

INFORMATION TECHNOLOGY IMPACTS ON ORGANIZATIONS:

ERP PROJECT CASE STUDIES

BY: MAX ARO

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Author: Max Aro	Date: 22.12.2005
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Abstract: <p>Recognizing information technology (IT) impacts on organizations has proven to be difficult to perform. Several researches have engaged in performing the task. Due to the complex nature of IT and business organizations, results have varied significantly. The topic requires further study as several organizations are currently implementing large scale IT systems for business performance support.</p> <p>The research objective is to distinguish IT impacts on the business process level, which correlates to organizational performance. The focus is on the set objectives for an IT business project and its outcomes. Factors such as goal setting and other project enabling factors are paid special attention to. Measurement procedures and detail are attended to. The above mentioned factors determine IT business success. The research is conducted utilizing the multiple case study method. An in-depth study permits thorough recognition of the study focus.</p> <p>The results distinguish automational, informational, and transformational IT impacts on organizations' business processes. Important IT business success enabling factors include clear goal setting and change management. Business performance metrics are required to be utilized in the pre- and post-implementation phases for result comparisons in order to determine IT business success.</p>	
Keywords: information technology, enterprise resource planning systems, information technology impacts, objectives, enabling factors, measurement metrics, IT business success	

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1 INTRODUCTION

Recognizing and measuring benefits of information technology has proven to be a complex task. However, it is a topical subject. The concept of information technology impacts on organizational performance and productivity has been a highly studied matter. Various results have illustrated the complexity of the task. Results have varied enormously on whether or not information technology (IT) provides organizational or financial benefits for companies. As current development increases and expensive IT systems are spreading in organizations, the topic has reached even greater importance. Organizations' desire to see proof of the benefits these systems provide. Successful IT implementations are essential for business accomplishment and continuance. The study utilizes the term IT business success for successful organizational business performance generated by IT.

The current study focuses on the organizational process view and process improvements enabled by IT. It has been noted by several studies that IT does not directly benefit financial performance, only indirectly. IT benefits are realized in increased efficiency in business processes creating improved business performance. IT impacts and its relationship towards performance has proven to be difficult to measure in quantifiable terms. The factors, which are missing in many studies, are the initial position of an organization and the objectives for the IT business project. In addition, firm-level strategy and management role have been disregarded in most cases. However, several studies recognize that these factors play an important role in the success of IT implementation and its effect on business performance. IT business success comparisons among organizations are cumbersome to distinguish by disregarding initial organizational factors and most importantly objectives, as it is objectives which set the benchmark to aim for in an IT business project. Moreover, objectives define the outcome success. The current study concentrates on IT process impacts and its enabling business performance in consideration of goal setting and other organizational factors.

The study focal point is on large scale IT systems aimed to support business performance. Features that the systems provide include business process efficiency, automation, information transparency, and process integration. In the current study, the IT concept includes enterprise resource planning (ERP) systems, which are widely implemented and utilized in the modern business world. Distinctions of the two are made further on in the study. However, both ERP and other IT systems are grouped together and referred to as IT in the study continuance.

1.1 Research Objective

The research objective is to recognize IT impacts on business processes taking into consideration an organization's initial situation. IT impacts on organizations and IT business success are not the same for each individual company, as IT strategy, objectives, and organizational resources and capabilities vary greatly. The initial status of an organization plays an important role in studying IT impacts and comparing IT success. IT business success is to be defined according to the achievement level of set goals for the new IT system and thus business performance for the organization. Defining success requires initial business performance measurement and comparisons of the results to the measured outcomes. Without comparisons, success is not feasible to define. Moreover, comparing organizations' IT success with different IT and business performance objectives is misleading, as outcomes may vary drastically. Comparisons of organizations with similar objectives shed light to their true IT business success. The following figure illustrates the study core.

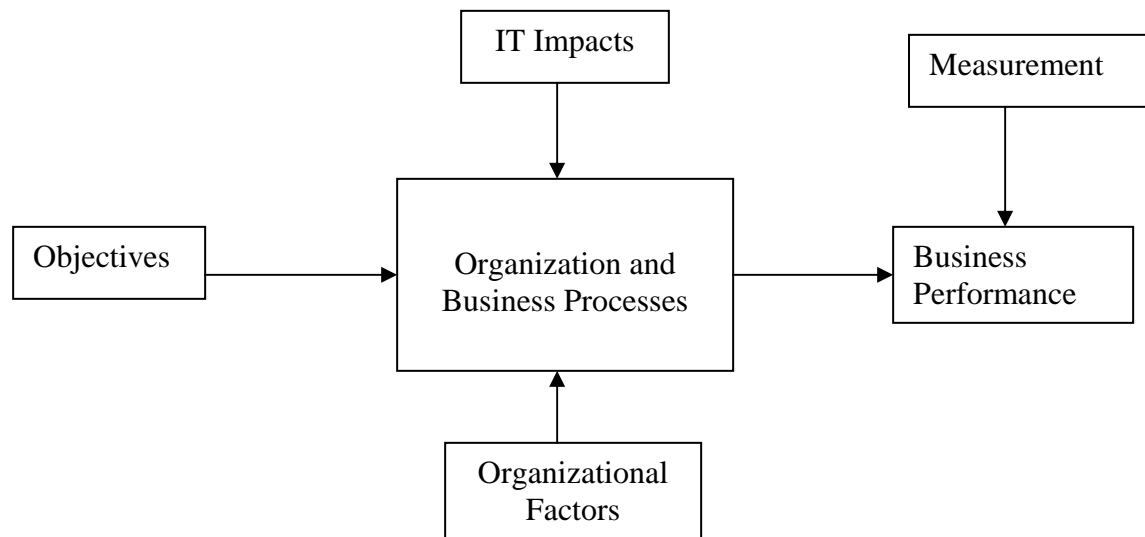


Figure 1 Study Core
(Source: Author)

The figure above demonstrates the main issues attended to in the current study. The main concern is IT impacts on the organization and business processes. However, special attention is paid to IT business objectives as they define the aimed outcome for business performance. Furthermore, organizational factors enable and affect the IT integration outcome. Business performance is focused on by comparing its IT pre- and post-implementation performance transformations. Initial performance measurement metrics are utilized in the post-implementation phase in order to discover business performance alteration in detail.

The current study is conducted as an in-depth study on the firm-level. A multiple case study methodology is executed in order to perform a comprehensive research. The results are exploratory in nature distinguishing detailed empirical evidence. A business process framework is utilized in order to understand how IT impacts business processes. Furthermore, factors enabling IT impacts are scrutinized. These include most importantly objectives and other organizational factors. The measurement metrics utilized to discover objective achievements are paid special attention to. The general research questions to be answered by the study are the following.

1. How IT impacts business processes and why?
2. What are the enabling factors for IT impacts affecting business performance?
3. What measurement metrics are utilized to discover objective achievement?

The research questions consider IT impacts on business processes and business performance as well as enabling factors and measurement procedures. Many studies have examined financial performance and productivity after an IT system has been implemented without considering other factors affecting business performance. Furthermore, it has been shown that IT has direct impacts on mainly processes. Therefore, financial performance indicators provide a rather vague picture about business performance improvements provided by IT. Thus, the current study focuses on process impacts provided by IT while taking into consideration both objectives and organizational factors.

1.2 Structure

The study commences by introducing the subject matter. Previous research is described and current issues are presented. Terms are explained in detail. Secondly, the IT business success research is illustrated in the core of the current study. Thirdly, the methodology for the empirical research is presented and explained. The process framework utilized for the empirical research is illustrated. Fourthly, empirical results are presented and analyzed. Finally, conclusions from the current study are drawn and suggestions for further research are explained.

2 IMPACT OF INFORMATION TECHNOLOGY ON BUSINESS

The problem of valuing information technology has always been a great predicament. It is difficult to measure the impacts IT has on profit, productivity, organizations, and performance. Thus, it is complex to distinguish the organizational business value IT provides, making IT investment decisions extremely problematic. These are issues many business managers have been pondering for several years. A conclusive answer is yet to be determined due to the complex nature of IT and the measurement difficulty of various IT attributes.

2.1 Productivity Paradox of Information Technology

Brynjolfsson (1993) built a basis for discussion on the negative correlation between IT and productivity. His research studied various sources of information on IT productivity. The common conclusion was that IT has no positive relationship to productivity or profit (Brynjolfsson, 1993). However, a window was left open for opposite results due to the limited amount of research in the area and the inadequate quality of previous research.

The fact that IT does not produce productivity or profit benefits raises many concerns as the opposite is quite widely assumed. Brynjolfsson (1993) presented four reasons for his findings. These reasons are commonly found in more recent research (Lee, 2001; Melville et al., 2004, Poston and Grabski, 2001). The first reason is the research miscalculation of outputs and inputs. The IT benefits are commonly intangible in nature. They relate to matters such as increased quality, customer service, and increased processing efficiency, which are matters very difficult to measure in quantifiable terms and thus are not statistically reliable. The second reason is IT benefits can take several years to provide evidence. The third reason for the productivity paradox is that IT may be beneficial for one organization but not the whole industry. In other perspectives, IT may be useful for example to the marketing department,

although not supporting the company as a whole. The fourth reason is mismanagement of IT. If the IT concepts and attributes are not understood and managed properly, the impact is not beneficial on corporate output (Brynjolfsson, 1993).

Not long after Brynjolfsson's (1993) conclusion of the productivity paradox, together with Hitt he found evidence of significant IT contribution to firm level output (Brynjolfsson and Hitt, 1996). The explanation for the rather opposite results compared to the paper in 1993 was due to three reasons. Firstly, the examined sample was from a later time period than previous researches have been. Therefore, IT users have had time to adapt to new procedures and significantly more post-implementation data was available. Secondly, a different data sample was used and more accurate firm-level information was acquired. Thirdly, the new sample consisted entirely of "Fortune 500" firms. Consequently, larger companies are more likely to illustrate positive impacts of IT spending. (Brynjolfsson and Hitt, 1996.)

Since the publishing of *The Productivity Paradox of Information Technology* (Brynjolfsson, 1993), several articles have been published on the subject matter with various results. Like Brynjolfsson and Hitt (1996), other research have found evidence of positive correlation between IT and organizational performance (Melville et al., 2004) and others have not (Poston and Grabski, 2001). Conflicting results have been produced because of several IT attributes measured and the lack of a universal model to distinguish IT business value.

2.2 Overview of the IT Field

The following section presents an overview on the research conducted on the subject matter concentrating mainly on IT. Both financial and performance based research is illustrated.

Dehning and Richardson (2002) have acknowledged the large research array on the topic of return on investments from information technology. The aim in their study is to synthesize

previous research and provide a model for future evaluation of information technology. The authors recognize that in general IT investments are measured in three ways:

1. Differences in the amount of money spent on IT (spending)
2. The type of IT purchased (strategy)
3. How IT assets are managed (management)

However, Dehning and Richardson (2002) expand the IT investment valuing methods by including accounting and market measures of firm performance, process measures, and contextual factors in their study. Thus, the authors present the following framework for evaluating research on the current topic.

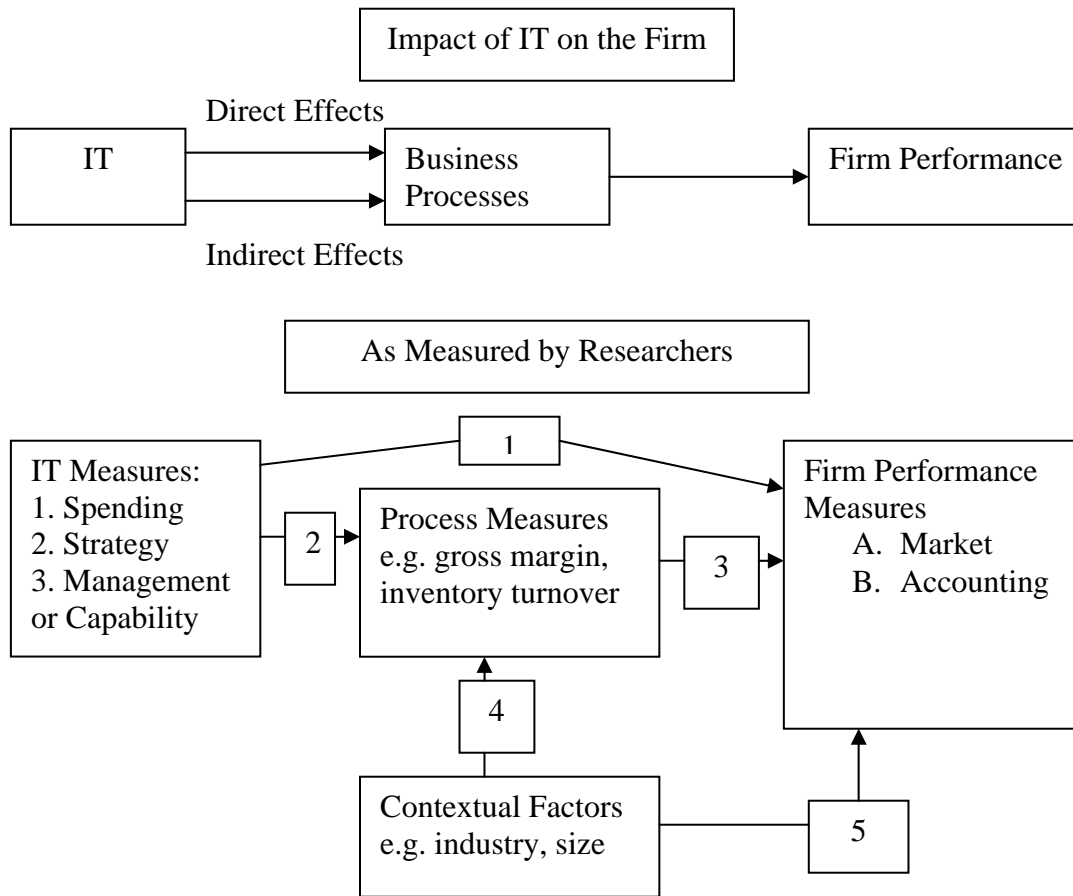


Figure 2 Framework for Evaluating Research on the Benefits of IT Investments
(Source: Dehning and Richardson, 2002)

The framework by Dehning and Richardson (2002) illustrates IT effects on business performance and thus on overall organizational performance both directly and indirectly. Accordingly, the framework distinguishes various measures used to distinguish IT business impacts explained in the previous paragraph. Path 1 explains the relationship between the three general IT measures towards firm performance. Path 2 explains the relationship between the three general IT measures towards process measures, which act as intermediate measures towards overall firm performance, thus path 3. In addition, the authors illustrate contextual factors in their framework, which affect both process measures and firm performance measures. The following section takes a more thorough accounting based aspect towards paths 1 and 2, which affects path 3 as well.

