



# Exploring the effects of ERP systems on organizational performance

## Evidence from Finnish companies

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### Abstract

**Purpose** – Previous research showed that there are payoffs from IT investments, but the question is when and why such payoffs occur. This paper aims to adopt an “inside the black-box” approach to the analysis of economic benefits of ERP systems by examining what business process (BP) changes take place in companies that have different motives for implementing ERP systems. This explorative study seeks to further examine the influence of these BP changes on organizational performance.

**Design/methodology/approach** – In Spring 2006, 14 semi-structured interviews were made in mid-sized Finnish companies that use an ERP system. An ERP scorecard framework was applied to assess the perceived benefits of ERP.

**Findings** – Companies that have a technologically-led motivation perceive “improved service time in accounting tasks” as an internal efficiency benefit, “faster response to business change” as customer benefits, and financial benefits in terms of other improved efficiencies. Companies that have a business-led motivation perceive “economies of scale” as an internal efficiency benefit, and financial benefits in terms of “lower headcount costs” and “lower selling, general and administrative costs.” Both groups of companies report BP changes in terms of “reassignment of financial management of business cases.”

**Research limitations/implications** – The balanced-scorecard approach offers a systematic analysis of the ERP effects in organizations, but it limits the interpretation of the interview data. The small number of ERP implementations studied means that the results are not directly generalizable, but they point out interesting avenues for future research.

**Practical implications** – The insights in the paper about the relationship between how ERP projects are motivated and how benefits are perceived may be helpful to organizations that implement ERP systems. The findings support the importance of continued monitoring of ERP systems to leverage their effects in maximizing benefits for the implementing organizations.

**Originality/value** – The paper provides new insights into the interrelationships between the motivations for implementing ERP systems and the perceived ERP benefits.

**Keywords** Manufacturing resource planning, Communication technologies, Organizational performance, Organizational change, Finland

**Paper type** Research paper



### Introduction

Despite the large investments, the benefits of the IT spending could not be found in the firm-level output in the early 1990s studies. The late 1990s studies showed evidence of positive IT returns in firms which restructured the organization to take advantage of the new technology (Hitt and Brynjolfsson, 1996; Brynjolfsson and Hitt, 1996, 2000; Stratopoulos and Dehning, 2000). Thus, the latest research efforts strive to understand

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“when and why there is a payoff” (Dehning and Richardson, 2002, Rickardsson and Kraemmergaard, 2006).

Dehning and Richardson (2002) put forward a framework that captures five analysis paths of the relation between IT and firm performance. The first and most analyzed link is the direct relation between IT and firm performance. The second, less analyzed link provides insights into the relation between IT and business process (BP) measures such as gross margin, profit margin, turnover ratios, inventory turnover, customer service, quality, and efficiency. The third path analyzes how these process measures combine to determine overall firm performance.

Brynjolfsson and Hitt (1998) observe that the IT payoffs are contingent, therefore they encourage the research of factors that leverage the impact of IT on firm performance. Thus, Dehning and Richardson’s (2002) framework comprises two more paths that show that contextual factors (e.g. industry, size, financial health, IT intensity) may affect the IT impact on both BPs and overall firm performance.

However, the above-mentioned framework points at the scarcity of studies on the changes in BPs caused by IT investments, and the effect of those process changes on organizational performance in the post-implementation stage. Such studies would provide a deeper understanding into the dynamics of the pre-, during- and post-implementation activities.

In addition, the measurement of IT investments can be improved. The previous studies have used single approaches to evaluate the IT investment, whether as IT spending, IT type (ERP systems or electronic commerce), or IT management (the level of ability within an organization or successful users of IT). Instead, the triangulation of the IT measures in order to investigate their combined effect on firm performance would represent a contribution to the field. An example of IT measures triangulation is the study of the relation between IT spending and firm performance when the company invests in a certain type of IT.

Furthermore, Arnold argues that while the IT payoffs are expected, little attention is directed towards understanding how organizations are affected when investing in IT and how the benefits are realized at inter-organizational level. A triangulation method that combines case studies research, surveys and cross-sectional field studies is suggested in order to enable theory development across organizations.

The present study explores the BP changes that occur in companies with different motivations for their ERP implementation projects and with different degrees of success in their ERP implementation experience. In addition, the effects of the resulting BP changes on organizational performance are explored.

The remainder of this paper is organized as follows. The next section reviews the literature concerning the motivations, the success measures for ERP implementations, and the ERP generated BP changes as factors leading to the materialization of the ERP benefits in organizations. The following section introduces the multiple-case study method. The “Findings” section presents interview evidence leading to the observation of nine interrelationships between the motivations for ERP implementations and the perceived ERP benefits. The paper concludes with a discussion of the findings and suggestions for future research.

