Association for Information Systems
AIS Electronic Library (AISeL)

AMCIS 2008 Proceedings

Americas Conference on Information Systems (AMCIS)

2008

Inhibiting Factors for Adopting Enterprise Systems in Networks of Small and Medium-Sized Enterprises - An Exploratory Case Study

Markus Schaefermeyer
Johann Wolfgang Goethe Universitat Frankfurt am Main, schaefermeyer@wiwi.uni-frankfurt.de

Christoph Rosenkranz
Johann Wolfgang Goethe Universitat Frankfurt am Main, rosenkranz@wiwi.uni-frankfurt.de

Inhibiting factors for adopting enterprise systems in networks of small and medium-sized enterprises – an exploratory case study

Markus Schäfermeyer
Johann Wolfgang Goethe University, Germany
schaefermeyer@wiwi.uni-frankfurt.de

Christoph Rosenkranz
Johann Wolfgang Goethe University, Germany
rosenkranz@wiwi.uni-frankfurt.de

ABSTRACT

Effective use of an enterprise system may result in productivity and quality improvements, cost reductions and a better resource management but also bears non-negligible risks. Since enterprise systems usually exhibit a proliferating complexity, many small and medium-sized enterprises fail to pass this hurdle. Therefore, the imperative of this research is to develop an understanding of what inhibits or drives the adoption of enterprise systems in networks of small and medium-sized enterprises. We use an exploratory case study to propose first explanations of the variables and factors that affect the adoption of an enterprise system for such a network.

Keywords

Information and communication technology, enterprise system, small and medium-sized enterprises, case study, network, competitive advantage

INTRODUCTION

Today companies use information and communication technology (ICT) to optimize almost all of internal and external business processes. Affected domains are for example human resource management, finance and accounting, customer relationship management, marketing and distribution, supply chain management as well as product life cycle management. The main strategy shared by most companies is to effectively exchange information and thus being able to create a competitive advantage (Porter 2001, p. 156). By now small and medium-sized enterprises (SME) are becoming aware of the potential which may be realized through inter-company coordination of processes and the associated positive effects on their competitiveness (Schubert and Leimstoll 2007, p. 43). Using ICT lowers costs, saves time and allows managers to access and filter decision-relevant information at any time.

Effective combination of different ICT components by an enterprise system (ES) may result in productivity and quality improvements, cost reductions and a better resource management but also bears non-negligible risks. An ES usually exhibits a complex software structure resulting from the large amount of real-world interrelationships it represents (Rettig 2007). To develop and successfully implement an application able to improve a company's business processes, lots of resources, expertise and time are needed (Davenport 1998, p. 122). Many SMEs fail to pass this hurdle due to capital constraints. Nevertheless, SMEs are increasingly collaborating in networks and therefore the attractiveness of an application which is able to coordinate interorganizational business processes is continuously increasing.

This paper presents an exploratory case study on a network of SMEs that has not adopted an ES until today. The described case shows insights on factors that influence the adoption of an ES in a real-world environment. The goal of this paper is to analyze the factors that hamper the adoption of an ES in a network consisting of collaborating SMEs. Therefore we focus on the following research questions: What are potential inhibitors or drivers of ES adoption in a collaborating network of SMEs? What benefits would result from the deployment of an ES? Which general factors and requirements has an ES to satisfy in this special domain?

This paper is structured as follows: Section 2 addresses relevant concepts from related work to build the theoretical foundation for the following analysis of the conducted case study. Afterwards, we present our research methodology and describe our exploratory case study in section 3. Subsequently, we analyze and qualitatively interpret our findings. Finally, we discuss our results and draw our conclusions with respect to the contemplated research questions.