Dehning and Richardson (2002) have reviewed several studies examining paths 1 and 2 of the proposed framework. Financial indicators used in their study include return on assets (ROA), return on equity (ROE), return on sales (ROS), cost of goods sold (COGS), and selling, general and administrative costs (SG&A) to mention a few. The results they acquired are quite controversial. Some of the reviewed studies indicate positive relation with the above mentioned indicators and IT, and some do not. The puzzling matter is that opposite results may occur when using the same data but in different studies. Furthermore, variances occur with different samples. The review confirms very few evidence of researches supporting one another. The discontinuance is striking when examining the studies.

Dehning and Richardson (2002) conclude after revision of numerous studies that the positive relationship between IT spending and financial performance (path 1) is vague. However, evidence of productivity and output increases can be distinguished. Concerning studies based on the other two IT measures (strategy and management), not enough research has been completed for generalization. However, evidence is seen that higher IT management and capability increases organizations competitiveness (Dehning and Richardson, 2002).

In addition to rates of returns and pure financial figures, Brynjolfsson and Hitt (2000) have studied IT relationship to organizational transformation and business performance. Their arguments include that IT enables organizational investments such as business processes and work practices, and the investments lead to productivity increases by reducing costs and increasing outputs (Brynjolfsson and Hitt, 2000). Furthermore, they argue that financial contributions may only be measured at an aggregate level. The authors conduct their study on the firm-level. The conclusions are the following. IT does not cause unproductive performance for an organization. Rather, IT enables economic growth. IT supports new business processes, skills, and organization structures. Brynjolfsson and Hitt (2000) argue that the above mentioned assets being of higher value than the initial IT investment. In other words, IT provides benefits of intangible nature, making it difficult to quantify and therefore distinguish

concretely. However, it is estimated that the benefits are of significantly greater value than previously believed (Brynjolfsson and Hitt, 2000).

Dedrick et al. (2003) have continued to study the subject matter further concentrating on economic performance. The authors evaluated 50 studies concentrating on IT and economic performance. Their study examines results on country, industry, and firm-level. For both country and industry level, evidence is recognized on productivity increases in relation to IT investments. Results are more varied on the firm-level. The reason for variance is due to the varying nature of organizations. Resources among other vary between organizations leading to inequality in capturing all the benefits provided by IT. Furthermore, Dedrick et al. (2003) recognize that IT provides benefits in management practices such as decentralized decision-making, job training, and business process reengineering.

2.3 Overview of the ERP Field

The following section presents an overview on the research conducted concentrating mainly on ERP. Both financial and performance based research are illustrated.

Enterprise resource planning (ERP) systems are included in the IT concept. ERP systems are business process supporting systems. Common features include organization wide integration, information transparency, and process automation (Chand et al., 2005). Several organizations are currently implementing and utilizing ERP systems in order to support their business.

With the evolvement of ERP systems, the interest in the impact these systems have on organizational performance has risen. Billions of dollars have been spent on these systems worldwide (Kalling, 2003). Yet, conclusive results on the true benefits are still to be proven. Managers provide various reasons for ERP implementations. These include improved productivity, reduced costs, greater operational efficiency, enhanced customer relationship

management, and better supply chain management (Beard and Sumner, 2004). The same issues as with IT productivity rest upon ERP systems. The matters of acknowledging the above mentioned benefits and distinguishing the effects ERP poses on profits or organizational performance are complex in nature. Consequently, the purpose of the following section is to find support for these issues by examining the results of previous research.

The ERP field is rather contemporary. Numerous researches have been conducted on ERP implementation. A significantly fewer amount of research have been performed on the realized ERP benefits. This is primarily due to the fact that it may require up to five years before benefits of ERP projects are realized (Poston and Grabski, 2001). As these systems are new, this type of data is not seemingly available yet. However, this research does review researches on financial and value-adding benefits and cost reductions of ERP and its impacts on organizational performance.

2.3.1 Reasons for ERP

In theory ERP systems should provide several benefits for an organization. The ERP benefits promised by vendors attract managers to consider implementing and integrating an ERP system into the organization and strategy. Markus and Tanis (1999: ch 10) have divided ERP benefits into technical and business benefits.

Reasons for Adopting Enterprise Systems

Small Companies/ Simple Structures	Large Companies/ Complex Structures
Technical reasons <ul style="list-style-type: none"> • Solve Y2K and similar problems • Integrate applications cross-functionally • Replace hard-to-maintain interfaces • Reduce software maintenance burden through outsourcing • Eliminate redundant data entry and concomitant errors and difficulty analyzing data • Improve IT architecture • Ease technology capacity constraints • Decrease computer operating costs 	Most small/simple company reasons plus <ul style="list-style-type: none"> • Consolidate multiple different systems of the same type (e.g., general ledger packages)
Business reasons <ul style="list-style-type: none"> • Accommodate business growth • Acquire multilanguage and multicurrency IT support • Improve informal and/or inefficient business processes • Clean up data and records through standardization • Reduce business operating and administrative expenses • Reduce inventory carrying costs and stockouts • Eliminate delays and errors in filling customers' orders for merged businesses 	Most small/simple company reasons plus <ul style="list-style-type: none"> • Provide integrated IT support • Standardize different numbering, naming, and coding schemes • Standardize procedures across different locations • Present a single face to the customer • Acquire worldwide "available to promise" capability • Streamline financial consolidations • Improve companywide decision support

Table 1 Reasons for Adopting Enterprise Systems
(Source: Markus and Tanis, 1999: ch 10)

According to the table by Markus and Tanis (1999: ch 10) many reasons for adopting ERP systems are due to integration both technically and business wise. In technical matters integration occurs in the sense of having a single system, architecture, and interface. It allows more ease to the user, as it is not necessary to work with several different systems. Moreover, a single ERP system is simpler to maintain once running properly, as no new integration is necessary and the technology is the same all over the organization. In business matters integration occurs as orders, transactions and inventory may be managed and traced more

easily, data and processes are standardized, and information is acquired in various forms as needed allowing improved decision making.

To conclude the benefits and reasons for ERP, the key issue is integration. Organizations may benefit from ERP both technically and strategically. Furthermore, organizations may be tempted to implement an ERP system for only a few reasons, after considering the strategic necessities and objectives. The driver towards ERP systems must benefit the organization in some matter. The reasons mentioned in Table 1 stimulate organizations towards ERP in hope for functioning ease and improvements in business performance.

In considering ERP implementation projects Markus and Tanis (1999: ch 10) recognize the reasons for adopting an ERP system should be linked to project outcomes. In other words, as an organization defines the objectives for an ERP business project, they should include and aim for the issues mentioned in Table 1. Setting business goals an ERP system cannot support leads to failure in project outcomes. Goal setting is further discussed in coming sections.

Markus and Tanis (1999: ch 10) recognize reasons for organizations not to acquire an ERP system. The three main reasons are high costs, risk of losing competitive advantage, and resistance to change (Markus and Tanis, 1999: ch 10). The above mentioned reasons for not implementing ERP are rather rational except the risk of losing competitive advantage. Gaining competitive advantage is a reason for ERP, therefore the risk of losing it is somewhat interesting. However, ERP systems are complex and successful implementations are realized far less than unsuccessful ones (Legare, 2002). Therefore, organizations must carefully analyze the risks of implementing an ERP system. As noted before, a successful ERP implementation provides organizations with several improvements, but an unsuccessful one may cause an organization to lose business in the worst case. Therefore caution is required when considering these complex systems.

2.3.2 Financial Impacts of ERP

Stakeholders are keen to learn the financial impacts of investments in their organization. Especial attention is paid on costly investments such as an ERP system. Good examples of ERP financial impact researches have been conducted by Poston and Grabski (2001) and Hunton et al. (2003). The following section presents the main findings of the two researches.

Poston and Grabski (2001) investigated the impact of ERP system implementation on organization performance. They examined 50 companies adopting ERP over a three year post-implementation phase. Additionally, the authors concentrated on three major areas, which they presumed would illustrate ERP effects on economical performance. These include internal coordination costs, decision information costs, and external coordination costs (Poston and Grabski, 2001). All of them are included with more detailed cost categories.

Poston and Grabski (2001) formulate four hypotheses related to the cost areas mentioned in the previous paragraph. All of the hypotheses state that the following ratios or performance indicators have improved after ERP implementation:

- Selling, general and administrative costs/Revenues
- Cost of Goods Sold/Revenues
- Residual Income
- Number of employees/Revenue

The results demonstrate a limited and insignificant positive correlation with ERP and firm performance. Neither the first nor the third hypotheses are supported with the results. Poston and Grabski (2001) found no significant evidence of selling, general and administrative costs divided by revenues or residual income would decrease. The relationship to cost of goods sold divided by revenues was slightly supported. A significant decrease was discovered on the third year of research. The ratio of staff number to revenues showed a significant decrease for all three years of the examined time phase. Thus, it was the only hypothesis fully supported.

The results are somewhat concerning. Companies are investing millions of dollars on ERP systems, which consequently fail to deliver any financial benefits. Poston and Grabski (2001) identify a few reasons for the outcome of their research. Firstly, as mentioned before, the ERP benefits on an organization may realize only after four to five years after the implementation phase. As the time frame in this research was only three years, it might have not been sufficient. Secondly, Poston and Grabski (2001) suggest that the true value of ERP systems are realized only after add-on packages such as customer relationship management systems are utilized. Apparently the research does not include features such as customer relationship management (CRM). Thirdly, it is identified that many companies reengineer their business processes while implementing ERP making it difficult to compare previous performance with ERP post-implementation performance (Poston and Grabski, 2001). Therefore, referring to the first limitation, a longer time frame might be sufficient in ERP financial impact research. Fourthly, macroeconomic or contextual factors were not considered in this study (Poston and Grabski, 2001). Thus, companies of the similar size and industry, which have not implemented ERP, should have been included. Finally, organizational control or initial objectives were not managed (Poston and Grabski, 2001). Factors affecting organizational change should be distinguished and measured in order to identify the true success of the ERP implementation. It could be that all of the 50 companies failed in ERP implementation with little financial impacts. However, it cannot be proven as the organizational factors are unknown.

Hunton et al. (2003) recognize a sixth reason for the results acquired by Poston and Grabski (2001). It is noted that a research in 1996 discovered that financial gains encountered with ERP adoption is passed through to customers with lower prices. This notion is supported by various other researches Hunton et al. (2003) had examined.

Hunton et al. (2003) aim to extend the study by Poston and Grabski (2001) and examine ERP benefits from a wider and different perspective. The objective of the study is to demonstrate whether or not the financial performance of a non ERP adopter is significantly lower than one of an ERP adopter. The study uses four different measures of financial performance. The first

one is the return on assets (ROA), which is a common measure of performance and widely used in research. The two second measures are parts of ROA. These are return on sales (ROS) and asset turnover (ATO). The last performance indicator is return on investment (ROI).

The study by Hunton et al. (2003) examines 60 companies from which it was possible to acquire performance information before and after the ERP implementation for a sufficient amount of years. The companies were chosen from a previous study and information was acquired from Compustat. The sample includes in addition companies, which have not implemented ERP in order to compare and contrast results.

The results by Hunton et al. (2003) indicate similar results as with the Poston and Grabski (2001) study. No significant difference in ROA is recognized between pre- and post-implementation performance of ERP companies. The difference among the two studies is illustrated in that non-ERP adopting companies show a great decline in ROA. Similar results were acquired with the other financial performance indicators (ROI, ROS, and ATO). However, it is noted that the decline in financial performance figures for non ERP adopting companies is significant only for ROA and ROI.

Apparently the study by Hunton et al. (2003) does not shed light to the ERP paradox and their impact on organizational financial performance. Thus, it could be possible that these complex systems that companies spend millions of dollars on are implemented only to sustain an already acquired market position and not improve overall financial performance. The research contributions by Poston and Grabski (2001) and Hunton et al. (2003) seem to reflect upon this theme. However, various other researches have identified other types of ERP benefits (Laughlin, 1999; Plotkin, 1999; Mabert et al., 2001), but recognized that these benefits do not occur until ERP systems have been successfully implemented and integrated into business processes (Markus et al., 2001). The following section examines these ERP benefits.

2.3.3 ERP Benefits

ERP provides other benefits than financial ones. These are benefits, which are more related to efficiency and process flow. These benefits are characterized as value-adding benefits (Beard and Sumner, 2004), which may be divided into two dimensions of technical and human (Markus and Tanis, 1999: ch 10). Value-adding benefits are difficult to measure and thus research utilizing accounting measures on value-adding benefits does not exist. However, as the following section illustrates, value-adding benefits have been examined.

In technical aspects, the value-adding benefits are all related to problem removal due to legacy systems (Beard and Sumner, 2004). With an ERP system all systems are integrated with each other and information is stored in a database, which can be accessed by authorized personnel. This eliminates the problems of various different systems not connected together and endless search of vital data.

The ERP key benefits managers have stated are most often related to performance measures such as quality, timeliness, and efficiency (Beretta, 2002). In more precise matters these performance measures are due to improvements in inventory accuracy, decrease in time cycles in various processes, faster and cross-functional information flows, language sharing, improved financial management and more important decision-making (Mabert et al., 2001; Beretta, 2002). This is all related to the essential point of the ERP system: business processes are standardized and integrated throughout the organization. Therefore, business processes are efficient, costs are reduced, opportunities for sales increase, quality and customer service improves, and results are measured continuously (Beard and Sumner, 2004). Plotkin (1999) has noted ERP productivity benefits as well. ERP systems include the ability to calculate new prices instantly, to make more accurate forecasting, to remove process bottlenecks, and identify duplicate processes. These numerous ERP attributes provide companies advantages. Although not all of the value-adding benefits relate to higher profits, competitive advantages may be gained. For example with supply chain integration a company may gain competitive advantage over its competitors although it might not immediately lead to financial gains (Markus and

Tanis, 1999: ch 10). Therefore, one might state that value-adding benefits create business performance efficiency and competitive advantage.

3 IT BUSINESS SUCCESS

The objectives of an IT system project are introducing, implementing, and integrating an IT system into an organization in order to benefit from them in some matter. The objectives are part of the overall organizational strategy. In order to measure IT success, the initial and intermediate objectives must be reflected upon the IT system outcome and the impacts it offers (Mooney et al., 1996). Due to the IT benefit nature, the outcome and impacts are best recognized and are more meaningful at the local performance level and its effect on overall performance (Mooney et al., 1996; Beretta, 2002). Attention must be paid towards IT systems, the organization, and their interaction (Mooney et al. 1996). With this perspective the IT role in organizational performance improvements may be recognized. This is important, as it has been difficult to distinguish organizational aspects IT impacts on.

The main reason for the IT impact recognition difficulties are due to the functional view of organizations. Most company managers and studies view organizations as several functional units (Beretta, 2002). In light of a functional view it is complex to understand the IT influence on processes and activities. The IT business value is more straightforward to distinguish with a process view. Furthermore, business processes link value generating strategies with actions and decisions (Beretta, 2002). Organizational change is restricted when an organization is viewed as several functional units and an IT system is implemented module by module (Beretta, 2002). Process reengineering and organizational change are key issues in realizing IT benefits (Mooney et al., 1996; Lee, 2004).