**Literature review**

*Motivations for implementing an ERP*

Researchers concur on the classification of the reasons motivating companies to implement ERP systems into technical and business driven implementations (Mabert *et al.*, 2000; Chand *et al.*, 2005; Botta-Genoulaz and Millet, 2006) (Table I).

In the first generation implementations, most of the failures were reported to have a technical perspective rather than a specific business orientation. Yet, Nicolaou (2004) shows that the technically-led implementations positively influence the firms' ability to gain higher financial benefits relative to firms following a different implementation strategy. Depending on the motivations, companies may have different ERP implementation experiences. The technically-led implementations may result in a better designed system that provides a better fit with the organizational processes, which does not necessarily pay off in the short run. Instead, the business-led implementations may be more focused and lead to better financial performance in a shorter time.

This paper further explores the link between the motivations for ERP implementations and the perceived benefits of ERP, by analyzing financial as well as non-financial benefits.

*The success of ERP implementations*

Markus *et al.* (2000) underpin three issues that are relevant when measuring the success of an ERP implementation. First, the way in which success is measured must be determined – success as perceived by the managers of the company implementing ERP, end-users, customers, suppliers or investors.

The perception of ERP success depends on how long-term is the different stakeholders' view on what it means ERP project completion. The ERP journey does not end with the system "going live." Thus, the second issue raised by Markus *et al.* (2000) is that the phase in the ERP lifecycle where success is measured must be established:

- At the project phase – success is measured in terms of project cost, completion time, and system functionality. Other papers evaluate the critical success factors that are considered by the companies implementing ERP: top management support, effective project management, business process reengineering (BPR), education and training, user involvement, and vendor support (Somers and Nelson, 2001; Nah and Lau, 2001; Al-Mashari *et al.*, 2003).
- At the shakedown phase when the implementing company goes through the post-implementation adjustment period – these measurements are concerned

Technical reasons	Business reasons
Solve the Y2K problem	Enable business growth
Replace disparate systems	Improve inefficient BPs
Reduce software maintenance burden by outsourcing	Reduce business operating and administrative expenses
Eliminate redundant data entry	Reduce inventory carrying costs
Reduce data errors	Acquire multicurrency IT support
Decrease computer operating costs	Eliminate delays and errors in filling customers' orders
Integrate applications cross-functionally	Standardize procedures across different locations

**Table I.**  
Motivations for ERP implementations

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with improvements in BP performance: the lead-time, service time, wait time and utilization (Reijers and Van der Aalst, 2005).

- At the onward and upward phase when most of the benefits are expected and when the company plans further system and business development – success is measured in terms of economic benefits, improved business practices, and improved decision making.

Third, the criteria for implementation success must be established. Usually, in technology-based evaluations, a way to measure success is through expectations and perceptions of those involved in the implementation. In addition to the internal subjective measures, Markus *et al.* (2000) recommend the use of external criteria of success, such as operational and financial metrics, and the organization's goal for implementing the ERP system.

In this paper, the focus is on the ERP implementation experiences at the project phase and how the degree of success at this phase can influence the benefits obtained in the later stages of the ERP implementation.

#### *Business process changes*

Kohli and Hoadley (2006) consider BPR to be a key factor in maximizing ERP system benefits. Motwani *et al.* (2005, p. 530) define the BP changes as:

... an organizational initiative to design BPs to achieve significant (breakthrough) improvement in performance (e.g. quality, responsiveness, cost, flexibility, satisfaction, shareholder value, and other critical measures) through changes in the relationships between management, information technology, organizational structure, and people.

Furthermore, Larsen and Myers (1999) find that the immediate outcomes of BPR are the creation of new organizational accounting structures, new work processes, and a new financial information system. In this study, BP changes are assumed important factors that should lead to internal process efficiency.

#### *ERP benefits*

Shang and Seddon (2002) propose a comprehensive framework for assessing ERP benefits at five dimensional levels: operational, managerial, strategic, IT infrastructural, and organizational. Operational benefits arise from the automation of BP. Managerial benefits arise from better planning and management of organizational resources and better monitoring of financial performance of products, for example. Strategic benefits result from the ERP system's ability to support business growth and competitive advantage. IT infrastructural benefits mainly come from the reduction of IT costs related to the maintenance of legacy systems. Organizational benefits are related to the system enabling business learning and staff empowerment.

However, in this framework, the ERP benefits are not linked to the reasons for implementing ERP. Such an interrelation would enable the measurement of the achievement of the desired goals of ERP (Mabert *et al.*, 2000; Markus *et al.*, 2000; Irani and Love, 2001; Chand *et al.*, 2005).