THEORETICAL FOUNDATIONS AND RELEVANT CONCEPTS

According to Shang and Seddon (2002, p. 12) ES are large-scale organizational systems based on a set of packaged application software modules which enable organizations to integrate processes, data and ICT across internal and external value chains. ESs are also called enterprise resource planning (ERP) systems, which themselves are defined as business software solutions that enable a company to manage the efficient and effective use of resources (materials, human resources, finance, etc.). ERP systems can be understood as integrated business solutions aligned with the organizations information-processing needs (Nah et al. 2001, p. 285). Due to the fact that ERP systems mainly focus on internal integration among large-scale and complex organizations (Davenport et al. 2004, p. 16) we have to expand our understanding of the term ES. Therefore, we refer to the interorganizational systems (IOS) concept, first coined by Cash and Konsynski (1985, p. 135). They defined an IOS as an automated IS which is used and shared by more than one organization. The main difference to an internal IS is that data, application and information are shared and can be accessed across organizational boundaries (Johnston and Vitale 1988, p. 154). According to Hong (2002, p. 262), an IOS enables the development of business to business (B2B) cooperation and simplifies the way of interacting with clients, suppliers and business partners due to information sharing, work specialization and quickness of response. Based on ICT, an IOS goes beyond legal enterprise boundaries, facilitating cooperation, coordination and networking among afore independent competitors (Kumar and van Dissel 1996, p. 279). By integrating business processes within and across firms using one single ES, organizations obtain more benefits from smooth information flows (Davenport et al. 2004, p. 17). Integrated and standardized data and processes reduce costs, improve collaboration and ease decision-making for management (Weil 1998, p. 2). This is especially true for interorganizational collaboration, when information and communication are the main instruments to coordinate the work (Champy 2002). An ES is creating new information channels and linkages between business operations and allows companies to coordinate their actions more closely among each other (Porter and Millar 1985, p. 152).

In this context Schubert and Leimstoll (2007, p. 45) point out that a quality leadership in products and services is one of the most valuable strategies for SMEs when trying to achieve a competitive advantage. Therefore, ICT respective ESs provide the technological means to implement these strategies. Here we concentrate on what Porter calls “strategic positioning”, which means that an enterprise is able to do business in a way that delivers an unique type of value to its customers and consequently differs strongly from competitors (Porter 2001, p. 70).

The sole implementation of standard business solutions also used by competitors does not result in the aspired competitive advantage (Rettig 2007). Individual developed or customized solutions are desirable. Producing an individual or customizing an off-the-shelf ES frequently results in a fundamental dilemma SMEs have to face. During customization, increasing complexity is associated with growing effort, costs and time (Davenport 1998, p. 122). Hence, developing an adequate ES is often too expensive for a single SME due to unavailable resources needed to deal with profound complex software.

Moreover, the trend in value creation to combine physical products and services as inseparable elements amplifies the integrated development of service solutions in networks (Zahn and Stanik 2006). In this context, the production of physical products merges with the provision of services grouped around these physical products, and leads to so-called hybrid products. Hybrid products provide complex solutions targeted to customer utility; therefore, hybrid products are highly individual and usually cannot be build-to-stock as traditional physical products (Bullinger 1997, p. 35). These solutions are neither pure physical products nor pure services, and are created by the provider through a network in participation with the customer (Bullinger et al. 2004, p. 302; Spath and Demuß 2003, p. 478). This is reflected in both academia and practice in the growing recognition of areas as service science (Chesbrough and Spohrer 2006) or service engineering (Bullinger and Scheer 2005; Scheer and Spath 2004).

With respect to Riemer and Klein (2007, p. 2) we point out that networks consisting of different companies build virtual organizations that achieve collaborative advantages by cooperating and pooling their resources. Such virtual organizations can be understood as networks where ICT is the main instrument for communication and collaboration and the cooperation is coined by project-base collaboration and organizational flexibility (Child and Faulkner 1998). The corresponding literature often designates strategic partnerships and alliances as a factor contributing to success in optimizing processes (Crane et al. 1997; Love et al. 2002), referring to vertical integration of the participants. Such long-term arrangements between related for-profit organisations are known as *corporate networks*, and are an organisational form between markets and hierarchies (Klein 1996b): if compared to hierarchies, a network is somewhat under organised; compared to markets, it offers more structure, produces more interaction among the members, provides more solid information channels, exhibits more trust, and puts less emphasis on prices. With regard to the following exploratory case study we highlight lateral networks, which contain companies settled on the same level of value creation. This results in a stringent demand on information and knowledge exchange.

AN EXPLORATORY CASE STUDY

Research Approach & Methodology

We believe that the research we undertake should be both relevant to the research questions, as set out in the introduction, and rigorous in its implementation. Accordingly, we propose that a philosophy which integrates interpretive and positivist approaches is required for this purpose (Lee 1991; Lee 2004). To acquire a first understanding of how ESs are used in and influence networks of SMEs, we first proceeded by creating a subjective understanding of everyday meanings and common sense within such an organization, which provides the basis for our interpretive understanding; after that we can begin to create a positivist understanding in order to explain the empirical reality – the explanation being a scientific theory which can be tested against the subjective meaning as recorded in the interpretive understanding (Lee 1991, pp. 351-354; Lee and Baskerville 2003, pp. 235-238).