3.1 Measurement Metrics

Numerous studies have pondered about whether IT success has been achieved or not after a new system has been implemented. Success however depends on numerous factors such as stakeholder perspectives, measurement units utilized, initial resources, initial and intermediate

goals to mention a few. In ERP implementation projects success is determined on the outcome of the project or the outcome of the business results achieved (Markus and Tanis, 1999: ch 10). When measuring project success, the measurement units are project costs and time. In order for a project to be successful, it has to be completed within the set schedule and budget. On the other hand, if the project success is measured according to the achieved business results, organizational performance in respect to set business goals is compared. (Markus and Tanis, 1999: ch 10.) The measurement problem however remains, as it is not clear which metrics should be utilized. Moreover, the nature of ERP benefits is both tangible and intangible. Lucid figures are complex to provide, as grasping intangible and indirect benefits is cumbersome. Furthermore, Markus and Tanis (1999: ch 10) recognize the complex nature of ERP systems and projects, and the necessity to measure success in several points in time.

In order to solve the prevailing ERP measurement problems Markus and Tanis (1999: ch 10) suggest a balanced scorecard outlook. The balanced scorecard measurement orientation allows success metrics to be measured from different dimensions and in several points in time. The measurement dimensions include financial, technical, and human proportions (Markus and Tanis, 1999: ch 10). Their suggestion for measurement metrics includes the following.

- Project metrics – performance compared to set schedule, budget and functionality
- Early operational metrics – business and ERP metrics relating to process efficiency and quality
- Longer-Term Business Results – organization performance at different points in time when normal business operation is attained

(Markus and Tanis, 1999: ch 10)

The measurement view by Markus and Tanis (1999: ch 10) is highly conclusive. It takes into consideration the whole time scale during which ERP has an impact on an organization. Longer-term business results take into consideration the notion by Brynjolfsson (1993) and Poston and Grabski (2001) that ERP benefits are realized only after a long period of time (4-5 years) after the implementation phase. Numerous studies have measured ERP success early in

the post-implementation realizing insignificant or negative correlation with performance. The metrics suggested by Markus and Tanis (1999: ch 10) resolve this measurement flaw. Moreover, both project and business result units are included in the metrics. The suggestion by Markus and Tanis (1999: ch 10) considers important aspects in measuring realized ERP impacts providing a very convincing measurement layout.

Chand et al. (2005) have taken a thorough approach in considering ERP impacts from a balanced scorecard viewpoint. They have created a framework, named ERP scorecard, in order to distinguish the various impact types ERP provides an organization. The framework is based on the IT process impact framework by Zuboff (1985) later utilized by Mooney et al. (1996). It concentrates on automational, informational, and transformational IT impacts. Chand et al. (2005) extend the framework into a 12 cell table by introducing process, customer, finance, and learning and innovation dimensions in substitute for operational and management dimensions presented in previous research. The authors conclude that often the original three dimensions are initial organizational objectives for an IT business project. However, in order to achieve them, the four introduced dimensions require acknowledgement. It is recognized that new dimensions create the link in achieving automation, information, and transformation (Chad et al., 2005). However, the authors acknowledge the immaturity in the framework, yet its strong potential when developed further. It is acknowledged that ERP may have even more impact dimensions on an organization. Furthermore, it is not clearly distinguished, which dimensions should be included in the ERP scorecard.

3.2 Success during the ERP Lifecycle

Markus et al. (2000) propose three stages of the ERP lifecycle and different success attributes, which may be achieved during each phase. The three phases are the following:

1. Project phase (Implementation)
2. Shakedown phase ('Going live')
3. Onward and Upward phase

Markus et al. (2000) present three success factors for each phase to be achieved. Especially the goals to be achieved mentioned in the shakedown phase indicate that organizations are not expected to experience at this stage yet, as one of the goals is stated as follows:

Length of time before key performance indicators achieve 'normal' or expected levels.

This phrase clearly indicates that performance is expected to be lower than 'normal' after initial implementation, and during the shakedown phase problems are to be solved in order to achieve expected performance as soon as possible. Furthermore, Markus et al. (2000) conclude that ERP benefits are realized only after successful implementation and business process integration. In the three phases proposed, benefits would occur in the onward and upward phase.

3.2.1 Optimal Success

Due to ERP system complexity, macroeconomic issues relating to the ERP impact measurement must be considered. ERP systems provide benefits for organizations. Organization size and function determine the different types and scopes the benefits are realized in. Therefore, Markus et al. (2000) propose the optimal success criterion. This criterion stated the best possible outcome an organization could achieve. The optimal success criterion can be different for different types or sizes of companies thus achieving different benefit types and in various scopes as mentioned above. The criterion acts as a benchmark for each individual organization's achievement level. It defines the realistic goals an organization may aim for.

Comparing success and failure in IT projects among companies requires the acknowledgement of the initial situation of each individual organization. Objectives, resources, and market situation may all lead to a different outcome for the IT project. Though an organization may have the same resources, capabilities and a similar IT project, the project success may vary enormously as the business objectives might be different. Markus and Tanis (1999: ch 10) recognize an example in their study where this phenomenon occurs. Two organizations with similar improvements in inventory carrying costs differed in their success metrics. The objective for the first organization was to replace its legacy systems and for the second organization to increase market share. The first organization succeeded in achieving its goals but the second one did not. (Markus and Tanis, 1999: ch 10.) Moreover, organizations of different scope may have different objectives and capabilities to perform an IT project. Most often small organizations concentrate on replacing legacy systems or implementing only few modules of a large IT packet. Thus, it would be incorrect to compare a small organization with a large SAP implementing organization. The resources, capabilities and most probably objectives for the two IT project implementations would be quite different as well as the success the organizations consider achieving from them. Therefore, it is crucial to concentrate on the initial factors mentioned above as they have a significant impact on the IT project outcome. Only after considering the initial circumstances for an organization and organizations clustered in respect to these factors may IT project success levels be compared among organizations. The initial circumstances define the optimal success organizations may achieve and according to what organizational factors should be clustered when compared. However, business evolution defines the optimal success nature as dynamic (Markus and Tanis, 1999: ch 10). Circumstances may change at each stage during the IT project and therefore organizational factors as well. Thus, success measurement and comparison should be performed at different IT project stages while taking into consideration organizational circumstances.

3.3 Variables Enabling IT Implementation and Integration Success

Though numerous studies have been performed on IT success and IT impacts, very few studies consider crucial variables enabling IT implementation, integration, and measured results. As discussed earlier, every organization cannot gain the same benefits out of IT. Much depends on the market position, competition, industry, objectives, management capabilities, and organizational resources to name a few on IT benefits produced. Kohli and Devaraj (2003) have investigated how different structural variables affect the outcome of IT impact results. The following illustrates the important enabling factors in measuring IT benefits. Firstly, industry is an important variable in how beneficial IT is for an organization. It is shown that non-profit sectors gain more IT benefits compared to financial and manufacturing sectors. Secondly, studies utilizing firm-level data obtain more positive results than secondary sources. Thirdly, it is noted that profitability measures are not the best measure for IT payoff. It is suggested that productivity-based measures are better suited for IT payoff measurement as it is closely related to processes and less likely to be affected by external variables (Kohli and Devaraj, 2003).

Careful attention must be paid towards the results by Kohli and Devaraj (2003) as their study aims to distinguish variables, which are positively correlated to beneficial IT impacts. However, the case might be that these variables are not the ones shedding true light towards the IT payoff measurement problem. On the other hand, industry, primary data, and process measures are all variables, which common sense advises to utilize when conducting a study of this type. In light of common sense and previous literature it may be concluded that these variables indeed have a crucial effect on the IT payoff measurement.

Kearns and Lederer (2004) examined at the industrial level how environmental uncertainty and information intensity affect IT focus and IT utilization. The results by Kearns and Lederer (2004) indicate that industries with high information intensity and environmental uncertainty show significant positive association with IT focus and IT utilization for gaining competitive advantage. In other words, industries with high competition and pressure for rapid strategic

decisions illustrate positive association for employing IT to extent of resources available and developing systems to organizational requirements. Moreover, Kearns and Lederer (2004) suggest that major investments in IT for organizations in moderately competitive and information intense industries might be inappropriate, as generally performance in these cases has decreased.

From the results by Kearns and Lederer (2004) one may consider that IT employment and its development extent are greatly affected by industrial conditions. Organizations in highly competitive and information intense industries are greatly motivated to implement and integrate a widespread efficient system into their organization and strategy. The motivation rises from the organizations requirements to acquire information rapidly and follow standardized efficient business processes. In other words, the organizations are dependent on their IT system and therefore are motivated to integrate and implement an efficiently functioning and information providing system. As the system is functioning accordingly with the organizational strategy, organizations in competitive and information intense industries utilize the system for gaining competitive advantage.

In addition to industrial factors, organizational factors have a great enabling force on IT implementation and integration success. Legare (2002) emphasizes creativity as an important factor in various levels inside the organization. According to Legare (2002) successful IT implementation and integration requires organizational change or process reengineering, which is enforced by creativity. Creativity should be recognized in various forms and levels employing more efficient process visions as.

Legare (2002) concludes that successful information system enabled process reengineering is only possible when creativity is current. Furthermore, risk-taking performance reward structures, interorganizational communication exchanges, and alignment of organizational structures with horizontal processes are key factors in enabling IT success driving organizational culture (Legare, 2002).

Legare (2002) emphasizes creativity as an important factor in IT implementation and business reengineering. More precisely Legare (2002) is referring to change management, which includes creativity as a motivating factor for personnel to become involved in the IT implementation project. As an IT project concerns the whole organization, motivating the organization is vital for the project success. Motivation creates commitment to the project and its goals. Management has great responsibility in communicating goals, motivating and involving personnel, and committing them in the project. The IT project lays on a strong basis only as strong and successful change management is achieved.

Somers and Nelson (2001) have studied critical success factors (CSF's) within an organization during the IT implementation phase. The results could be applied to any project. Some important factors include top management support, clear goals and objectives, project management, and communication. Though these results are significant, their importance is often neglected and left uncontrolled in both academic studies and in practice. The conclusive study by Somers and Nelson (2001) viewing over 100 companies, distinguish critical success factors or success enabling factors during an IT implementation phase as an issue clearly influencing an IT business project outcome and profitability. From a managerial perspective the authors emphasize the planning stage in an implementation project. Acknowledging organization requirements and setting objectives and choosing the best suitable software are critical issues. Building a solid foundation with careful planning enables strong commitment and involvement inside an organization. Furthermore, project team competence and employee training and communication are matters of high priority. Somers and Nelson (2001) conclude that in order for the above mentioned factors to be taken into consideration and enabled, top management must be involved and committed to the project. Though the authors focus on the implementation phase and the current study on the post-implementation phase, these factors are of great importance as the implementation has a direct linkage to the gained outcomes in an IT business project.

Akkermans and van Helden (2002) have continued the study by Somers and Nelson (2001) on critical success factors. The authors present a case study to recognize the critical success

factors enabling ERP project performance. The focus is on the top ten critical success factors presented by Somers and Nelson (2001). The conclusions are the following. Firstly, the top ten critical success factors have a strong effect on the success or failure of an ERP implementation project. Secondly, the critical success factors are fundamentally related to each other. They reinforce each other in a positive or negative manner. Thirdly, communication and collaboration throughout the organization is essential for a successful implementation. The following factors have a strong influence on collaboration and communication.

- Top management
- Project team
- Project management
- Project champion
- Package vendor

(Source: Akkermans and van Helden, 2002)

In case the above mentioned factors are not performing in manner yielding to success, reinforcing changes in presence or attitudes is necessary in order to create an environment yielding to a successful outcome (Akkermans and van Helden, 2002).

A crucial matter, which should be considered thoroughly as a variable in IT impact studies, is IT integration into strategy and the IT objectives determined by management. As King and Xia conclude, IT value is created through its integration into strategy and its enabling features in processes. According to their study, specific attention must be paid towards the improved process efficiency enabled by IT and their impacts on firm performance (King and Xia). This view is in accordance with Mooney et al. (1996) and Dehning and Richardson (2002).

The above implications may be driven down to management capability. Firstly, management must understand the organizational needs and requirements from both inside and outside the organization. Secondly, management must have the knowledge of the available technology and its possible empowerment. Thirdly and most important, management must have the capability to integrate organizational needs and requirements with the available technology. In other

words management must have the competence to integrate new technology with organizational strategy creating IT value for the organization. It consists not only of supporting IT integration but involving management in the process.

Management involvement and support has been identified by several studies as a key issue in successful IT implementation, integration and development (Kearns and Lederer, 2004; Legare, 2002; Somers and Nelson, 2001; Markus and Tanis, 1999: ch 10; King and Xia; Kalling, 2003; Beard and Sumner, 2004). After management has set the objective for the IT implementation and integration, risks must be evaluated and plans set. The goals and plans must be communicated throughout the organization. Communication must occur both from and to management in order to activate personnel involvement. Furthermore management must be up to date on changes in plans and the project proceeding.

3.4 Business Process Reengineering

Business process reengineering and IT system implementation has been stated to be dependant of each other for successful IT project outcome. As organization processes are recognized to be inefficient, timely or costly, the need for a new business process design is often integrated into strategy. At the planning stage managers view IT capabilities as a resolving issue for improved business processes. However, it is also acknowledged that IT in itself does not design or enable improved processes, but managers must design them according to IT capabilities and organization strategy. The following figure illustrates the relationship between IT capabilities and business process reengineering.

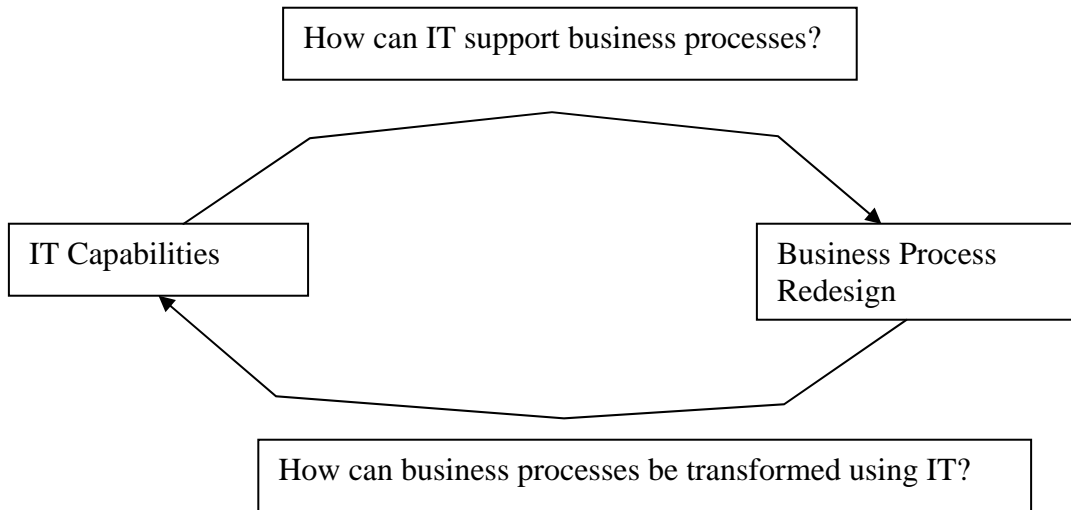


Figure 3 IT Capabilities and Business Process Reengineering
(Source: Davenport and Short, 1990)

Davenport and Short (1990) illustrate that IT should support new strategically reengineered business process when taking into consideration IT capabilities as well. Furthermore, managers should view organizations as a set of cross-organizational processes rather than individual functions (Davenport and Short, 1990). The process view enables the organization to perform as a single unit instead of individual function maximizing organizational performance. The key issue is to keep in mind strategical objectives in designing new processes according to IT capabilities and possibilities.