Chand *et al.* (2005) suggest an improved tool dubbed ERP scorecard, which integrates Kaplan and Norton's balanced scorecard (BSC) with Zuboff's automate, informate, or transformate goals for use of the information systems. At the automate and informate levels, the implementing company benefits from improved process

efficiency and improved tactical decision making. At the transformate level, the implementing company benefits from the capability to facilitate business agility, to meet the new needs of existing customers or the needs of new customers, to move from content learning to knowledge learning. Using the case of a successful ERP implementation, Chand *et al.* (2005) showed that the success of ERP implementations and operations was contingent on the three goals of firms to use information systems.

In this paper, the ERP scorecard is applied as a tool to assess the impact of ERP on organizational performance. This ensures a larger view on performance, beyond the financial measures to the customer satisfaction, internal process efficiency, and the ability to learn and grow. The intentions to use the system to automate, informate and transformate the business are assumed to change as the system moves away from the project phase to the onward and upward phase.

### Methodology

Nordic countries are particularly useful for conducting case studies due to the openness, trust and goodwill that business people show for research. This paper is based on a multiple-case study of eight Finnish companies that were selected from the sample used in Velcu (2005). The companies were contacted by phone and given a research project description. The companies that agreed to be part of the project were interviewed from February to June 2006. The applied snowballing technique enabled different access levels in each of the eight companies. Whereas in five companies, the researcher interviewed only one project manager or chief financial officer (CFO), in the remaining three companies, the researcher had deeper access to two, three and, respectively, four interviewees. Thus, a total of 14 interviews were made.

The semi-structured interviews were based on an interview guide, which is presented in Appendix 1. The interviews were tape-recorded and transcribed verbatim. The analyzing process began at the interviewing stage, and continued with transcription and content analysis. The content analysis adopted the cross-case strategy where the answers from different interviewees were grouped together around the central topics of this study (Patton, 1990). Then, the observations were derived by identifying common codes across cases concerning the motivations for implementing ERP, the success measures of the ERP implementation project, the BP changes mentioned by interviewees, and the perceived ERP benefits.

The use of Chand *et al.*'s (2005) ERP scorecard as a framework for identifying the ERP benefits mentioned during interviews avoids the "drowning in data" experience with respect to the evidence collected (Humphrey and Lee, 2004, p. 237).

The companies are at different implementation phases and vary in size and industry. They are presented in the chronological order of the interviews. The first interviewed company (designated "Company 1"), a mid-size company, one of the leading food manufacturers in Finland, implemented the Movex system from 2003 to 2005. The second company (Company 2), the subsidiary of an American company, and one of the world's leading distributors of electronic products, implemented the tailor-made system, RamBase, in 2002, after merging with another company already using this system. The third company (Company 3), a large international stainless steel and technology organization based in Finland, started implementing SAP at the corporate office level in 2001. Implementation is still taking place in different subsidiaries. The fourth company (Company 4) is a small-size recruitment company, in

the development stage of its in-house ERP system since 2002. The fifth company (Company 5), a mid-size distributor of spare parts for manufacturers, implemented the Solagem system from 2000 till the beginning of 2003. The sixth company (Company 6), a mid-size industrial company, implemented the ERP system in 2000. The seventh company (Company 7), a mid-size manufacturer, implemented the Movex system from 2000 till 2003. The eighth company (designated "Company 8"), a mid-size structural engineering company, implemented PARM software in 2003.

## Findings

The findings reported in this section are based on the interviewees' perceptions regarding the motivations for the ERP implementation, the success of the ERP implementation project, the BP changes, and the actual benefits achieved. In Appendix 2, one can see the main interview results.

### *Motivation for ERP implementations*

The evidence collected from these interviews shows that the most frequent motivation for ERP implementing is to replace the legacy system. Five of the eight participating companies were motivated by the need to replace their old legacy system. Three out of the five companies claimed other technologically-led motivations, such as the Y2K problem, the need for a new integrated system, and the ease of upgrading to new versions.

The remaining three case companies mainly had a business-led motivation, such as the need for a common financial strategy and vision throughout the organization, or the need to have a common system with a newly acquired company.

### *The ERP implementation project – successful or less successful?*

The participating companies had more or less successful implementation experiences, depending on the implementation cost and time, and the critical factors envisaged during the implementation project.

Company 1 completed the ERP project within four years, but the expenses were within budget. In collaboration with IBM, the company went through a two-phased BPR, which output a requirements list for the request for tender for the ERP package. Each BP personnel were involved in the analysis of the BP functions before implementation. The top management supported the end-users training program as it believed that the benefits generated by the system increased when the users were familiar with the software functions. Thus, Company 1 managed a successful ERP implementation project.

Company 2 implemented the ERP software on time and within the budgeted direct costs, although the indirect costs were higher than expected. The company decided on a complete BPR. The key users of each BP trained the end-users, and involved them in the implementation project. Change management was the responsibility of both management and the most skillful employees. The overall perception was that Company 2 managed a successful ERP implementation.