In order to create the subjective and interpretative understanding, we engaged into an exploratory case study as a starting point for our research (Eisenhardt 1989). The case study approach is a well-recognized methodology for exploring areas where theory is still developing (Yin, 2003). Due to existing contacts to a network of SMEs from the construction industry, we had full access to all operational processes, information systems, documents and reports of this organization. In addition, we conducted a number of open interviews with the organizations' members. Our research items included documents, work descriptions, interview transcripts and field notes from observing and enquiring, which were collected in a project diary. The diary served as the main source of data for the following analysis and interpretation.

Case Description

Business Overview

The object of our study is a lateral network of SMEs, the *Baufairbund* (BFB). BFB is an association of SMEs in the German construction sector, mostly craftsmen. The cooperation aims at the provision and coordination of Building and related services. BFB was established by ten partners in 2003. In 2004 BFB became a registered cooperative society, supporting two permanent positions responsible for administration and coordination (Cooperation Manager and Operations Manager). By the end of 2007, membership in the cooperative has grown to include 14 legally independent businesses obligating themselves to a long-term cooperation. BFB is complemented by five so-called "synergy members", who are not partners in a legal sense but work closely together with the cooperative (e. g., independent architects and construction planners). Consequently, the cooperative is not purely a trades cooperative, but rather consciously includes the planning side of construction, in addition to the building side. From architects to carpenters, all planning and building trades are represented in BFB, so that all services required by a construction project can be offered to a customer by one source. Moreover, the cooperative members and the customers are not only concerned with the finished building. The close cooperation among the parties involved provides a comprehensive service for building and tenancy that is intended to offer the entire spectrum of value creation in the construction industry: from the original consultation through to the planning and realization of the building project up to and including subsequent services surrounding financing and facility management, e. g., maintenance and operation.

The administrative staff of BFB has the overall responsibility for building projects as well as for the coordination among the members. In addition they support customer relations and sales management. At the end of 2007, BFB opened it's own exhibition centre with seven exemplary parts of model houses, which are custom-built to allow detailed information and insight on which materials and construction techniques are used, and where potential customers can therefore directly relate their questions to existing examples whiled discussing a project with the planners and craftsmen. Approximately 5,400 visitors made a stopover at the exhibition in 2007. In addition, BFB uses the exhibition centre to offer educational courses and seminars subject to a charge for private home-builders and clients. Overall, the partner of BFB invested circa 975,000 EUR between 2005 and 2007 for system development, quality management and the exhibition centre.

The businesses are based in the region of North Rhine-Westphalia, Germany, and support up to 50 employees. According to the cooperation agreement, the individual partners are allowed to generate a maximum of 40% of their turnover via the cooperative in order to prevent them from becoming too dependent upon the cooperation, thereby avoiding resulting conflicts of interest. By the end of 2006 the total volume of, mostly small (additions, renovations and finishing), 39 contracts closed via the association reached 500,000 EUR (350,000 EUR in 2005). The total turnover of all members in the same period was approximately 20 million EUR (17 million EUR in 2005). On average, four partners participated in the individual contracts compared to an average of two to three integrated partners in 2005. Against the background of increasing growth, according to the Operations Manager, BFB must deal with a proliferating complexity in communication and coordination.

The main difference between BFB and a general contractor is that the cooperative is not limited for the duration of the building project, but is committed to long-term collaboration. According to the Operations Manager, this allows a learning process to take place during the cooperation of the various trades: the partners, all from the same region, know each other well, and achieve a high level of transparency regarding working style, responsibility and workflow, which facilitates the avoidance of fundamental misunderstandings. BFB's integration of all trades and tasks required by a building project makes possible the lean and efficient centralized coordination of all partners and offers the customer the advantage of having one single point of contact.