IT implementation and business process reengineering (BPR) are quite closely tied together in order to achieve success in IT integration. BPR initiates from outside demand such as competition and customers (Ahadi, 2004). Ahadi (2004) recognizes the importance of management role as a key issue in BPR just as it is in IT implementation. One might state that IT implementation is the equivalent to BPR as usually the need for IT is outside driven from changing circumstances. Moreover, both IT integration and BPR are major changes, which must be involved in strategy planning. Often the implementation and integration of a new major IT system involves changes inside the organization and in the way processes are performed. Though IT enables automation, the most important effects are related to changes in

process flow, reduction in cycle times, and process centralization. Therefore, as Dedrick et al. (2003) recognize, IT is not simply a tool for automation but it allows BPR. In other words, though the driving force from outside the company pushes towards IT implementation, the outcome might actually be process reengineering and more efficient functionality within the organization.

Ahadi (2004) illustrates key factors in BPR success. The major component in BPR success is top management commitment, just as in IT implementation. Top management should set the objectives for BPR and participate in the project throughout its timeframe. Furthermore, management should communicate the objectives and inform employees on the project progress. Another major component crucial for BPR success is customer participation. Ahadi (2004) states that customers should be involved in analyzing and designing BPR. Therefore, the outside driving force is important as mentioned above.

3.5 Literature Analysis

The current, rather controversial IT impact studies suggest numerous relationships on organizations and reasons for them. As IT has become a crucial factor in business and organizations, it must be carefully analyzed what benefits individual organizations may gain from IT and the way benefits may be acquired. The role of management is crucial when considering IT and organizational strategy. A strategy analysis is required before IT implementation in order to reengineer processes to the optimum. It is to be performed in a manner that IT may support processes at the most. A strategy design considering IT as a support and efficiency enabler provides organizations the optimum performance, value and competitive advantage over its competitors.

After careful revision of several studies a few conclusions may be stated. Firstly, the subject matter is highly complex. It is clear that IT does have a significant positive impact on

organizations. The productivity paradox discussed by Brynjolfsson (1993) has been overcome (Chand et al., 2005). IT and technology have developed a great deal since the early 1990's providing a great deal more value for users. However, the main problem in the field resides on proving the positive impacts IT provides. As noted by several studies, many IT benefits are intangible in nature and therefore seemingly difficult to measure and prove. However, intangible benefits may be noted best by considering an organization without IT infrastructure. Clearly IT has become a necessity and a comfort many would not be willing to sacrifice. The difficulty is to measure the value IT provides for each individual and thus the organization.

The numerous studies produced so far have aimed to take several different approaches in finding a methodology that would illustrate benefits IT provides for organizations. Most studies conclude that IT provides benefits, but the scope is mostly rather limited with just a few measurement units providing a very narrow picture of organizational impacts as a whole. The most common measurement units used in current studies are various rates of return measurement units, which provide a distorted picture about IT effects on them.

The results of different authors are in a sense quite diverse. Concentrating merely on IT impacts on organizations, no strong benefit indications may be seen. Results of positive correlation may be distinguished with a few financial indicators (i.e. ROA and ROE), even so usually not in several performance indicators in the same study. Even more alarming is the fact that no continuance in the acquired results has been seen. One research may illustrate beneficial IT results towards an organization, yet another study with the same sample or a sample from a different geographical area may demonstrate totally opposite findings. From this perspective it can be stated that IT systems provide benefits for some organizations but not for all. Furthermore, researches have not yet found a common path on what should be measured when the objective is to distinguish IT impacts on organizations. Consequently, it is not a surprise that such a great variance of results and performance indicators are illustrated in current researches.

When focusing on studies examining ERP impacts towards organizations results are varied, yet not in the same scale as when talking about IT impacts. It was illustrated that no noteworthy financial benefit was gained with ERP systems. However, various reasons for these findings are acknowledged. Hunton et al. (2003) recognize from a reviewed study from 1996 that most financial benefits gained from information systems are passed through to lower prices of outputs. Other reasons for unrecognizable financial benefits include various detailed performance and productivity benefits, which do not directly affect the final performance of an organization. This is all related to organizational complexity and to ERP systems. Figure 1 by Dehning and Richardson (2002) illustrates this phenomenon with path 2 on the process measures. ERP systems demonstrate value-adding benefits, which do not affect financial performance. However, the effect is illustrated more in process measures, thus processes become more efficient and add value to an organization. Therefore, the results explained in ERP literature are varied as financial benefits are not distinguished, yet value-adding ones are noted. However, reasons for these findings are explained, as mentioned above. With the understanding of the acquired results it can be concluded that ERP provides process benefits, which are not directly linked to financial performance.

Secondly, in order to continue with the IT financial benefit discussion and join the IT and ERP literature as one, it may be stated that numerous studies have found little evidence of financial gains IT reflect upon. However, evidence is found of beneficial IT impacts on process efficiency. Decreases in costs, cycle times, and labor force to name a few have proven to be factors IT has significant positive correlation on. It has been identified that IT impacts organizations on lower level instead of higher ones. In other words, IT provides an aid to reengineer processes and improve efficiency and quality. Thus, it is more rewarding for future research to focus on the process view when studying IT impacts.

Thirdly, all of the reviewed researches agree upon the fact that gaining benefits from IT systems depends on various factors, as organizations and the systems are highly complex. Figure 1 by Dehning and Richardson (2002) names these as contextual factors. However, many others affect as well. One important factor above all, which has not widely been discussed

before, is the role of management. Each study reviewed, emphasizes the importance top management commitment in information technology projects. Information technology must be managed properly as well. Management must have an understanding of the system capability and its execution. Furthermore, management is required to understand business requirements and set goals accordingly. Consequently, outsourced expertise is insufficient. Both management and the end-users must be involved and committed in the organization's information system.

Fourthly, focusing on the reviewed literature, a crucial factor for success beyond management commitment is process reengineering. Especially in a manner that constructs the possibility to perform processes and utilize the IT systems efficiently. In other words, not necessarily reengineering processes according to the IT system nor coding the IT system according to old processes, but a mix of the both. The IT system and the organization's processes are enabled to their optimal performance level when accomplishing a favorable mix.

Careful attention must be paid to the findings of the papers reviewed. Due to the often mentioned complexity of IT systems and organizations, benefits realized may vary drastically. The focal point must be in the initial situation of an organization and its status compared to for example its main competitors. With a view of this kind, the achievable benefits for the organization can be distinguished. With excellent performance, a company cannot expect to increase performance significantly and vice versa. Moreover, attention must be paid on the initial objectives and strategy an organization has set for its IT system. An organization might not be seeking all the possible benefits an IT system may provide. This fact has affects on research findings and must be acknowledged.

Organizations are to be examined more carefully on an individual basis to recognize factors, which affected the end results of IT impacts. Several questions currently in the air would be answered. Furthermore, the current researches so far have not included the thorough study of the initial objectives organizations have for their IT systems and their effect on the end result of IT impacts. It presents interesting aspects to the field.

4 RESEARCH DEVELOPMENT, METHOD AND DATA

The following section builds the basis for the empirical research. The section acts as a connection for the empirical study to be based on the theory presented in previous sections. The research development, chosen methodology, data analysis, and theoretical and empirical linkage is introduced and discussed in the following section.

4.1 Research Development

Current studies focus on measuring IT impacts with various rates of return or other output measurement units. These measurement units however, provide a very limited understanding about IT conceptual value (Mooney et al., 1996). Many studies concentrating on output figures have concluded the limited significance in their results. Though IT impacts have been studied for several years, it has been problematic to distinguish financial gains IT provides (Beretta, 2002). The reason for lack of proven financial gains is due to the impact nature IT provides. Both Mooney et al. (1996) and Beretta (2002) recognize that IT provides benefits mainly in improvements in business processes. The improvements are distinguished in enhanced quality, cycle times, and efficiency (Beretta, 2002). Mooney et al. (1996) suggest a process oriented framework as the basis for research. Their approach is based on the fact that IT has a direct impact on processes and through them an indirect impact on organization performance. The view of direct and indirect IT impacts is consistent with the model by Dehning and Richardson (2002). The measurable units that may be quantified are not therefore rates of returns or other output measures, but cost reductions, cycle times, labor reduction, and inventory.

The process view may be justified in further matters. As studies have failed to distinguish the IT impact in financial figures or impacts at the higher level, it is necessary to investigate deeper inside the organization and recognize the actual effects IT has on organizations. Therefore, the

focus is on the intermediate level, the processes to be precise, in order to identify the true IT outcome for an organization. In other words, concentrating on cause and effect relationships provides the linkage between IT and firm performance. Mooney et al. (1996) define the steps of the process oriented framework in the following manner.

- Processes are defined
- IT impacts on those processes are distinguished
- Analysis is conducted on the IT value on those processes reflecting the whole organization

(Source: Mooney et al., 1996)

The emphasis is on the drivers that cause an organization to perform in the manner it does. The importance of performance drivers is clearly illustrated in a case study by Wright et al. (1999). The study identifies the key issue in Compaq's success in the late 1990's being the fact of recognition of performance drivers of their leading business results.

The complexity of ERP systems is the reason for the various complex benefits they provide for an organization. As a result the impact of an ERP system to an organization cannot be measured with just one measure or from just one point in time (Markus and Tanis, 1999: ch 10). As pointed out in the current review, ERP provides benefits in various dimensions such as financial and value-adding benefits. Consequently, different measures for different attributes must be utilized. Moreover, it must be recognized that ERP implementation projects are quite timely, taking from one year to several. And beyond the implementation phase, continuous maintenance and enhancements are made for the ERP systems. Therefore, benefits may not occur at every ERP lifecycle stage. As noted by Ross and Vitale (2000), most organizations experience a decrease in performance after the initial ERP implementation. This phenomenon is mainly due to the fact that most organizations face difficulties in recognizing possible problems with the new system and in solving them (Ross and Vitale, 2000). Therefore, measuring organizational performance at various stages in time stated by Markus and Tanis (1999: ch 10) may be appropriate.

4.2 Methodology

The following section illustrates in light of the literature review the framework and methodology utilized in the empirical research. The objective is to utilize an already developed framework as the basis for the research. The framework utilized is chosen based on the literature findings and analysis.

4.2.1 Process Oriented Framework

Based on the literature and the conclusions derived from it, the logical choice for a framework is a process oriented one. The framework utilized as the basis for the empirical research is developed by Mooney et al. (1996). It is based on a process oriented model of IT business value illustrated below.

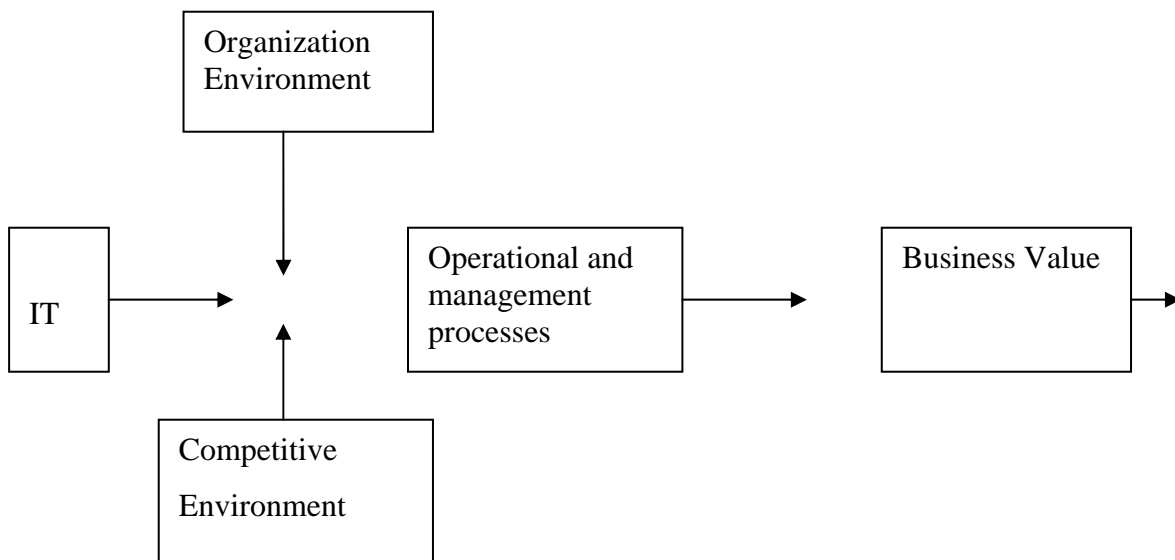


Figure 4 A Process Oriented Model of IT Business Value
(Source: Mooney et al., 1996)

The model by Mooney et al. (1996) illustrates the current study core and focus. It identifies the factors affecting business process conducting and business value is created through processes. The model identifies that it is not only IT, which affects business outcomes, but organizational resources, objectives, management as well as competition and current market circumstances. Moreover, IT in itself does not create value, but its enabling drive towards improvements. These issues are clarified during the empirical research.

The model by Mooney et al. (1996) focuses in discovering IT business value process impacts. In order to so, the following process identifying and defining steps must be performed.

1. Formulate a business process typology
2. Formulate a potential IT impact on business processes typology
3. Formulate a framework for analyzing IT business value created by its impacts

(Source: Mooney et al., 1996)

Formulating a business process typology requires the understanding of process definition. Mooney et al. (1996) define a process according to the following quotation by Davenport (1993):

Specific ordering of work across time and place, with a beginning, an end, and clearly identified inputs and outputs: a structure for action.

Mooney et al. (1996) extend the definition by Davenport (1993) in dividing process as operational and management processes. Operational processes are tasks forming the activities of the value chain (Mooney et al., 1996). Management processes, on the other hand, are activities associated with administration, allocation, and control of resources within an organization (Mooney et al., 1996). An example of the two process types is illustrated below.