The ERP project in Company 3 lasted twice that initially planned because of the business strategy changes and the ERP strategy change from the rollout to the cluster strategy. Despite the perceived efficiency of the education and training program, the end-users had a negative attitude towards change. The communication between the

project members was faulty as well. Though the implementation was technically ready, further enhancements, upgrades, and organizational changes were planned. The implementation was perceived successful from the technical perspective.

Company 4 committed too much money and time to building an in-house ERP system. The project had top management support and a project champion in the person of the CFO, but the company would have needed consulting to speed up the implementation. The implementation was considered a less successful one.

Company 5 experienced major business strategy changes during the implementation project. After two years of planning, the ERP implementation cost double than estimated. The BP were changed to fit the ERP package, which was not customized to the company's needs. Each project member responsible for a business area appointed subordinates to be involved in the project. The new ERP system was not fully utilized, as it did not always support the company's data. After the first three years, the software selection proved not to be the best. However, the CIO perceived the ERP implementation project as successful.

Company 6 implemented a full-scale ERP system within nine months. The implementation starting point was considered to be wrong: the old system was used for comparison when formulating the requirements list for the new system. The project leaders also had limited support from top management and the software vendor. Features of the off-the-shelf software were implemented based on their fit to the existing BP within the organization. The education and training offered by the vendor should have been continued during the shakedown, onward, and upward stages. Instead, key users with different degrees of comprehension of the system provided the training. Hence, Company 6 was perceived to have been a less successful implementation project.

Company 7 implemented the ERP package within the established budget. The project involved the reengineering of the sales, financial, manufacturing, warehouse and procurement processes. The end-users were involved right from the planning phase of the implementation. Moreover, the education and training continued to be provided in the shakedown period. The implementation project was thus perceived as successful.

Company 8 implemented the system on time and within budget. The project team concurred upon a partial BPR. A complete one would have led to too radical organizational changes. The software vendor and the company project manager provided the education and training, throughout the three years of system use, according to the needs that arose at different times. Company 8 was perceived to have managed a successful implementation.

In Company 3, the ERP strategy and the system requirements were changed to accommodate the latest changes in its business strategy, and extended the implementation duration. In Company 5, the use of the system was not coordinated with the significant changes in business strategy, impacting negatively the system functionality. Thus, coordination between business strategy and system use may lead to a longer implementation project, but results in good system functionality in the long run. Hence:

*Observation 1.*

There is a positive relationship between alignment of the ERP implementation and business strategies and the success of the ERP implementation.

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### *Business process changes*

Most of the reported BP changes consisted of streamlined processes and modified work processes, which mainly involved:

- New tasks, such as credit invoicing in Company 1. This task aimed to correct the customer invoices which had previously contained errors. This was because the end-users were not fully familiar with the system. It would be interesting to observe if credit invoicing is performed less frequently in the long run.
- Decision-making decentralization and employees' empowerment. In Company 2, the ERP system's users started making real-time decisions, which were previously made at a higher level in the organizational hierarchy.
- The decentralization of sales reporting and purchasing, reassignment of the finance and control tasks, more accurate responsibilities within the delivery department, segregation of financial reporting. For example, in Company 3, the basic accounting tasks were transferred to the sales department and the financial reporting duties were segregated as accounts payables, accounts receivables, and general ledger reporting. In Company 8, the reassignment of the finance and control tasks enabled the project leaders to establish the selling prices, the due dates and other invoice terms. Thus, the project leaders were oriented towards the financial management of their projects, which involves better cost management of the business cases. Hence:

#### *Observation 2.*

Technologically-led ERP implementations may lead to reassignment of the tasks concerning the financial management of the business cases, which enables a cost-effective completion of business cases.

In Company 8, further BP changes consisted of the availability of the information on previously completed projects in the company and the real-time follow-up of the project. Project leaders were able to follow the expenses of each business case and make the necessary adjustments at every stage. Hence, an observation regarding the managerial accounting implications of real-time follow-up of customer cases is made:

#### *Observation 3.*

Technological-led ERP implementations may enable real-time follow-up of business cases, hence better cost control.

### *ERP benefits*

The perceived benefits of ERP are reported through the four perspectives of the BSC: internal processes, customers, learning and growth, and financial.

#### *Internal efficiency benefits*

The internal efficiency benefits come from improvement in process efficiency, improvement in tactical decision making and adaptation to the radical environment changes in a routine manner (Chand *et al.*, 2005).

Based on the interview data, benefits were perceived in terms of increased transparency of BPs, economies of scale, improved service time in accounting tasks,



improved access to information, enhanced process management, and shorter cycle times. However, the respondents could not provide any quantitative measurements such as lead times, service times and wait times, regarding the improvement in process efficiency.

In Company 1, some distribution and invoicing tasks were more inefficient than before ERP implementation (e.g. longer time lags in the warehouse, longer automatic processing of invoices). However, benefits such as more effective routing and scheduling activities were expected. Sales orders and customer enquiries are now transparent.