Moreover, cooperation is promoted by a high level of trust among the partners. This trust is based upon both the "Ten Commandments of BFB" as a list of behavioral principles, as well as a quality management handbook. As a condition of membership in the cooperative, new members are obliged to accept the precepts laid down in the quality management handbook and the "Ten Commandments" in their dealings with other members. In addition, overall *cooperation meetings* are held on a regular basis every two weeks. During these meetings, members exchange news and report on current projects. If problems arise, they are discussed during these meetings and solutions are worked out. In this way, a continuous improvement in both the workflows, as well as the cooperation among partners is encouraged:

> "*The atmosphere of cooperation and trust that has arisen among the partners enables them to act without great discussion extremely effectively and purposefully. This allows prompt and unbureaucratic responses especially to critical situations.*" (Operations Manager)

According to the Operations Manager, another major difference as opposed to a general contractor contributes significantly to the successful cooperation among the participants: rather than being exclusively accumulated at the top of the organization, profit is distributed among all levels, such that, as the Operations Manager claims, higher-quality building performance and motivation is achieved if compared to a usual general contractor.

Processes & Projects

In a building project, the trades are involved from the outset, starting with the conceptualization phase. As all interviewed craftsmen state, the early involvement of the required know-how enables the most concrete description possible of the services needed, thus eliminating possible confusion and problems right from the beginning. At the same time, the partners can directly price the required services, enabling a fast and frictionless tender process for the whole project in the absence of a concrete project commission. In addition, their early involvement in the planning process provides the trades with the advantage of more time for coordinating their resources than is usually the case (e. g., in projects with a general contractor). In the subsequent planning phase, the time frame in which the resources are required can be agreed upon in cooperation with the trades as well. In exceptional situations, when the partners' resources are insufficient, sub-tasks can be outsourced to external companies. In order to preserve the continuity for the other members, even in such an exceptional case, there is an extended circle of so-called "B-Partners", to be contacted first in such a case. The B-Partners are not themselves members of the cooperative, but the members have often worked together with these outside contractors.

As said by the Operations Manager, during the actual construction phase, his main responsibility is *project management*. This comprises the supervision of project progress in terms of deadlines, but also quality standards. At the same time, detailed planning and the exact coordination of the various trades is being hammered out, in order to guarantee the seamless workflow at the construction site. In this way, unnecessary and unproductive idle times and routes, that often otherwise cause scheduling conflicts in intersecting tasks of the various trades, can be avoided. Although mutual trust exists and eases everything, structures and rules are becoming more and more important:

> "*Small-business craftsmen are chaotic and need a kind of supervision. That is why we have rules and are now beginning to enforce these rules. For example, there are penalties for not reporting back to me within a defined time-frame.*" (Operations Manager)

Based upon this organizational setting, BFB has created an extremely flexible and effective framework, providing multi-company coordination relying on a central administration, while the responsibility for and guidance of operational processes is delegated to the trades, specifically, to the experts in the corresponding fields. Although trust is the backbone of the cooperative and, as emphasized by the Cooperation Manager, has been the most important success factor in the first years, clear rules and structures are now becoming ever more important.

> "*We are doing things that are totally untypical in the construction sector. We focus on quality, not on effects of scale. Or have you heard of any construction enterprise that thinks about measuring customer satisfaction by suing call centers? Actually, we just think about becoming a franchise system, as other cooperatives frequently ask us about how they can become successful.*" (Operations Manager)

Software Applications & Technology

The role of the Operations Manager and the overall coordination within the organization is supported by a web-based custom-built collaboration software, the so-called *cooperation server*. On this server, the administration can file new contracts and schedule them as projects. Depending upon which of the trades are responsible, the projects can be structured, and in turn scheduled, in the form of smaller sub-projects. The responsible trades can then structure their sub-projects into individual jobs, scheduling them according to the dead-line of the project as a whole, so that the companies can achieve the optimal use of their resources in completing their lists of jobs contracted. Documents and discussion threads can be attached to projects.

Upon completion, individual jobs, or even entire subprojects can be documented, giving the central coordinator a clear and detailed overview of the progress of every area of the project. If dead-lines are not kept, the contractors as well as the coordinator are automatically informed. Thus a need for action can immediately be recognized and the coordinator can take appropriate measures regarding the responsible contractor, while informing other participating partners, in case the delay might have an impact on them. Moreover, the participants can use the server at any time to immediately get the latest information about the progress of the project, enabling them to take into account current developments in the internal planning. The cooperation server has been developed and is hosted by a small software producer. BFB pays fees of 150 EUR per month for both licence and hosting on the server of the software producer (application service provision). Besides the cooperation server, e-mail is used.

