. Therefore, selection of an ERP system should not be based only on

conceptualizations inherited from the legacy systems. SMEs also need to consider the effect of ERP system maturity on the system customization and its further development in particular. All these aspects might lead to lower resistance to change and enable SMEs to better recognize the potential of ERP systems.

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Table 1.   Overview of case companies and informants

	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, key users, end user, 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), IT/IS administrator, economic/warehouse/ technology/ production managers, payroll clerk, end user, vendor.

Table 2.   ERP implementation project characteristics

	CompA	**CompB**	**CompC**	**CompD**
Time of "going-live"	April 2009	October 2006	August 2007	January 2005
Experience 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	Finance, Commerce, Logistics, Production Control	Finance, Commerce, Logistics, Production Control, Asset Management, Human Resources	Finance, Commerce, Logistics, Asset Management, Human Resources, CRM (limited)	Finance, Commerce, Logistics, Production Control, Asset Management, Human Resources, Material Requirements Planning, Production Planning, Business Intelligence (extension in 2010)
Legacy information systems	4 separate DOS-based systems (accounting, production control, payroll system, 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
Implementation team	10 internal employees	4 internal employees + consultant	2 internal employees	6 internal employees

Table 3.   Cross-case comparison of ERP system customization

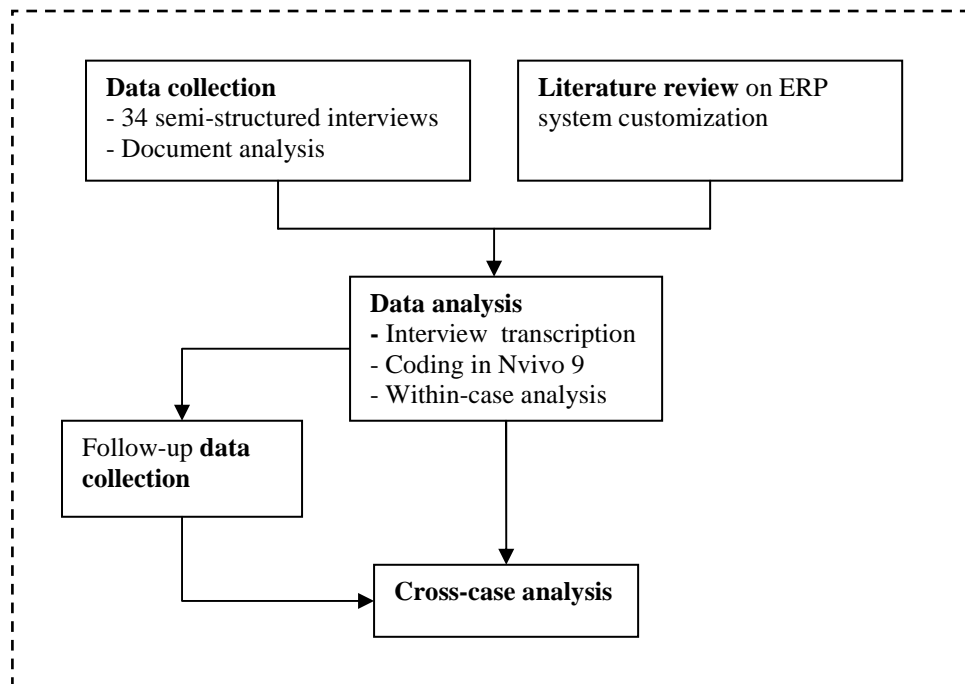| Cases	Level of usage prior to "going-live"			Level of usage after "going-live"			ERP system customization type
	Not used	Low	High	Not used	Low	High	
CompA			x			x	Programming of add-ons
		x			x		ERP source code modification
CompB			x		x		Programming of add-ons
		x		x			ERP source code modification
CompC		x				x	Programming of add-ons
	x				x		ERP source code modification
CompD	x				x		Programming of add-ons
		x				x	ERP source code modification

Figure 1.   Research design.