Company 2 perceived more efficient interdepartmental communication and spare time which is utilized for identifying business growth opportunities. In Company 3 the material costs and finance processes were in the harmonization process, which was expected to lead to job rotation throughout the organization. The financial reporting cycles in Companies 3, 4, 7 and 8 were estimated to be shorter. In addition, for the last two companies, the production, sales and invoicing cycle times were improved. Company 5 reported improvement in the accuracy of the sales data. The drill-down feature of the sales module reduced the wait times of the sales personnel, improved their decision making and allowed them to use their time more efficiently. The CFO of Company 8 perceived improvement in accounts receivables management, thus the following observation is made regarding the perceived impact of increased invoice accuracy on accounts receivables management:

*Observation 4.*

Technologically-led ERP implementations may increase the accuracy of sales transaction data, thus enabling better account receivables management.

Further, in Company 8 cash management improvements were reported, hence an observation regarding the impact of the changes in the invoicing process on cash management is formulated:

*Observation 5.*

Technologically-led ERP implementations may lead to more flexible invoicing, which improves cash management.

Companies 2, 6 and 8 described improved service time in accounting tasks and improved access to information, which resulted in improved customer service. Thus, the following observation regarding the relationship between ERP motivations, internal process efficiency benefits and customer benefits is made:

*Observation 6.*

Technologically-led and business-led ERP implementations may lead to improved service time in accounting tasks and improved access to information, thus improving customer service.

*Customer benefits*

Customer benefits come from meeting current needs of customers more efficiently, from identifying the customer needs proactively, and from meeting new customer needs or new needs of customers (Chand *et al.*, 2005). The most frequent customer

benefits mentioned by five of the case companies were improved customer service and more accurate customer invoices.

In the first two months after implementation, Company 1 received customer complaints showing decrease in customer satisfaction. However, better customer service was expected to result from the connection of the ERP system to other new systems in which the company planned to invest (e.g. the system optimizing the distribution routes).

The ERP system in Companies 4, 7, and 8 enabled faster response to customers. For example, Company 4, reported improvement in the customer response for orders with a fulfillment period of less than one week. Based on a customer survey, in Company 7, the new ERP system helped to meet the delivery terms. In Company 8, the ERP system enabled faster customer reports and more accurate customer reports regarding the project stages, the tasks of the project members, and the time spent on performing the respective tasks.

In Company 2, less internal mistakes visible to the customer, better follow-up of the customer relationships, and more flexibility in adapting to business changes were perceived.

The FICO process owner of Company 3 did not consider that there were any customer benefits, yet. Still, increased customer satisfaction and more customer value added were expected once the company enhanced its ERP package with a new module (the sales and distribution module). Companies 5 and 6 did not perceive any customer benefits despite the full-scale implementations and despite their being in the onward and upward stage when most of the benefits should have surfaced.

#### *Learning and growth benefits*

The learning and growth dimension refers to the assessment of the capability of employees and information systems to manage the organizational processes and their adaptability to change (Hoque and James, 2000).

The participating companies saw their ERP implementations as an opportunity to increase organizational knowledge regarding the system, the internal processes, and the stakeholders involved in the respective processes.

#### *Financial benefits*

The financial benefits come from reduced costs, increased revenues and improved market value (Chand *et al.*, 2005). The respondents could not make quantitative assessments of the ERP systems impact on their firms' financial performance. One reason is that there are other structural changes occurring at the same time with the system implementation, making it difficult to evaluate the direct contribution of the ERP system to financial performance. However, the respondents admitted they expected indirect financial impacts either at the cost or income level.

For example, Company 1 expected lower distribution costs. The ERP system of Company 2 helped the organization maintain steady profitability. Selling prices were calculated more accurately and this had an indirect effect on profit margins. The CFO of Company 8 perceived also fewer mistakes in the invoiced prices and improvements in revenues. In Company 4, indirect effects on revenues were perceived as the system enabled the sales agents to focus more on current customers and on increasing the customer base. Based on this evidence the following observation is made:

*Observation 7.*

Technologically-led and business-led ERP implementations may enable more accurate selling prices, which lead to better profit margin maintenance.

Further, in Company 2, the ERP generated economies of scale reduced the generation of costs, in particular headcount costs. In Company 4 decreased headcount costs and economies of scale were perceived after implementation. Hence:

*Observation 8.*

Business-led ERP implementations may enable economies of scale, which avoid the generation of additional headcount costs and selling, general and administrative costs.

Company 3 reported lower costs concerning their legacy system maintenance. After the transfer of basic accounting tasks from the financial to the sales process, the number of accountants was reduced. Additionally, the harmonization of the material costs was expected to empower the company to better negotiate the acquisition cost of input materials.