The Operations Manager states that the cooperation server has an extremely salutary effect, especially in terms of securing high transparency across the entire construction supply chain. But according to survey findings within the cooperative, in contrast to most planners, the craftsmen did not really accept the cooperation server at the beginning. They argued that mobile phone and face-to-face contact were more efficient and time-saving. According to the Operations Manager, this can be explained by the multiple small projects that the craftsmen usually are conducting in parallel. Due to this, they usually make decisions very spontaneous and on an ad-hoc base, i. e. at which construction site to work at a givem day. However, this has changed recently, together with the growth of projects and customers in the cooperative. Decisions and planning and sticking to schedules have become more and more important in contrast to flexibility.

Up until now, the cooperation server and e-mail are the only software applications used by the cooperative. However, the single planners and craftsmen all use some personal information management software such as Microsoft Office or CAD software. But at BFB or at the partners, no ES does exist as of today. The Operation Manager declares that the cooperative does not have 1) the financial means to acquire a sophisticated ESs, 2) does not have the time to engage into a detailed requirements analysis since everybody is too engaged into daily operations, 3) although the partners trust each other, critical information like margins are not shared, and 4) up until now there has been no need for an integrated information system, since “everybody knows who knows what and just calls them on the phone”. Moreover, material requirements planning is the responsibility of the individual craftsman or planner, since the cooperation projects are only one part of their daily work. While this has been a very flexible approach in the starting phase of the cooperative, nonetheless, due to the increasing growth in projects and customers, along with more emphasis on rules and structures, there are plans to implement a small open-source customer relationship management system, since “customer data is like hard cash”. Likewise, as the Operations Manager states, the administrative overhead continues to rise, as collaborative construction projects become larger and more frequent. In the near future, this could lead to the decision to take a more deeper look at ESs, if the partners agree that this benefits the whole cooperative.

INTERPRETATION AND ANALYSIS OF CASE STUDY FINDINGS

Summarizing our findings, we observe that in the case of BFB, the development of mutual trust has been the most important success factor for this particular network of SMEs. Standard operating procedures, formal structures and processes have not been that important in the starting phase. The related work leads to the suggestions that ESs should be very useful for networked SMEs since they offer needed functions and a central database so that information is integrated over the whole value chain. But exactly why then has BFB up until today *not* adopted an ES yet? Of course, the most obvious inhibitor is budget restrictions. However, under the surface, we believe that other factors are more pressing. Otherwise, BFB would certainly have found a way. According to our findings and our interpretation, the following factors inhibit the adoption:

- Although the partners work closely together, each of the partners is more ore less *not dependent economically* on the cooperative. In the foreground stands the idea of project-based collaboration on a long-term basis, but the partners are not dependent on each other for individual economic success. In fact, each of them is only allowed to generate a percentage of their overall turnover via the cooperative.

- Although central management staff exists to coordinate the projects and to offer one face to the customer, the *ratio of decisions* that have to be made at an ad-hoc base by each partner is still very high. Craftsmen and planners are encouraged to make their decisions independently and creatively; no central planning in the sense of ES takes place (of course, planners do make central building plans and material analyses). Decision processes are initiated very fast because otherwise, the desired flexibility for each craftsmen would be missing. Thus, standard operating procedures are effectively not in place.
- Since they know each other personally, the communication and coordination between the planners and craftsmen is very *informal*, relying mostly on (mobile) phone and face-to-face meetings.
- This consistent and personal relationship requires *collaborative trust*. Since the partners are working at the same level of value creation and success of the cooperative depends on the sharing of critical knowledge, trust is the most important enabler that precedes formal rules, structures and information systems.
- The *spatial distance* between the partners is minimal. All partners are from the same area and region.
- BFB's value creation is characterized by the trend in value creation to combine physical products and services as inseparable elements as *service solutions*. The customer gets an individual product and accompanying immaterial services. The production of physical products merges with the provision of services grouped around these physical products. The resulting solution is highly *individual* (an individual building and services, e. g., facility management).
- BFB made technical and organisational decisions that supported *collaborative working and knowledge transfer* between the partners (e. g., use of mobile phone, e-mail, cooperation server). In the initial phase of the cooperative, nobody required more formal and structured information. Instead, according to our interviews, formal structures were seen as a barrier for cooperating smoothly, and building trust. With growing numbers of projects and customers, we observe that this is now slowly changing. While the built-up trust is still the foundation of the cooperative, rules and structure are becoming more and more important. This can be observed e. g. in that penalties for breaking rules are now really enforced. Likewise, especially on side of the planners and administrative staff, a tendency for more formal communication and coordination is observable, e. g., the stated need for a customer relationship management software.
- The current setting at BFB implies that information about projects, customers, resources etc. is distributed throughout all partners and not centralized and integrated. Nonetheless, existing information systems like the cooperation server allow comparing, balancing and sharing these information in a semi-structured fashion.
- Both Cooperation Manager and Operations Manager state that neither they nor the partners (their employees) do have the time for explicit requirements analysis due to the daily work load. While especially the administrative staff mentions a growing need for more formal communication and coordination (professional bureaucracy), time and budget for a detailed requirements analysis are not available.