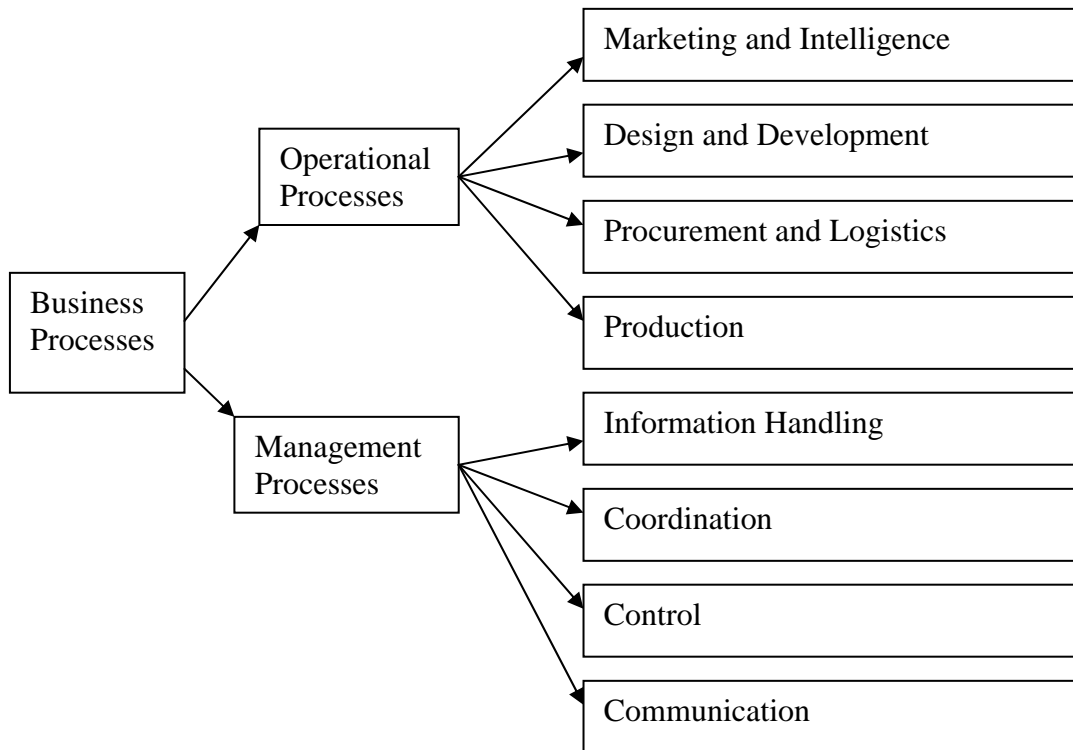


Figure 5 Typology of Processes
(Source: Mooney et al., 1996)

Mooney et al. (1996) consider it important to identify the two process types as IT is unique in affecting both. Both process types have an effect on acquired business value. The key issue is identifying the technology utilized, the organization and their interaction. In this manner, IT role in business performance improvements is recognized. (Mooney et al, 1996.)

4.2.1.1 Business Value Measurement

IT, organizational strategy and business value are closely linked together. As noted before, IT should be integrated into organizational strategy and managed properly in order to achieve business value from it. Therefore, IT success should be measured closely in relation to the strategic goals, which have been set for it. Moreover, the organizational resources and the environment in which the organization is conducting business in should be taken into

consideration. The goals and plans should include intermediate phases affecting individual processes, as business value and set strategy may be acquired through processes. Mismeasurement occurs when concentrating on only financial improvements after IT integration as many factors influence profit. Process improvements against set goals are the main focus. Moreover, measurement at the process level allows result generalization. (Mooney et al., 1996.)

4.2.1.2 IT Effects Increasing Business Value

A recent IT impact framework is by Chand et al. (2005). However, their framework is still in a development phase and is not utilized in the current study. Following the same principles as Chand et al. (2005), the framework by Mooney et al. (1996) is utilized in the current study. According to the authors, IT has three main effects on business processes. These are automational, informational, and transformational effects (Mooney et al., 1996). These effects create IT business value. Automational effects increase business value as processes are automated and less labor force is required. This enforces cost efficiency objectives. Informational effects increase business value in collecting, storing, processing, and forming information. This allows improved decision making, employee empowerment, decreased resource usage, enhanced effectiveness, and quality. Transformational effects increase business value as IT enables process innovations and reengineering. Therefore improvements occur in reduced cycle times, improved responsiveness, downsizing, and service and product enhancements. (Mooney et al., 1996.) An IT business value illustration can be viewed below.

IT Business Value Dimensions and Examples

Business Processes	Automational	Informational	Transformational
Operational	Labor Costs Reliability Efficiency	Responsiveness Quality Utilization	Customer relationships Product and service innovation
Management	Control Administrative expense Standardization	Effectiveness Decision quality Resource usage	Competitive flexibility Competitive capability Organizational form

Table 2 IT Business Value Dimensions and Examples
(Source: Mooney et al., 1996)

Mooney et al. (1996) recognize that the framework may be utilized only as a basis for practical use. Consistent with Markus and Tanis (1999: ch 10), the study argues that no one measure is appropriate for IT business value measurement. It offers a new perspective for the long disputed measurement dilemma (Mooney et al., 1996). However, the framework has its limitations as well. It does not clearly distinguish the direct effects IT has on specific business processes (Mooney et al., 1996). However, as mentioned before, it provides a good understanding about improvements in processes improving overall organizational performance and thus creating business value. Therefore, it accomplishes in specifying the object to measure in business value measurement (Mooney et al., 1996).

4.2.1.3 Process Based Business Value Metrics

Several value metrics have been reviewed in the current study. The following section aims to identify the process based metrics utilized in the empirical research. The study focus is on the initial organizational factors, objectives, and their effect on the IT project outcome. Therefore, the measurement focus is on the post-implementation business results in comparison to set

goals. These measures may be associated with the longer-term business results mentioned by Markus and Tanis (1999: ch 10). Process based measurement metrics include the following.

- Labor force
- Costs
- Process cycle time
- Quality
- Inventory levels

(Source: Markus and Tanis, 1999: ch 10)

4.2.2 Multiple Case Study

The chosen method to utilize the process oriented framework is a multiple case study. Three organizations with similar initial business driven IT projects are chosen and their results are compared and contrasted in light of the business process framework by Mooney et al. (1996). The following section introduces and discusses the multiple case study methodology.

4.2.2.1 Case Study Research

A case study is an empirical research method, which examines a contemporary phenomenon in a real life situation (Yin, 2003: ch 1). The case study research method is widely utilized in many scientific fields. There are several possible methods for executing an empirical research and acquiring primary data. These methods include experiment, survey, archival, history, and case study. The choice of the method depends on three factors listed below.

- Research question
- Control over behavioral events
- Focus on contemporary events

(Source: Yin, 2003: ch 1)

The above listed factors are analyzed according to the current study. Firstly, the research question is a crucial matter in choosing the research method. In the current study the research questions possess the questions why and how. According to Yin (2003: ch 1) these questions are best suited for case study research. The case study therefore suits the IT business success subject matter, as it has proven to be complex and highly difficult to materialize into general conclusions. The case study research method allows explanatory operational links describing how IT affects organizations and why. Therefore, the method allows in-depth research into the subject matter forming descriptive and explanatory results. In the current subject matter this method is beneficial, as pure statistical studies have failed to provide links for IT effects on acquired business performance. Secondly, control over behavioral events is not necessary in the case study research method (Yin, 2003: ch 1). Though in almost all research methods control over behavioral events is not necessary, especially in the current study it is not favored or possible as it concerns several organizations. Thirdly, the focus is on contemporary events and therefore the case study research method is suitable. In conclusion, the case study research method allows a highly in-depth research with direct, first hand observations on organization performance and other primary information sources.

4.2.2.2 Criticism and Benefits

The case study method has faced a great deal of criticism. The first criticism against case studies is that they are not commonly known to be quite exact (Yin, 2003). Often case studies are altered in teaching circumstances, thus creating inaccuracy and faultiness. The case study research is, however, a different concept, where sloppiness is not acceptable, though it has

occurred (Yin 2003: ch 1). The second criticism concerns an important issue. One cannot create scientific generalizations of only one single case (Yin, 2003: ch 1). Thus, many say that it is not a valid scientific research method. It is true that scientific generalizations of case studies cannot be made, but generalizations to theoretical level may be performed (Yin, 2003: ch 1). This however, is a great defect in the research method. However, case studies may be compared to individual experiments. One experiment cannot lead to theory generalization, as neither a case study. However, generalizations are drawn from several experiments and cases studies. In other words, one case study expands a theory to a more concrete level but not enough to make a scientific generalization. In the current study, a multiple case study approach is utilized, which according to Yin (2003: ch 1) always provides a more robust analysis compared to a single case study. The third common criticism towards the case study method is that they take a great deal of time and produce massive amounts of documents (Yin, 2003: ch 1). However, it may be said that case studies, if well done, are highly descriptive and explanatory providing thorough insight to the subject matter.

The case study method stands out from other methods in the sense that it has two distinct techniques for gathering information, direct observation and systematic interviewing (Yin, 2003: ch 1). The case study method includes various techniques in gathering information that builds the method to be very reliable and current. Since the information is gathered from various sources, the evidence is very difficult to manipulate without being perceived (Yin, 2003: ch 1). Therefore, the case study method is highly accurate.

4.2.2.3 A Valid Multiple Case Study Research

In order to contradict the prevailing criticism over the multiple case study research method the study must be prepared and conducted in a valid manner. A strong theory and a research framework are crucial for the research to be even designed (Yin, 2003: ch 2). The current

research presents the before mentioned issues in previous sections. The research design should consist of the following components.

- Study questions
- Its propositions, if any
- Unit of analysis
- The logic linking the data to the propositions
- The criteria for interpreting the findings

(Source: Yin, 2003: ch 2)

The research design components mentioned above are mostly issued in previous sections. The logic linking data to the propositions and criteria for interpreting the findings are addressed in upcoming sections as the research results are analyzed.

Generalization is a critical issue in drawing conclusions from the acquired results. As discussed earlier, generalizations are not to be made from just a few case studies. However, Yin (2003: ch 2) suggests a process of analytic generalization. In this method, a previously developed theory is compared to the acquired empirical results. If results match with the theory, replication may be claimed (Yin, 2003: ch 2). In the current study, it is hypothesized that IT improves business process performance. If acquired results support the hypothesis, the study has improved the theory to a more concrete level with an in-depth study.

The multiple case study research gathers information from six sources. The primary source is the relationship with the participating organizations. Within them exists numerous important sources to attend to. The main sources are listed below.

- Administrative documentation
- Archival records
- Interviews
- Direct observations
- Participant observations
- Physical artifacts

(Source: Yin, 2003: ch 4)

For the study to present high quality, four factors must be considered during the research. Firstly, all evidence provided must be attended (Yin, 2003: ch 4). As the research is performed in this manner, the researcher may not lead to own subjective views. Therefore the study will be truthful. Secondly, all major rival interpretations must be attended (Yin, 2003: ch 4). As all hypothesis contradicting views are acknowledged, again a truthful picture of the real situation is presented. Thirdly, the most significant aspects of the case must be paid special attention in order to acquire the objective view on it (Yin, 2003: ch 4). Fourthly, the researcher must utilize previous knowledge on the subject matter in order to understand the core and significant points in the case (Yin, 2003: ch 4). These quality issues are addressed in the empirical research.

4.3 Data Analysis

Data analysis is a crucial multiple case study research aspect (Yin, 2003: ch 5). The most utilized and proper method is to rely on theoretical propositions (Yin, 2003: ch 5). In this method data is analyzed against the research theory. In the current study the theory is built in previous sections. The empirical research results are analyzed by comparing and contrasting the built theory. In this manner, the current study how and why questions are answered efficiently.

4.4 Theoretical and Empirical Linkage

In order to build a valid empirical study, the required information must be specified (Yin, 2003: ch 1). The linkage between the theory and empirical data entails clarity. The theory focus concentrates on the process view. The conclusion is that IT provides benefits in the process level and improves organizational performance as a whole through process improvements. However, in order to specify IT benefits, initial factors require evaluation. Factors such as organization circumstances, reasons for the IT project, objectives, objective measurement, project follow-up, and organizational factors need to be distinguished as they play a crucial role in an IT project as noted in Figure 4 (Mooney et al., 1996). Furthermore, only as these factors have been clarified may true IT benefits and business success be determined by reflecting the initial factors to the achieved outcome. Without organizational factor and objective knowledge comparisons may not be made. Furthermore, without comparisons the true improvements and thus IT benefits and business success may not be determined. Therefore, the knowledge of these factors is vital and acknowledging their role in the project outcome provides a truthful view on the outcome success.

In the current study as well as in the study by Mooney et al. (1996), the perspective is to distinguish IT business success according to the set initial objectives. Objectives determine the IT business outcome and success, as well as the measurement metrics to be utilized. Without analyzing objectives outcome success levels or measurement units may not be established, as objective and outcome comparisons are then possible. Moreover, objectives determine issues to be measured. Utilizing random measurement units provides indefinite results on actual outcomes. Utilizing measurement units according to set objectives on the other hand, provides definite results on actual outcomes and provides a tool for determining IT business success. Therefore, initial objectives are paid special attention to.

For the above mentioned data to be acquired for analysis, the questionnaire for the interviews must be designed accordingly. The perspective for the questionnaire is to obtain a clear picture of the initial circumstances and objectives inside the organization and their effect on the final

outcome for the project. Moreover, the organization's perception on the achieved outcome and methods for acquiring this perception is to be distinguished. Furthermore, process impacts are to be clarified. The main points in the questionnaire are the following.

- Circumstances for the organization before and after the project
- Main objective(s) for the IT project
- Objective achievement and measurement
- Major enabling factors in the project

The original questionnaire may be found in the Appendixes section as Appendix A.

The above mentioned questionnaire issues are the main aspects in the current study. Firstly, the initial circumstances in the organization are distinguished in order to gain further understanding on reasons for the set objectives and for initiating a new integrated IT platform. Secondly, the set objectives are determined in various aspects such as long-term, short-term as well as organizational and process level. Thirdly, the perceived outcome is distinguished. In order to perform so, measurement metrics utilized are issued and other methods in distinguishing the IT business outcome. In other words, the organizations are to provide evidence in how the achieved outcome is determined and what is the actual outcome. Fourthly, enabling and impacting organizational factors are determined. The major enabling factors for both the IT business project as well as IT business success are issued. The information provided aids in acknowledging critical success factors in IT project and thus directly impacting IT business success.

5 EMPIRICAL RESULTS

The following section presents the empirical results acquired. Firstly, the interviewed companies are introduced. Though, due to confidentiality demands the companies are left anonymous. Moreover, financial figures and other distinctive information are altered in order to camouflage the true company identities. However, all changes are made in a manner, which does not alter the final result values. Secondly, the data gathering is described. Thirdly, the empirical results are presented and analyzed.

5.1 Company Descriptions

The current study is performed in cooperation with an international consulting company. The author and a representative of the cooperating consulting company have chosen three companies for the current study from the consulting company's clientele. The main criteria for choosing a company are the following.