Company 5 reported improvement in inventory levels hence the following observation is made regarding the effect of such improvement on intermediate financial performance measures:

*Observation 9.*

Technologically-led ERP implementations may lead to better monitoring of inventory levels, which leads to higher inventory turnover.

Table II summarizes the nine observations and the associated quotations extracted from the interview transcripts.

### **Findings discussion**

The eight case companies had different implementation scales and experiences, and ranged in their ERP life cycle stages, from the project phase to the fifth year of post-implementation in the onward and upward phase. Five companies stated a technologically-led justification for their ERP implementation, whereas another three case companies mentioned business-driven implementations.

The case companies had more or less successful ERP projects, contingent on their abilities to complete the project on time and within budget, and to involve critical factors for the success of the implementation (e.g. top management support, BPR, effective project management, user involvement, education and training, vendor support, and change management). The attitude of end-users towards the new system was a key aspect of the success of the ERP implementation, since ERP systems typically start generating benefits when the system utilization improves. This confirms Park *et al.*'s (2007) findings that a users' ability to understand ERP knowledge influences the ERP performance.

Some similarities and differences were observed in how the case companies coordinated their motivations for implementing their system with the BP changes, and the ERP benefits perceived in the post-ERP implementation stage (Figure 1).

*Observation 1.* There is a positive relationship between alignment of the ERP implementation and business strategies and the success of the ERP implementation project

*Observation 2.* Technically-led ERP implementations may lead to the reassignment of the financial management of business cases, which means more cost-effective completion of business cases

*Observation 3.* Technologically-led ERP implementations may enable real-time follow-up of the business, hence better cost control

*Observation 4.* Technologically-led and business-led ERP implementations may increase the accuracy of sales transaction data, thus enabling better account receivables management

*Observation 5.* Technologically-led ERP implementations may lead to more flexible invoicing, which improves cash management

*Observation 6.* Technologically-led and business-led ERP implementations may lead to improved service time in accounting tasks and improved access to information, thus improving customer service

*Observation 7.* Technologically-led and business-led ERP implementations may enable more accurate selling prices, which lead to better profit margin maintenance

*Observation 8.* Business-led ERP implementations may enable economies of scale, which avoid the generation of additional headcount costs and selling, general and administrative costs

*Observation 9.* Technologically-led ERP implementations may lead to better monitoring of inventory levels, which leads to higher inventory turnover

"I would say that because of this business strategy changes, we didn't achieve what we targeted, I mean the transparency and we needed a harmonized data already during the roll out phase." (FICO Process Owner, Company 1)

"Everybody takes their own responsibility regarding the projects. At the end of a project you know how much it cost per quadratic meter, per kilogram, and they can have the information very easily." (CFO, Company 8)

"So we can follow up the projects very easily, and also when doing the project. If something goes wrong we can make the adjustments. Before it was so that it was much slower." (CFO, Company 8)

"... I think we are able to track our business better, so we can maintain our profitability. We make less mistakes so we don't give out our money to our customers ..." (Managing Director, Company 2)

"So we can follow up the customer projects very easily, also when doing the project. If something goes wrong we can make the adjustments." (CFO, Company 8)

"The information is everyday updated, because everyday we have the time sheet entries there, so we can invoice as soon as we want to. Before it took longer ... so at least this is one benefit, to receive some interest benefits or something like that." (CFO, Company 8)

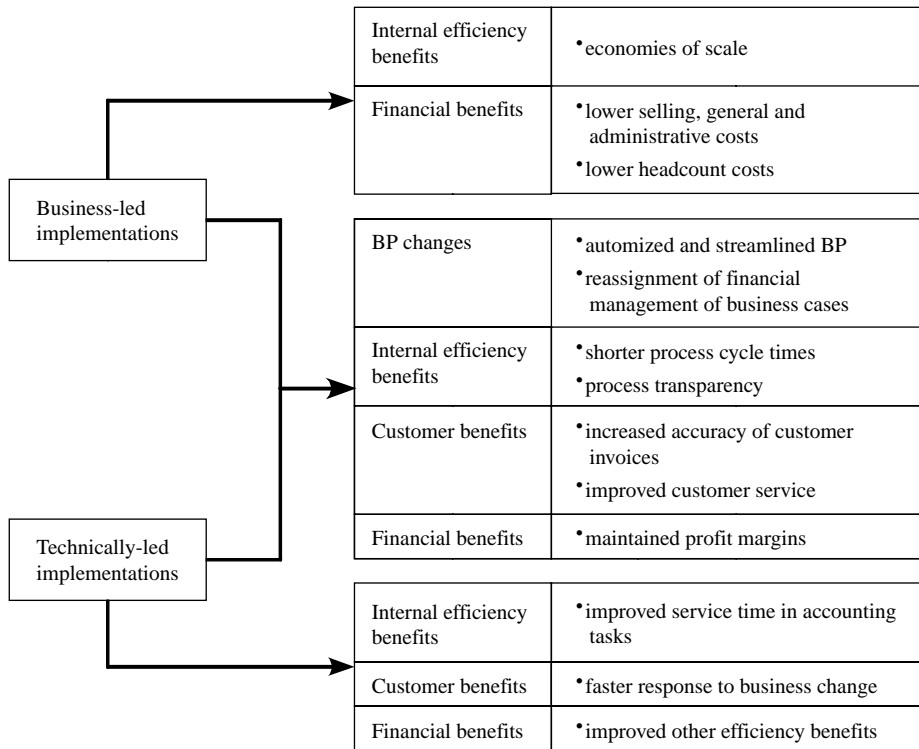
"We can use better our resources in the finance team. Before, it was input in many phases and now all the input is gone, so we can take that time to serve our client better. More reasonable work, which gives some value, not just some input entries." (CFO, Company 8)