We argue that these findings form our exploratory case study can be used do deduce general factors that influence whether ESs are adopted – or not, as in the case of BFB. Furthermore, propositions for further research stem from these factors (cf. Table 1).

Table 1. Identified Factors and Propositions for Adoption of ESs by SMEs

Factor	*Description and proposition*	*Related work in support*
Autonomy of partners	- Rates how independent the cooperation partners are.	(Ménard 2004, p. 353)
	- Characteristic at BFB: high	(Perrin and Godart 2004, p. 63)
	- Proposition: low autonomy moderates the use of standardized ESs; high autonomy moderates the use of heterogeneous application systems or no ESs.	
Frequency of collaboration	- Rates how frequently the cooperation partners work together.	(Fleisch 2001, p. 228 f.)
	- Characteristic at BFB: low-medium	(Ménard 2004, p. 350 f.)
	- Proposition: low frequency moderates the use of heterogeneous application systems or no ESs; high frequency moderates the use of standardized ESs.	

Number of decisions to be made	- Rates how many decisions need to be made spontaneously and on an ad-hoc basis. - Characteristic at BFB: medium-high - Proposition: low numbers of decisions moderate the use of standardized ESs; high numbers of decisions moderate the use of heterogeneous application systems or no ESs.	(Pohland 2000, pp. 118, 337) (Ménard 2004)
Formality of information	- Rates how formal and structured the information needed for collaboration is. - Characteristic at BFB: low, but rising - Proposition: low formality moderates the use of heterogeneous application systems or no ESs; high formality moderates the use of standardized information systems.	(Hedberg et al. 1997, p. 19) (Klein 1996a, p. 100) (Jarillo 1993, p. 135 ff.)
Ratio and duration of collaboration	- Rates the duration of typical collaboration projects. - Characteristic at BFB: low - Proposition: low duration moderates the use of heterogeneous application systems or no ESs; high duration moderates the use of standardized ESs.	(Ménard 2004, p. 362)
Spatial fragmentation of partners	- Rates the spatial fragmentation of the cooperation partners. - Characteristic at BFB: low - Proposition: low fragmentation moderates the use of heterogeneous application systems or no ESs; high fragmentation moderates the use of standardized ESs.	(Melin 2003) (Fawcett et al. 2007, p. 359)
Individuality of value creation	- Rates how individual and customer-specific the value creation is. - Characteristic at BFB: high - Proposition: low individuality moderates the use of standardized ESs; high individuality moderates the use of heterogeneous application systems or no ESs.	
Integration of products and services	- Rates the integration of physical products and immaterial services in one customer solution (i. e., if the resulting customer solution is a more physical standard product, a highly customized service or a hybrid service solution which focuses on specific physical products. - Characteristic at BFB: high - Proposition: low integration moderates the use of standardized ESs; high integration moderates the use of heterogeneous application systems or no ESs.	(Rayport and Sviokla 1995)

The proposed factors can be used to articulate a more formal model and hypotheses, e. g., "the higher the frequency of collaboration, the higher the formality and structure of information". We argue that these factors are the core of a framework for assessing if a network of SMEs will adopt an ES or not.

SUMMARY AND CONCLUSION

In large organizations, ESs are supposed to function as integrated systems that regulate complex business processes while being adaptable to changing business needs. In reality, rather than streamlining and simplifying business processes, ESs "have produced rigidity and unexpected barriers to change, a veritable glut of information containing myriad hidden errors, and a cloud of questions regarding their overall benefits." (Rettig 2007). It is not clear if this problem can be solved, especially in SMEs that do not have budget and resources for large ES projects. (Rettig 2007) notes that success will also require closer communication and collaboration between the IT and business sides of the organization, but that has been little in evidence in the past.