- The company has performed a large scale IT implementation.
- The IT implementations are business driven.
- The main objective for the IT implementation is to improve business performance.
- The IT implementations are mostly finished and the system is currently running.

As all the companies fulfill the criteria, a logical study may be built and the criteria are justified. Comparisons may be made and thorough analysis is allowed, as all the companies have similar initial circumstances before IT implementation. In this manner, the current study increases value to previous research.

Due to confidentiality reasons the three companies are referred to as companies W, X, and Y.

5.1.1 Company W

Company W functions in the paper industry worldwide. Printing solutions, office and magazine paper, and consumer packaging are the company's main products. It holds 15 500 employees worldwide. The company is an accomplishment of several acquisitions and various organizations merged together.

5.1.2 Company X

Company X functions in the domestic banking sector. Its main function is to guide and direct its consolidated subsidiary banks in financial matters as well as management issues. The consolidation holds around 9 200 employees. The consolidation is formed by company X and its subsidiaries.

5.1.3 Company Y

Company Y functions in the power and service sector. It is a global organization providing services for clients throughout their product lifecycle. The group employs about 12 500 employees in 60 countries. The group consists of two complementing businesses and their common services.

5.2 Data Gathering

The data gathering process follows the principles by Yin (2003: ch 4) mentioned previously. The primary sources of information in the current study are interviews and archival documentation. Each company provided archival documentation on their IT project details including reasons for implementation, objectives, the business case, as well as documentation on the objective follow-up. This information was provided before meeting company personnel in order for the interview to be more thorough. Two personnel members from each company involved in the IT project were interviewed. Together with the archival documentations, the interviews provided a broad scope about each IT project and its specifics.

The interviews took place during fall 2005. As mentioned before, two personnel members from each organization were interviewed. In all the cases, the first interviewed is the project manager and the second holds an important role in the project. Therefore, two different perspectives are gained. The interviews took from one to one and a half hours. The questions were open ended questions, thus the interviewed could freely answer them as they will. The interviews followed a questionnaire found in Appendix A. The interviews were recorded on tape in order to document answers thoroughly and in an objective manner.

5.3 Case Results

The following section presents the case findings acquired from both the interviews and the documentation concerning the IT project. Results are presented according to received information. Furthermore, the results are analyzed in contrast to discussed theory in previous sections. As mentioned earlier, the focus is on the initial factors, objectives, and IT process and business performance impacts according to Figure 4 (Mooney et al., 1996). The study perspective is that it is not only IT, which affects business outcomes, but organizational resources, objectives, management, as well as competition and market circumstances.

The following section is presented in the subsequent manner. Firstly, the cases are introduced and illustrated in detail. Secondly, the recognized IT process impacts for each case are discussed. The model by Mooney et al. (1996) (see Table 2) is utilized to sector various process impact types according to the set objectives and acquired information. Thirdly, it is important to distinguish factors influencing the IT projects, as the IT project influences business processes and therefore business performance. Furthermore, organizational factors discussed previously in section 3.4 are identified based on the critical success factors by Somers and Nelson (2001). Finally, the measurement instruments utilized by the case organizations are introduced and analyzed. The focus is not on project metrics such as budget and time, but on business performance indicators in comparison to set objectives. The main focus in the following section is to answer the general research questions discussed in section 1 formed as follows.

1. How IT impacts business processes and why?
2. What are the enabling factors for IT impacts affecting business performance?
3. What measurement metrics are utilized to discover objective achievement?

The above mentioned issues provide the information and facts to conclusively answer the questions.

5.3.1 Case W

The IT project for company W took place from 1999 and is still performed to a certain extent as all the rollouts are not yet completed. The chosen IT platform is an ERP solution by SAP.

The initial steps for the ERP project began in 1999 as the organization had various IT systems and process models designed towards the special needs of each unit (Project Board Member A,

Company W. Interview 4.10.2005). The main objective for the organization was to harmonize operative process models throughout the business especially in the sales and logistics sector (Project Board Member A, Company W. Interview 4.10.2005). The objective was to improve their whole operation and support systems, which included customer service, supply chain management, data availability, organizational flexibility, and IT architecture (Project Documentation, Company W). This meant various changes inside the organization. Data was to be unified and standardized for each person with access rights to be viewed and utilized. The feature allows increased decision making support as well as increased customer service as information may be provided to the customer and the organization in a more rapid pace. The numerous previous systems caused delays in acquiring and sharing information and therefore slowed customer service and eliminated for example last minute changes in deliveries (Project Board Member A, Company W. Interview 4.10.2005). Furthermore, information about logistical possibilities for deliveries was unknown. The new target was to make logistical capacity information available and thus specify delivery schedules. Moreover, delivery follow-up was to be improved. All deliveries were to be tracked and followed in order to provide accurate delivery information for the customer and standardize delivery schedules. In the previous systems the feature was nonexistent. In order to improve customer service even more, a single customer interface was to be utilized for identity clarity (Project Manager A, Company W. Interview 6.10.2005).

Demand planning and scheduling was a huge development the organization set as an objective for the project (Project Board Member A, Company W. Interview 4.10.2005). With the new ERP platform these before unavailable features were possible. They provide large improvement in decision making support in various aspects within the organization (Project Manager A, Company W. Interview 6.10.2005). As a whole, the organization aimed to grab further control and manage its daily processes. The only possibility to perform in that matter was to integrate all systems, allow up-to-date information availability, and perform processes in a standardized yet flexible manner.

The organization faced many changes during the years the project took place as it rapidly expanded through acquisitions even into new business areas. The new expanded organization now had even more varying IT systems and process models (Project Board Member A, Company W. Interview 4.10.2005). The expansion hugely affected the project as its objective is to support business and now business has modified. However, reevaluating project objectives and processes did not occur in a highly detailed manner. It was recognized that a more concrete reevaluation would have been necessary (Project Manager A, Company W. Interview 6.10.2005). The new business area in itself along with the growing organization required careful planning in order to design optimal process models and business support systems organization wide. Many problems arise from the new situation. Firstly, reevaluation was insufficient and secondly new units were not committed to the project. The new expanded organization was not prepared for a drastic change. As the organization aimed for a diverse business model, the new system supported a centralized business model. The controversy was obvious. Modifications have, however, occurred. A new business support system was developed for the business acquired during the acquisition. The traditional business rollouts have been performed for every unit and implementations have been accomplished.

The new integrated business model has improved business performance inside the organization and its business processes. The main reason for improvements is due to information transparency throughout the organization, which has been accomplished successfully (Project Manager A, Company W. Interview 6.10.2005). Other objectives and goals have not been measured or followed upon. Business has improved, but in what aspects and how much is unknown. However, as each unit functions according to the same process models, percentage improvements in the business case may be measured to distinguish the amount standardized business models are utilized. It may therefore be assumed that in the process standardized units business has improved. However, the distinction is quite abstract. Measurement defects are recognized to be a cause of various changes in responsibilities as well as in the organization (Project Manager A, Company W. Interview 6.10.2005). Furthermore, objective measurement has not been company policy previously either, especially in strategic projects such as the case

here (Project Board Member A, Company W. Interview 4.10.2005). The objective follow-up and measurement is the responsibility of each business area.

The fact that objectives have not been followed or success levels measured has led to a hazy improvement plan for the project (Project Manager A, Company W. Interview 6.10.2005). The main modification in the project planning and objective setting is clarifying both (Project Board Member A, Company W. Interview 4.10.2005). The meaning of each objective and requirements for its accomplishment are explained in a more thorough manner. Moreover, responsibility areas are assigned and described more concretely. In fact, the whole organization structure has been altered to become more suitable for the new business objectives and process models.

The previous paragraph distinguishes the main issues in the case. The business plan was carefully set initially. However, as organizational changes occurred, very little reevaluation took place. Furthermore, communication was limited and change management restricted. These issues lead to non-commitment and lack of support among various stakeholders involved in the project. It is recognized that business or business process reengineering to be more specific is the key driver in the project. If this driver would have been followed throughout the project, complications could have mostly been avoided (Project Board Member A, Company W. Interview 4.10.2005).

Though the project has been difficult, the organization has managed to raise its customer service level (Project Manager A, Company W. Interview 6.10.2005). In what degree, is not quite clear. Certain assumptions may be made, but factual figures are unfeasible to present. However, many modifications made during the misguidance in the project, distinguish the main issues in a business oriented IT project. The main changes made during the particular case include the following. Firstly, the objectives were modified to being business originated. The project was performed in order to improve business, thus the objectives must be set according to the targeted business performance. Secondly, stronger emphasis was placed on commitment and communication. The commitment lack caused by insufficient change

management directed the project into an undesirable path. The focus of various stakeholders was on their own agendas and objectives instead of the organization as a whole. Not until organization changes were made and responsibility areas modified, a firm basis for the project was created. In addition, strong communication and motivation for change initiated the stakeholders in committing to the business oriented project. Thirdly, as business changes, the business oriented project must change along. Not until the project was modified accordingly targeted at two different business areas and process models, began the project flourishing as a business performance improvement for the whole organization. As noted, the project was a business process reengineering project performed with an ERP system. ERP requires the whole enterprise involvement and vision. ERP provides a support tool for business processes and decision making, which yield to increased business performance for the organization. Thus, the project vision and commitment must be enterprise wide.

5.3.1.1 IT Impacts on Business Processes

The main objectives for company W in their IT business project included improving customer service, supply chain management, data availability, and organizational flexibility. The IT impacts on business processes for case company W are presented below in respect to the main objectives. The business value dimensions are set according to retrieved information from the case company following the principles of Mooney et al. (1996).

IT Business Value Dimensions for Case W

Business Processes	Automational	Informational	Transformational
Operational	1. Reliable performance 2. Efficient processes	1. Increased customer responsiveness with transparent information	1. Organization alignment according to business
Management	1. Increased control over processes	1. High decision support	1. Integrated business operations 2. Organizational flexibility 3. Increased management control

Table 3 IT Business Value Dimensions for Case W

(Source: Mooney et al., 1996, modified by author according to empirical evidence)

The IT impacts on business processes for organization W are high. The IT project for company W was a business process reengineering project. Business processes and organization structure globally were aligned and managed more efficiently. The company aimed to perform reliably and increase customer service level. The main impacts have occurred in just these aspects. Business processes have been standardized to be efficient. Furthermore, the integrated IT platform provides information transparency allowing higher customer responsiveness and decision support. The standardized processes and information transparency permit the organization to improve its business processes.

5.3.1.2 Factors Enabling IT Success

The IT business project for company W was difficult. The greatest difficulties arose from the changing organization. Initially the project was well planned, however, it was noted that objectives may have been ambitious compared to the competence level of the young project team. Furthermore, the necessity for change management was not recognized before problems arose. However, great difficulties occurred as the project was not reevaluated thoroughly during the large acquisition phase the organization faced. Only as the above mentioned issues were carefully acknowledged and considered, the project began flourishing. Therefore, the major enabling factors for case company W included changed management, and objective

evaluation and setting. These factors played a crucial role for the project to be at the rollout phase it is today.

5.3.1.3 Utilized Measurement Metrics

Company W has finished its IT business project, though certain rollouts are still being performed. The company recognizes that measurement has been performed in a highly limited scale. The measurement metrics utilized are listed below.

- Process cycle times
- Percentage of designed business models utilized
- Number of personnel

The measurement responsibility lay on the responsible personnel for each business area. It was noted that the measurement units were not realistic. Furthermore, the measurement process was performed in a very limited extent. Inventory cycle times were monitored, as well as the percentage of designed business models utilized in every business unit. In other words, the new IT platform provided a tool for calculating the business units utilizing the new standardized business process models. From the percentage the realized business case may be estimated. Number of personnel may be measured as the new efficient business processes require less personnel.

5.3.2 Case X

The IT project for company X took place from 1999 to the beginning of 2002. The project scope included financial management systems for the financial administration. More

specifically the systems included consolidated bookkeeping and closing of accounts, cost accounting, personal ledger, and fixed assets.

In 1999 the company began planning a new system for their financial administration due to several reasons both inside and outside of the organization (Project Chairman A, Company X. Interview 26.9.2005). Firstly, the organization had very non-uniform financial management systems and work processes throughout various financial administrations. Secondly, the official bookkeeping requirements and regulations created new demands for a financial management system in matters such as consolidated bookkeeping and the Euro conversion. Thirdly, the old database was quite outdated and managing a new single system is more convenient and cost effective.

Beyond purely technical reasons, the company sought to unify processes, function more efficiently, and be cost effective (Project Documentation, Company X). As a matter of fact, the project was stated to be a new concept for financial management instead of an IT project (Project Manager B, Company X. Interview 29.9.2005). The vision was to create more rapid and higher quality service inside the financial administration. In order to fulfill the company objective the SAP financial module was chosen to be the IT platform for the new centralized financial administration managing financial issues for several organizational units. In other words unnecessary routines and double work was aimed to be eliminated, financial management processes were to be centralized and harmonized in order to be efficient both in cost matters as well as processes, increase financial information quality and thus increase decision making support (Project Manager B, Company X. Interview 29.9.2005). Financial management was desired to be a value adding service for the organization. An integrated system was required to achieve the goal.

The project outcome was successful. The IT implementation and replacement of old IT systems was conducted according to schedule and functional deficiencies did not occur (Project Chairman A, Company X. Interview 26.9.2005). The Euro conversion was managed

trouble free as well as other official bookkeeping requirements and regulations. For example yearly closings were now performed several days earlier than before.

In terms of performance improvements, increases were notable. A centralized financial administration was created managing increasing amounts of units' financial issues run by professional SAP users. The decrease in work years is 30-35% (Project Chairman A, Company X. Interview 26.9.2005). Furthermore, financial administration labor force costs have decreased. A data archive for financial information is now available at all times on-line and up-to-date for everyone with access rights. Traditional reporting has been bypassed with more rapid and relevant information providing queries (Project Manager B, Company X. Interview 29.9.2005). Thus, decision making support has now increased. Moreover information being available, information quality has increased. With harmonized processes and system requirements, information is entered to the system in a standardized matter and only once leaving fewer possibilities for error. Cost efficiency may be achieved in other aspects as well with the new centralized personal ledger system. Purchases can now be focused to a certain supplier instead of several in order to acquire discounts. On a whole the financial administration was raised to a new level within the organization.

Certain aspects which were not included in the original scope and objectives were achieved during the project as well. The payroll system could now be included in the centralized financial administration. Furthermore, the new system supported the IFRS standards, which was an unexpected benefit. Thus, extra costs and work was saved.

Objective measurement occurred during and after the project but not in a highly detailed manner (Project Chairman A, Company X. Interview 26.9.2005). The objective follow-up was the responsibility of the project board chairman. It was recognized that measurement could have been performed in a more concrete and specific manner (Project Manager B, Company X. Interview 29.9.2005). Functional matters are relevantly simple to measure and distinguish. The new system replaced the old one. Furthermore, it is more accurate and reliable in that it is error free, providing rapid closings, and it did not fail at any point. The official requirements were

met in schedule such as consolidated closings and Euro conversions. All of these factors are technical in a sense, however they are highly necessary providing great assistance for the organization.