"... our product pricing is sometimes very complicated. So, if we make mistakes then it impacts on the customers with the wrong invoices, and impacts ourselves with the wrong margins, which can maybe make loose our business." (Managing Director, Company 2)

"... now when we see positive development in the market again, our system can process more business for us, without the need to increase the headcount, for example." (Managing Director, Company 2)

"Well, let's just say that after the ERP implementation, the cost has dropped in comparison with the situation before [...] Costs related to the management of payroll and billing, and costs related to matching the orders and the staff ... The system provides economies of scale." (Finance Manager, Company 4)

"... we have now lesser value of the stock than we used to have, and the things that we have in stock are new ..." (CIO, Company 5)



**Figure 1.**  
Similarities and differences between technically and business-led implementations

Both technologically- and business-led companies perceived the same BP changes: automated and streamlined BP, and modified work processes such as decentralized decision making and improved work assignments.

Both company groups perceived shorter process cycle times and improved process transparency as internal efficiency benefits. However, the improved service time of accounting tasks was a distinct benefit reported by the technologically-led case companies, whereas the business-led companies reported economies of scale.

The increased accuracy of customer invoices and improved customer service were the common perceived customer benefits by both company groups. However, Company 2, with a business-led motivation perceived its faster response to the business change as a different category of customer benefits.

For the technologically-driven companies, other improved efficiency benefits were the main perceived financial benefits. For the business-led companies, the main perceived financial benefits were the lower headcount costs and selling, general and administrative costs. Both groups of companies perceived the capability to calculate more accurate selling prices as an internal efficiency benefit that maintains profit margins and profitability.

### Conclusions and future research

The purpose of this study was to explore what BP changes happen in companies implementing ERP systems with different motivations and implementation experiences.

Additionally, the study explores the impact of the respective process changes on organizational performance. The results provide a perspective into the interrelationships between ERP motivations and the benefits of ERP. However, this paper does not offer an exhaustive account of how ERP systems influence BP that ultimately affect performance. This is due to the analytical framework, which provides the lenses through which the interview-based data is interpreted, but which focuses the analysis, interpretation and reporting of the multiple-cases (Patton, 1990). The quality and reliability of the observations made are enhanced by providing relevant quotations extracted from the transcribed interviews.

Furthermore, the validation of this qualitative analysis is enhanced by applying the methods triangulation. Thus, the nine observations drawn from the interview data will be tested in a future quantitative study. Alignment between ERP and business strategy emerged as a new dimension in this analysis and is proposed as a variable, which contributes to the success of ERP projects. Observations 2, 3, 4 and 5 offer a perspective into how successful ERP implementations – either business or technologically justified – lead to BP changes, which then result in perceived internal efficiency benefits. Observations 6, 7, 8 and 9 relate to the link between successful ERP implementations – either business or technologically justified – and internal efficiency benefits, which then reflects in perceived customer benefits and financial benefits. These benefits of ERP are obtained at the automate and informate stages. There were no perceived benefits at the transformate level due to the fact that the case companies have not reached that stage in their system use.

These findings are characterized by a lack of generalisability to settings in other industries or countries. However, the multiple-case study format has the advantage of enabling a better understanding of the BP, companies implementing ERP experience in their natural settings. The implementation and performance of ERP systems differs between countries, industry sectors, business types and system types, whereas the reasons for implementing ERP are similar. Future case studies may thus be undertaken in different settings to understand the particulars of the interrelationships between reasons for implementing ERP systems and the realized ERP benefits.

One trend in ERP systems consists in the integration of external parties into the system, for example customer relationship management. Hence, one future research path on ERP benefits should focus on intra-organizational relationships, and on how companies can maximize their ERP benefits as a result of integrating their ERP system with the ERP systems of the suppliers and customers within the same supply chain. Then, considering O'Leary (2004) findings that the financial benefits are constant across industries and that the non-financial benefits vary from one industry to another, future research should analyze the non-financial ERP benefits across different industry supply chains.