In our case study, we explored factors that influence the adoption of ESs by a particular networks of SMEs. After giving a detailed analysis of the case study setting, the business processes and the technological infrastructure, we generalized our findings and proposed factors that influence ESs adoption. Our study contributes to the body of knowledge of success factors for ESs. It is a first building block for a more sophisticated model, which needs to be elaborated in further studies. A more formal model can relate the identified factors and propose hypotheses that can then be tested on a large scale. Of course, our

findings suffer from being based on one single case only. We plan to conduct multiple case studies to generate more insight into the proposed factors, and to generate theory that will help both practitioners and researchers as a general framework for the adoption of ESs in networks of SMEs.

ACKNOWLEDGMENTS

We are grateful to the anonymous reviewers for very helpful hints and advice concerning the theoretical grounding and the analysis of our findings. Additionally, we would like to thank the German Federal Ministry of Education and Research, which funded this work within the scope of the research project “Mind-Bau” under record no. 01FD0611.

REFERENCES

1. Bullinger, H.-J. *Dienstleistung für das 21. Jahrhundert*, Stuttgart, 1997.
2. Bullinger, H.-J., Krämer, M., and Zähringer, D. "Logistik in der Dienstleistungswirtschaft," in: *Gabler Lexikon Logistik,* P. Klaus and W. Krieger (eds.), Wiesbaden, 2004, p. 302.
3. Bullinger, H.-J., and Scheer, A.-W. (eds.) Service Engineering. Entwicklung und Gestaltung innovativer Dienstleistungen, Berlin et al., 2005.
4. Cash, J.I., and Konsynski, B.R. "IS redraws Competitive Boundaries," *Harvard Business Review* (63:2) 1985, pp 134-142.
5. Champy, J. *X-Engineering the Corporation* Warner Books New York, NY, 2002.
6. Chesbrough, H., and Spohrer, J. "A research manifesto for services science," *Communications of the ACM* (49:7) 2006, pp 35-40.
7. Child, J., and Faulkner, D. Strategies of Cooperation: Managing Alliances, Networks, and Joint Ventures Oxford University Press, New York, 1998.
8. Crane, T.G., Felder, J.P., Thompson, P.J., Thompson, M.G., and Sanders, S.R. "Partnering Process Model," *Journal of Management in Engineering*:May/June) 1997, pp 57-63.
9. Davenport, T.H. "Putting the enterprise into the enterprise system," *Harvard Business Review* (July-August 1998) 1998, pp 121-131.
10. Davenport, T.H., Harris, J.G., and Cantrell, S. "Enterprise systems and ongoing process change," *Business Process Management Journal* (10:1) 2004, pp 16-26.
11. Eisenhardt, K.M. "Building Theories from Case Study Research," *Academy of Management Review* (14:4) 1989, pp 532-550.
12. Fawcett, S.E., Osterhaus, P., Magnan, G.M., Brau, J.C., and Matthew W. McCarter, M.W. "Information sharing and supply chain performance: the role of connectivity and willingness," *Supply Chain Management* (12:5) 2007.
13. Fleisch, E. Das Netzwerkunternehmen. Theorien, Strategien und Prozesse zur Steigerung der Wettbewerbsfähigkeit in der "Networked Economy" Springer, Berlin et al., 2001.
14. Hedberg, B., Dahlgren, G., and Olve, N.G. *Virtual Organizations and beyond: Discover Imaginary Systems* John Wiley & Sons, Inc. New York, Chichester et al., 1997.
15. Hong, I.B. "A new framework for interorganizational systems based on the linkage of participants’ roles," *Information and Management* (39:4) 2002, pp 261-270.
16. Jarillo, J.C. Strategic Networks: Creating the Borderless Organization Butterworth-Heinemann, Oxford, 1993.
17. Johnston, H.R., and Vitale, M.R. "Creating Competitive Advantage with Interorganizational Information Systems," *MIS Quarterly* (12:2) 1988, pp 153-165.
18. Klein, S. "The Configuration of Inter-Organisational Relations," *European Journal on Information Systems* (5:5) 1996a, pp 92-102.
19. Klein, S. Interorganisationssysteme und Unternehmensnetzwerke - Wechselwirkungen zwischen organisatorischer und informationstechnischer Entwicklung Deutscher Universitäts Verlag, Wiesbaden, Germany, 1996b.
20. Kumar, K., and van Dissel, H.G. "Sustainable Collaboration: Managing Conflict and Cooperation in Interorganizational Systems," *MIS Quarterly* (20:3) 1996, pp 279-300.
21. Lee, A.S. "Integrating Positivist and Interpretive Approaches to Organizational Research," *Organization Science* (2:4) 1991, pp 342-365.
22. Lee, A.S. "Thinking about Social Theory and Philosophy for Information Systems," in: *Social Theory and Philosophy for Information Systems,* L. Willcocks and J. Mingers (eds.), Chichester, 2004, pp. 1-26.
23. Lee, A.S., and Baskerville, R.L. "Gerneralizing Generalizability in Information Systems Research," *Information Systems Research* (14:3) 2003, pp 221-243.
24. Love, P.E.D., Irani, Z., Cheng, E., and Li, H. "A model for supporting inter-organizational relations in the supply chain," *Engineering, Construction and Architectural Management* (9:1) 2002, pp 2-15.