Measuring other objectives varied. During the project, objectives were followed in half year loops. After the project, objective follow-ups were seldom and not detailed. The largest cost savings occurred in labor costs. The savings were estimated to be 30-35% (Project Chairman A, Company X. Interview 26.9.2005). The measurement occurred by comparing time spent on financial administrative tasks before and after the project. However, it was not followed how the relieved time from financial administration was utilized. In other words, it is not known where to the financial administrative cost savings were allocated or how they were realized (Project Manager B, Company X. Interview 29.9.2005). Cost effectiveness occurred in other matters as well and is measured by the cost accounting system. Savings are realized in single system maintenance instead of several, electrical archiving instead of 10 million pages of paper annually, and electrical invoicing instead of traditional invoicing. Furthermore, user satisfaction measurements were used in order to determine how well the system performs in the end users perspective. In a scale of 1-5, the end users evaluated a 3.97 satisfaction level. As noted, most of the measuring techniques are quite rugged and provide merely an abstract view of achieved goals. However, certain aspects may be distinguished of becoming very beneficial though difficult to prove.

Important factors enabling the project outcome are recognized to be management as well as stakeholder commitment, communication and user education, a clear common objective, high motivation, and efficient resources (Project Manager B, Company X. Interview 29.9.2005). Moreover, the project team had a great deal of time for preparing and planning the project. This allowed the team to carefully and realistically scope achievable objectives and available resources.

It was recognized that change management is a crucial factor in a project of this type (Project Chairman A, Company X. Interview 26.9.2005). Personnel must be involved in and notified

about the project at all times. Motivating them is the only way to successfully involve personnel. In the current case, motivation occurred by informing of more efficient and higher quality work being the outcome of the project. Reward systems were utilized as well.

More concrete project follow-ups were recognized to be a factor for improvement both during and after the project. One reason for the follow-up lack is due to the changes in responsibilities for the duty. Moreover, data storage and harmonization is a factor for improvement as well. Data impacts and is utilized by many stakeholders and thus must be in perfect harmony among itself and available in every single unit.

The project overall may be seen as well accomplished. Careful planning, objective setting, resource analysis, and scope positioning provided a strong basis for the project outcome to be quite successful in the sense that most objectives and benefits seemed to be achieved. It is difficult to distinguish how successful the project truly became, as concrete objective measurement and project follow-ups were not performed.

5.3.2.1 IT Impacts on Business Processes

The main objectives for company X in their IT business project included performing efficiently both in processes and costs, providing increased financial administration service, and increased information transparency. The IT impacts on business processes for case company X are presented below in respect to the main objectives. The business value dimensions are set according to retrieved information from the case company following the principles of Mooney et al. (1996).

IT Business Value Dimensions for Case X

Business Processes	Automational	Informational	Transformational
Operational	1. Efficiency increase in financial management processes 2. Labor cost decrease by 30-35% 3. IT expense decrease with less maintenance	1. Higher quality financial information 2. More rapid information and fast book closing 3. Higher responsiveness due to integration	1. Financial services centralized
Management	1. Control increase over financial management and performed processes 2. Standardized processes	1. Higher decision support due to efficient queries	1. A centralized process and cost efficient financial administration

Table 4 IT Business Value Dimensions for Case X

(Source: Mooney et al., 1996, modified by author according to empirical evidence)

IT has widely impacted organization X. The main issue is business process integration and centralization. The organization centralized and renewed its financial administration processes. In other words, it allocated its resources into efficient utilization. The new IT platform was the means to do so. The main impacts include decreases in financial administration labor force and efficiency in work processes. Less labor is required to perform tasks, as processes are centralized and information is online. Furthermore, information transparency impacts the organization in various aspects. Information retrieval has improved greatly with query possibilities allowing increased decision support in various organizational issues. Integration and centralization has allowed the organizations financial administration to perform more efficiently and provide increased service for the whole organization.

5.3.2.2 Factors Enabling IT Business Success

The IT business project for company X was carefully planned. Objectives were set according to the requirements of the organization. Though the project was required to be performed due to official financial regulations, the company succeeded in including beneficial aspects in it in terms of organization performance improvements. Through efficient change management the project team enabled the whole personnel to be involved and educated in the process. Furthermore, management supported the project creating motivation inside the organization. The most important factor to be emphasized is the goal setting. Due to sufficient planning time, the objectives were able to be scoped realistically. Therefore, the most important factors enabling the project include clear goal setting and change management.

5.3.2.3 Utilized Measurement Metrics

Company X has finished its IT business project in 2002 providing them sufficient time for measuring realized business performance benefits. The measurement metrics utilized concentrate on tangible factors. The indicators are presented below.

- Cost savings
- User satisfaction surveillance in a 1-5 scale
- Process cycle time
- Number of personnel
- Number of errors

The user satisfaction surveillance was a measurement indicator only company X mentioned in the current study. The company utilized the results acquired on a 1-5 scale in order to count a percentage for efficiency improvements according to how satisfied personnel was in utilizing the new IT platform. Furthermore, as processes were centralized, the company evaluated

reductions in personnel in the financial administration business area. Error surveillance acted as the organizations' quality measurement metric. The new platform performed fewer errors and malfunctions, increasing the business performance quality in company X, when less time was spent on maintaining the system and more time spent on financial administration. Cost savings and process cycle times could be monitored carefully as initial measurement results existed for comparison.

5.3.3 Case Y

The ERP project for company Y began from the planning stage in 2002 and is still performed to some extent as global rollouts are taking place. The new platform is SAP.

The initial circumstances in the organization consisted of numerous confusing IT platforms and process models (Project Manager C, Company Y. Interview 7.10.2005). Information retrieval was tedious, cumbersome and often unfeasible (SAP Specialist, Company Y. Interview 13.10.2005). Therefore, customer service was compromised to an extent as service information could not be produced at a reasonable time frame or of required standard. Though IT was the initial driver for the project, it was defined to be a business integration and modification project (Project Manager C, Company Y. Interview 7.10.2005). In order for business performance to improve, IT support systems require integration for rapid information retrieval and decision making support.

The company has a mission to improve performance by creating value for the customer throughout the product lifecycle globally (Project Manager C, Company Y. Interview 7.10.2005). In order to perform business in this manner harmonized processes and global data are required. Information must be trustworthy and high quality in order to create one whole organization with unified business processes generating improved business performance. Improved business performance includes factors such integrating IT systems, automating and

reengineering processes into a more efficient manner, and providing higher quality decision making support (Project Documentation, Company Y). More detailed objective setting occurred in various smaller business cases mainly in cost and process efficiency such as labor savings, which lead to the above mentioned goals. For each detailed objective a money savings figure was set. These figures were produced according to estimations and benchmarking figures. As these objectives would be achieved, control over the organization would increase, processes would become more rapid, and flaws may be detected sooner.

The objective follow-up was the responsibility of each in charge for their business areas, however, the ultimate responsibility was with the project leader (Project Manager C, Company Y. Interview 7.10.2005). During the project objectives were followed until the rollouts in order to verify everything as planned before utilization. Some follow-up has occurred after as well. The final business objectives are to be achieved after final global rollouts and further measurements will occur at that point (SAP Specialist, Company Y. Interview 13.10.2005). However, not all objectives have or will be measured. Measurement is focused on cost efficiency and process efficiency according to the measurement tool provided by SAP and the utilization of other process metrics (Project Manager C, Company Y. Interview 7.10.2005). Problem detection has proven to be a good business case measurement method as well. However, most objectives or business cases have not been followed due to insufficient methods.

The planning stage included a great deal of business improvement consideration. However, it was noted that the new IT platform should have been included into the planning phase much earlier in order to distinguish its business capabilities and possibilities (Project Manager C, Company Y. Interview 7.10.2005). Furthermore, throughout the project resource management has proven to be a hard task (SAP Specialist, Company Y. Interview 13.10.2005). Weighing resource allocation and benefits provided from it has been a constant predicament. Moreover, the project has faced considerable change resistance. The issue was overcome by stronger communication and support.

Impacting factors in the project included management and organization commitment, strong change management, and sufficient resources and support. Moreover, the successful business oriented objective setting provided a stable basis for the project. These factors impacted the business performance change project to be as desired. The success level, however, is distinguishable only to a certain level as measurement occurs in just a few business performance areas. The SAP support tool for business measurement may distinguish the level in which business is conducted according to the set business models. By these results, it may be estimated how well the global business case has been achieved.

The project is expected to be successful and objectives are to be mostly achieved as all the rollouts are performed (Project Manager C, Company Y. Interview 7.10.2005). Variances may occur in smaller business area success levels, but overall achievement is to be successful. Variances in business areas occurred due to a couple reasons. Firstly, the business areas were noted to be too small and unattractive for strong commitment (Project Manager C, Company Y. Interview 7.10.2005). In the future, business areas should be divided into larger parts, which would create more responsibility and therefore commitment as well. Secondly, it was noted that business changes all the time (SAP Specialist, Company Y. Interview 13.10.2005). Therefore objectives need to be modified constantly accordingly causing variances in achieved objectives.

The project is well planned and managed. Objectives are clearly set and communicated throughout the organization. The organization has a clear vision on its targets and how to accomplish them. It is understood that business is the driver for the project and the ERP system is a support and enforcement tool for new business performance. Details such as time scope, objective analysis, and communication emphasis are noted to be improvement aspects. However, the business performance transformation project has been built on a firm basis.

5.3.3.1 IT Impacts on Business Processes

The main objectives for company Y in their IT business project included harmonizing processes and data, performing processes efficiently, providing tools for increased decision making support, and improving customer service. The IT impacts on business processes for case company Y are presented below in respect to the main objectives. The business value dimensions are set according to retrieved information from the case company following the principles of Mooney et al. (1996).

IT Business Value Dimensions for Case Y

Business Processes	Automational	Informational	Transformational
Operational	1. Cost and performance efficient processes 2. Throughput time decreases 3. Labor cost decreases	1. Higher quality global data 2. Transparent information 3. Fast closings	1. Increased operational flexibility and product lifecycle service
Management	1. Harmonized processes 2. Higher control over processes, problem areas, inventories etc.	1. Increased decision support with efficient queries 2. Improved global resource utilization and empowerment	1. Integrated business organization 2. Capability to control product lifecycle 3. Increase in business capacity

Table 5 IT Business Value Dimensions for Case Y
(Source: Mooney et al., 1996, modified by author according to empirical evidence)

The new IT platform has impacted business processes for organization Y in various aspects. The main issue is business integration. The company has integrated its global business units in order to manage the organization as one. The new IT platform allows harmonized processes, information transparency, and control. Therefore, the company may perform more flexibly, formulate quality decisions more rapidly, and serve the customer efficiently throughout the product lifecycle. The IT system permits process and cost efficiency. Business performance is now centrally managed and controlled in a global scale.

5.3.3.2 Factors Enabling IT Business Success

The IT business project for company Y was well initiated. The planning stage was timely enough for resources and objectives to be defined accordingly. However, it was recognized that the planning stage could have been improved by considering the possibilities and capabilities of the new IT platform at an earlier stage. The new business models and processes were carefully planned and the organization had a strong vision in how performance should be improved. Therefore, the project was greatly driven by business requirements. Communication methods and its partial lack caused great change resistance within the organization. However, these obstacles were overcome by enforced communication and personnel training creating commitment in the project. Moreover, the project leader's capability to run the whole operation and hold the strings together was mentioned being highly professional. Therefore, the most important influencing factors in the project included clear goal setting, management capability, change management, and commitment.

5.3.3.3 Utilized Measurement Metrics

Company Y is currently in the rollout phase in their IT business project. In other words, measurement at this point has not been critical in terms of business performance indicators. However, measurement has been performed to a certain extent. Utilized metrics are listed below.

- Cost savings
- Percentage of designed business models utilized
- Throughput times
- Other process cycle times

The respondents for case company Y noted that the responsibility for measurement was at lower hierarchical levels. Personnel responsible for measurement utilized their own

measurement indicators for each responsibility area separately. Furthermore, it was noted that throughput time and other process cycle time measurement was to some extent inadequate as initial measurement results did not exist for comparison. Thus, it is not clear how performance time has decreased. However, cost savings in different business areas are carefully monitored. The SAP platform provides a tool for following the amount of units performing business according to the designed standardized business models. Company Y utilizes the tool to evaluate the total business case fulfillment to a certain extent.

5.4 Result Analysis

The following section compares and contrasts various issues mentioned in the case descriptions. An overview of similarities and differences assists in viewing initial circumstances, objective setting, problem solving, and other factors impacting as well as their contribution to the project outcome.

5.4.1 Business Performance Projects

The initial driver for the case company projects is IT. All case companies initially contained several IT platforms and systems. These systems were not integrated and caused a great deal of maintenance in both technical matters and information feeding. Furthermore, information retrieval was tedious and cumbersome. The systems did not serve the case companies organization wide. Moreover, the IT systems all required various data feeding methods and therefore various process methods. Business processes and IT systems were all designed according to individual unit or division needs. Thus, great inefficiencies both in processes and costs existed when considering the organization as a whole. Information needed to be fed

several times in various systems causing inaccuracy and errors. Many routines were performed twice as it was not known what has already been executed.

Though the initial driver for all case companies was IT, the projects were stated to be business performance improvement projects. The companies targeted in process and cost efficiency, information transparency, and business integration. Moreover, the aim was to increase business performance. In order to increase business performance, business processes required improvements to be more efficient. More specifically, the organizations aimed for reengineering their business processes to be more efficient. It is acknowledged that the project does not change business performance, but the change originates from the organization and strategy. Achieving the set targets required IT integration and a unified IT platform for business support. Furthermore, standardized processes enforced by an IT platform provide more efficient work methods. Thus, it may be stated that all the projects were strategic in nature.

Strategically the IT business projects were business performance improvements as stated before. Though the projects were strategic business performance wise, competitive advantage was not sought to gain. The objectives included increased and higher quality service for the clients and increased business capability. These objectives are factors, which may increase competitive advantage over competitors. However, the organizations' focus was not directed in competitive matters. Rather the organizations saw themselves as a single unit performing in the market, aiming to increase individual business performance and serve clientele in higher standards. The vision was focused on the individual perspective and not the market-wide viewpoint. The above mentioned point requires distinction as for many organizations an integrated IT platform is utilized in order to gain competitive advantage over the market (Markus and Tanis, 1999: ch 10).

5.4.2 Objective Achievement

The initial circumstances for each project were good. Each case company had management approval and support for the project. The planning and objective setting was clear and realistic. However, in certain aspects objective and planning reevaluation may have required more precise action as business evolved. As the IT business projects duration is commonly several years, the modern fast paced business worlds tends to evolve quite rapidly. In order for the IT business project to succeed and the new IT platform to support to business, the objectives require reevaluation according to business modifications.