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**Appendix 1. Interview guide**

- (1) What were the reasons for which the company decided to implement the ERP package?
- (2) What are the ERP packages you have implemented in your organization?
- (3) What was the implementation cost?
- (4) How long did the implementation take place?
- (5) What is your opinion about the system functionality of the ERP software?
- (6) What is your opinion about the degree of utilization of the ERP system capabilities?
- (7) What modules have been implemented?
- (8) How was the implementation project managed? (critical success factors considered during implementation)
- (9) What BPs did the ERP system change?
- (10) How did the ERP system change BPs ?
- (11) Were any metrics established for determining how well the company achieved the ERP implementation objectives? Was any cost/benefit analysis performed prior to or post implementation?
- (12) I would like to find out more about how the ERP system has affected your organization. What would be the best way for me to learn more from you about it?
- (13) What are the financial benefits as a result of using ERP?
- (14) What customer benefits does the company derive from ERP use?
- (15) Are there perceived internal process effectiveness and efficiency benefits from the use of ERP? If yes, please list them.
- (16) Does the ERP system contribute to improvement of processes and value creation within company? If yes, please describe how.
- (17) How are the benefits measured?

Appendix 2

	Company 1	Company 2	Company 3	Company 4	Company 5	Company 6	Company 7	Company 8
Intention to use the ERP system	Automate and informate	Automate, informate, transformate, with emphasis on automate	Automate, informate, transformate	Automate	Automate, informate, transformate	Automate, informate, transformate	Automate, informate, transformate	Automate, informate, transformate
Justification for the ERP implementation	Technologically-led	Business-led	Business-led, mainly, technologically-led, secondarily	Business-led	Technologically-led	Technologically-led	Technologically-led	Technologically-led
Management of the project	Successful	Successful	Technically successful	Less successful	Successful	Less successful	Successful	Successful
BP changes	Streamlining the sales, invoicing and distribution processes The streamlining engendered new tasks, like the credit invoicing	Streamlining the sales, purchasing, financial, and supporting processes that changed the workflow management system	The transfer of the basic accounting tasks from the financial process to the sales process Changes in the financial reporting workflow segregation at group level	The automation of the processes	Availability of the sales transactions data to stakeholders in the sales process The decentralization of the purchase task and its transfer to the sales process The sales reporting decentralization	The only company shareholder did not want to make any changes in the BPs	More accurate responsibilities in the delivery department Automation of the dispatch and finance processes	The reassignment of the monitoring of financial profitability of business cases to the project leaders The decentralization of responsibilities within projects Real-time follow-up of the projects. Availability of financial information about completed projects Improved service time of accounting tasks Shorter invoicing cycles
Internal process efficiency benefits	Sales order transparency Customer enquiry transparency	Transparent BPs Improved interdepartmental communication Economies of scale	Harmonized material costs Purchase data transparency Flexibility in financial reporting	Economies of scale Improved financial cycle times	Faster data processing More accurate sales transaction data Service time improved	Better material management	Better transparency of production and delivery processes Production, sales and invoicing, finance cycles improved	

(continued)

Exploring the effects of ERP systems

Table AI. Summary of interview responses

Table AI.

	Company 1	Company 2	Company 3	Company 4	Company 5	Company 6	Company 7	Company 8
<b>Customer benefits</b>	Current customer complains due to mistakes in customer invoices and deliveries Expected improved customer service	Focus on business growth Faster customer response, more accurate customer invoices, faster response to business changes	Improved financial reporting cycles with one week Expected increased customer satisfaction and value-added once the company enhances the ERP package with the sales and distribution module	Improved customer satisfaction, more accurate invoices and faster customer response	No perceived benefits	No perceived benefits	Improved customer satisfaction with company's delivery terms	Improved customer satisfaction, more accurate customer invoices and faster and more detailed customer reports
<b>Learning and growth benefits</b>	Employees understand better the BP's	Improvement of business areas	Employees understand better the BP's	For new employees, the system facilitates faster learning of the BP's	Improvement of the internal processes and organizational culture	The system helps the employees understand better the business, but it helps more the employees who are not acquainted with the old system	Increase the understanding of other process stakeholders' responsibility	Finance employees become more aware about how much they cost the company
<b>Financial benefits</b>	Expected lower distribution costs	Maintained profitability Improved accounts receivables Improved profit margin Maintained headcount costs	Lower maintenance costs for the legacy systems Lower headcount costs Net income maintenance	Lower headcount costs Higher sales	Lower inventory	Lower operational costs	"... that is the main problem. I can't answer based on numbers because I don't have them." (CIO)	Improved cash management Improved revenues Better acquisition prices Improved accounts receivables

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