25. Melin, U. "The ERP System as a Part of an Organization's Administrative Paradox," 11th European Conference on Information Systems, Naples, Italy, 2003, pp. 16-23.
26. Ménard, C. "The Economics of Hybrid Organizations," *Journal of Institutional and Theoretical Economics* (160:3) 2004, pp 345-376.
27. Nah, F.F.H., Lau, J.L.S., and Kuang, J. "Critical factors for successful implementation of enterprise systems," *Business Process Management* (7:3) 2001, pp 285-296.
28. Perrin, O., and Godart, C. "A model to support collaborative work in virtual enterprises," *Data & Knowledge Engineering* (50:1) 2004, pp 63-86.
29. Pohland, S. Globale Unternehmensarchitekturen: Methode zur Verteilung von Informationssystemen Weißensee-Verlag, Berlin, 2000.
30. Porter, M.E. "Strategy and the Internet," *Harvard Business Review* (March 2001) 2001.
31. Porter, M.E., and Millar, V.E. "How information gives you competitive advantage," *Harvard Business Review* (63:4) 1985, pp 149-160.
32. Rayport, J.F., and Sviokla, J.J. "Exploiting the Virtual Value Chain," *Harvard Business Review* (73:6) 1995, pp 14-24.
33. Rettig, C. "The Trouble With Enterprise Software," in: *MIT Sloan Management Review*, 2007.
34. Riemer, K., and Klein, S. "Is the V-form the next generation organisation? An analysis of challenges, pitfalls and remedies of ICT-enabled virtual organisations based on social capital theory," *Journal of Information Technology* (advance online publication, 4 December) 2007.
35. Scheer, A.-W., and Spath, D. (eds.) Computer Aided Service Engineering. Informationssysteme in der Dienstleistungsentwicklung, Berlin et al., 2004.
36. Schubert, P., and Leimstoll, U. "Importance and Use of Information Technology in Small and Medium-Sized Companies," *Electronic Markets* (17:1) 2007, pp 38-55.
37. Shang, S., and Seddon, P.B. "Assessing and managing the benefits of enterprise systems: the business manager's perspective," *Information Systems Journal* (12:4) 2002, pp 271-299.
38. Spath, D., and Demuß, L. "Entwicklung hybrider Produkte - Gestaltung materieller und immaterieller Leistungsbündel," in: *Service Engineering: Entwicklung und Gestaltung innovativer Dienstleistungen,* H.-J. Bullinger and A.-W. Scheer (eds.), Berlin, 2003, pp. 468-478.
39. Weil, M. "Guide to growth," *Manufacturing Systems* (June) 1998, pp 2-9.
40. Zahn, E., and Stanik, M. "Integrierte Entwicklung von Dienstleistungen und Netzwerken - Dienstleistungskooperationen als strategischer Erfolgsfaktor," in: *Service Engineering. Entwicklung und Gestaltung innovativer Dienstleistungen,* H.-J. Bullinger and A.w.-W. Scheer (eds.), Springer, Berlin, Heidelberg, New York, 2006, pp. 299-319.