Evaluation is required in comparing the organizations' IT business project objectives compared to the achieved outcome. In general, the achieved outcomes are stated to be evaluations. As measurement occurred in not a highly detailed manner and some organizations are still in the rollout phase, exact outcomes are difficult to present. However, the evaluated outcomes provide a perspective to the truth and are treated as according to the IT impact tables presented in section 5.3. The main focus in the following section is to distinguish the achievement level of stated objectives. The following table presents stated objectives and achieved outcomes for more thorough analysis.

Set Objectives Compared to Achieved Outcomes

Objectives	Outcomes
Business integration	The organization is performing as one. Not as several functions.
Automate, harmonize and standardize processes	Routines are eliminated and processes are performed according to set models.
Information transparency and standardization	Information feeding is restricted to set standards and is accessible throughout the organization.
Improve customer service	Service increases as transparent information allows customers to be served immediately.
Organizational flexibility	Transparent information allows organizations to flexibly make last minute decisions.
Integrated IT platform	A single IT platform throughout the organization.
Reporting efficiency	Fast and efficient queries provide more detailed information for decision making than traditional reporting.
Decrease costs	Processes are centralized, standardized, and automated in a manner, which saves costs.
Increase management control	Transparent information allows management to control and manage business performance in a detailed and current manner.
Unanticipated Objectives	Unanticipated Outcomes
Increased process centralization	Business processes not included in the scope may be centralized together with other centralized business processes.
Future financial regulation capability	The new IT platform supports features demanded in future financial regulations.
Increased features for business assistance	The new IT system supports business in increased amount of business areas than anticipated.

Table 6 Set objectives compared to achieved outcomes
(Source: Author)

The above table distinguishes more achieved outcomes compared to set objectives. However, acknowledgement is required in that though several objectives are achieved, they might have not been achieved at the level the organizations aimed for. There are various reasons for these two findings. Firstly, organizations and enterprise wide systems are highly complex. Understanding organizational requirements and system capabilities thoroughly is quite intricate. The project team experience and capability define the accuracy level in realistically scoping objectives in achievable outcomes. Secondly, business evolvement is to be considered. Objective setting requires the consideration of future business aspects. Recognizing future business directions and modifications poses great challenges for a project team. Thirdly,

strategy integration together with the chosen IT platform is complicated. Certain aspects may be disregarded, though later distinguished as providing benefits for an organization. On the other hand, some IT features may not realistically support business as designed. Each organization functions as an individual and therefore all IT features do not serve each individual business area as anticipated. These above mentioned factors create challenges in setting objectives realistically and in achievable scope, and define how the process is performed.

Business evolvement requires objective and planning reevaluation as discussed previously. Furthermore, as it is noticed that objective setting does not match project outcomes entirely, objective reevaluation has not occurred in a detailed manner. Though scoping objectives is noted to be difficult as organizations have noticed enhancement requirements or defects in objective setting compared to future outcomes, very little development has occurred in objective evaluation. More precise measures should be performed in objective evaluation as business and projects evolve. Though it is important to keep the project in the set scope, certain reevaluation is justified in order to gain the best possible outcome for the organization. However, it is noted that development in the above mentioned areas have been acknowledged in most recent projects. Moreover, the most recent cases provide significant advances in both objective scoping as well as project conducting. Many problem areas faced by organizations have been taken into consideration in more recent IT business projects.

5.4.3 Measurement Metrics

Objective follow-up and measurement was conducted in all the companies to an extent, however, mostly not in a precise manner. The measurement metrics utilized may be divided into tangible and intangible in nature. Furthermore, the measurement metrics may be categorized according to technical or operational in nature. The operational measurement metrics utilized are presented below divided according to tangible or intangible in nature.

Utilized Operational Measurement Metrics

Tangible	Intangible
Labor costs	Quality
Other costs	
Number of personnel	
Process cycle times	
Designed business models utilized	
User satisfaction scale	

Table 7 Utilized Operational Measurement Metrics
(Source: Author)

Costs and process cycle times are fairly straightforward to measure. In both metrics reductions are anticipated. Costs are simple to measure as costs are closely monitored in every organization. Reductions are therefore easy to distinguish. Cost measurement focused on labor costs as it is noted to be the largest savings area. Process cycle time measurement is straightforward if measurement has existed before implementation. Only then may reductions be distinguished by comparing the initial situation to the achieved one. Though costs and process cycle times are undemanding to acknowledge, only costs were measured in an acceptable manner in all the case companies as initial figures existed for comparison. Process cycle time measurement is not considered to be acceptably conducted in most case organizations as initial measurement did not occur for comparison. However, the case companies improved in information retrieval cycle times. Information is now acquired by utilizing queries, which are more rapid and efficient compared to traditional reporting. Furthermore, official consolidated book closings have been accomplished in a more rapid pace than before with the new IT platform.

The case organizations pointed out technical measurement metrics in addition to operational ones. The technical measurement metrics utilized are presented below divided according to tangible and intangible in nature.

Technical Measurement Metrics Utilized

Tangible	Intangible
Number of errors	System reliability
Processing times	

Table 8 Technical Measurement Metrics Utilized
(Source: Author)

A matter often mentioned by the interview respondents was error reduction and system reliability from purely the technical aspect. System reliability and error reduction are measured by detecting that technical flaws or breakdowns do not occur. Therefore, as for most organizations flaws and breakdowns often occurred with the old IT platform, the new one is an improvement with less technical problems compared to the initial circumstances. Flaws included technical inefficiencies as well as defects in data quality. Technically the systems were tested that processing times were acceptable and that the system did not crash. Data quality improved as information feeding was standardized and performed only once according to the restrictions set by the IT system. System reliability relates to error measurement. As fewer errors occur, the system performs in a more reliable manner. Furthermore, less time is spent in maintaining the system and more time is utilized in business performing thus providing value for the organization.

For several organizations the aim was to increase customer service. However, customer satisfaction measurement was not performed. User satisfaction evaluations were performed for organization users, however, outside customer satisfaction was not issued. Though increased customer service was an objective, it was not even initiated to monitor its change. Initial customer satisfaction surveillance was not performed in order for post-implementation surveillance to be possible. It may be considered an area of development in future business projects.

Measurement during the IT business project was performed in a fair manner. Schedules, budgets, and functionality were monitored quite precisely over the implementation phase. These measurement metrics concentrate on the project and not business performance. Business

performance metrics were monitored during the project to an extent as well. However, post-implementation measurement occurred in decreasing amounts. The case organizations recognize it as a development area. Further business performance measurement should occur after the implementation phase in order to distinguish development areas and the project outcomes concretely. However, the responsible personnel for measurement are often assigned to new responsibility areas and measurement procedures are therefore not performed. In order to distinguish IT business project outcomes concretely, measurement responsibilities should be assigned for a longer post-implementation period.

Reasons for the rather insubstantial measurement include the following. Firstly, for many the IT business project was seen as a means for continuing business performance at the already achieved level. It had to be conducted in order for the organization to be able to function according to set strategy and business requirements. As the projects are seen maintaining achieved business performance or strategic investments, many do not consider it to be necessary to measure objective achievement levels. Secondly, it is noted that measuring a business case success is demanding. Many consider it unfeasible because of insufficient methods. Thirdly, as many ERP systems provide a business process design surveillance tool, many organizations rely on it. However, the measurement indicator here is how many units are performing business according to the designed business models compared to having individual modifications. From the result a percentage of the realized business case may be calculated. Furthermore, according to the realized business case a percentage may be calculated of the realized initial objectives. However, as the initial objectives are mostly estimations, a concrete benefit calculation is still to be performed.

The current empirical study recognizes only a few concrete measurement metrics utilized. The reality might be somewhat different. As mentioned before, the respondents for the case study interviews were project managers and another person on the higher hierarchical level in the project. These persons along with the project board define the measurement metric according to the set objectives. The chosen measurement metrics are communicated to lower hierarchical levels for each business area responsible. The actual measurement procedure is therefore

performed by business area responsible personnel, which then report results to the interviewed people among others. As the measurement procedure is not conducted by the interviewed, the current study may have acquired higher level data concerning measurement metrics. Further study must be conducted on lower hierarchical levels of an IT project to acquire more concrete objective measurement information. Fourthly, measurement does not occur as personnel responsible for business areas are not committed to the IT business project. It is noted that only by commitment are personnel motivated to aim for set objectives and therefore measure outcomes. As for many case organizations commitment lack posed an issue, measurement may have not been performed in the best possible manner.

It requires notice that measurement procedures, though existed, are quite neglected. It is highly concerning. Detailed measurement has not been performed by any of the case organizations. Clearly, more precise measurement is called for. Measurement enables an organization to improve its business performance and detect its weaknesses. Therefore, business performance could be raised to a higher level. Measurement responsibilities are to be issued more carefully in benefit for the whole organization.

5.4.4 Enabling Factors

The case companies distinguished various factors enabling the IT project outcomes. The most often mentioned issues are change management and clear objectives. Change management includes factors such as commitment, support, and communication. Beyond change management, clear business originated objectives structure a strong basis for the project. Therefore, these factors are raised above others.

5.4.4.1 Change Management

Change management requires certain clarification and is illustrated below.

Change Management

- Communication
- Commitment
 - Management commitment
 - Personnel support -> Personnel motivation ->
 - Personnel commitment

Figure 6 Change Management
(Source: Author)

As mentioned, change management includes factors such as commitment, support, and communication. Furthermore, commitment may be divided into management and personnel commitment. The difference may be distinguished as follows. Management commitment is acknowledged as management clearly is involved in the project by setting objectives, communicating, and supporting the organization. Through management actions personnel is bought into the project and personnel motivation is created. Furthermore, commitment to succeed in the project throughout the organization is formed.

Change management was seen as a strongly enabling factor for the projects for the following reasons. Management involvement and approval in the project was considered to be essential in order for it to even commence as targeted. Moreover, commitment was necessary in order for resources to be available and to motivate the organization, thus enforcing involvement. Responsibility areas and objectives need to be communicated throughout the organization. Personnel responsible for various project categories must consider their responsibility area as highly regarded for the project to be successful in order for motivation and high involvement to occur.

Many case companies have recognized commitment for organizational objectives vital especially in global projects. Cases where foreign unit responsible personnel have performed their own agenda instead of company policy is more common than one might imagine. Change resistance may only be overcome by strong management motivation and support. Therefore, especially in global projects strong change management is seen critical. Communication, personnel support and training may not be emphasized enough. As working culture and methods differ greatly from country unit to another, managing the change period and resistance requires special attention.

The reason for change management being recognized as a highly important influencing factor is because most case companies faced problems in the issue. In many cases commitment was not strong enough and aiming for set objectives failed. Only after personnel and stakeholders were motivated and supported by management to achieve set goals commitment occurred. Therefore, as commitment was achieved by both management and personnel, only then could the project succeed. The case organizations thus recognized change management as a vital enabling factor.

One might consider the lack of change management a management flaw. In the planning stage, management must recognize personnel motivation, communication and through them commitment as a crucial issue in order for the project to succeed and thus business objectives to be met. As in most case organizations failure occurred in commitment, the actual flaw originates from the planning stage and management capability to conduct change management.

5.4.4.2 Clear Goal Setting

Clear goal setting was seen highly important for project success. One might consider goal setting to be the most important factor in a project. However, in the conducted interviews it

was not thought so. A reason for this might be that setting clear goals for a project is seen as default procedure. Therefore it is not considered as the most crucial enabling factor. However, it is considered highly important that goals are set according to business requirements. Business was considered to be the most important driving force in the project and therefore objectives must be set accordingly. The objectives must be business originated and common for the whole organization. Communicating the objectives is equally important. Only then may the whole organization be motivated in the project and committing themselves to it. Communications should occur often and emphasize correct issues. Equally important is to communicate in appropriate paces and current issues. Communicating the current situation and the next milestone to achieve are required in fixed intervals. In other words, placing perspective in the project goals is important in order for everyone to understand and realize them. Communicating only the final outcome and objectives causes the average employee to lose perspective in ones involvement and fail to commit one to the project.

Setting clear goals originate from management capability as does change management. Management defines objectives according to business requirements and communicates the goals in a proper manner and perspective throughout the organization. As discussed previously, only then may commitment occur. Therefore, the author suggests that the most important enabling factors in for the current study cases are change management and clear goal setting. These two factors are the origin for communication, motivation, and finally organization commitment. The reason for most case organizations to distinguish change management as the most highly enabling factor is due to the fact that flaws occurred in this issue. Goals and objectives were however clearly set for each case organization and therefore did not require improvements. As King and Xia and Kearns and Lederer (2004) conclude, IT value is created as it is integrated into strategy. Management plays a key role in accomplishing this. The case respondents view management capability being fairly good in all the projects. However, development areas existed in all the cases yielding originally from management capability. Therefore the issue requires focus.

5.4.4.3 Enabling Factors in Previous Research

The case organizations are all profit making ones, functioning in a moderately competitive market. Kohli and Devaraj (2003) see that profit organizations in moderately competitive markets do not tend to yield highly positive IT impacts. In contrast to Kohli and Devaraj (2003), the case companies view that they have acquired beneficial IT business process impacts. To what extent, is not known without proper measurement. Therefore, Kohli and Devaraj (2003) may be considered correct, as non-profit organizations or companies in highly competitive markets may be yield even more positive IT business impacts than the presented case companies. The current study however, does not provide enough information in order to fully answer the issue.

Kearns and Lederer (2004) consider information intensity to be a driver for high IT focus and utilization. For the case organizations information retrieval and its transparency were high necessities. As discussed in section 3.4, it may be assumed that information intense organizations are highly motivated to implement and integrate a widespread efficient system into their organization and strategy. Therefore it may be concluded that though the case organizations are profit ones and function in a moderately competitive market, their information intensity yields high IT benefits. In other words, information is highly required and therefore the organizations are motivated to build strong, information providing, and integrated IT platforms.

5.5 Validity, Reliability, and Generalizability

The following section evaluates the validity, reliability, and generalizability for the analyzed empirical evidence. It is a necessary procedure in order to assess the quality of the study and its qualification to contribute to the general trusted knowledge. The focus remains on the empirical results and how the results were obtained. In addition, limitations are discussed.

The empirical evidence and results were obtained mainly from two sources. The two sources included documentation and key personnel interviews. Furthermore, background information about each participating organization was gathered through their Internet sites. All the sources utilized in the current study are to be considered valid information sources. The sources are primary information sources leaving little possibilities for misinterpretation and flaws in data objectivity. Modifications or information from secondary sources have not been attended. All information is treated in an equal manner as presented in section 5. Furthermore, the study focuses on process measures. As Kohli and Devaraj (2003) conclude, utilizing primary data and process measures provide a convincing IT impact study. Moreover, the interviews were performed according to the case study methods by Yin (2003). Each interview was recorded on tape for ensuring data is presented objectively and according to acquired information. The respondents had time to prepare for the interviews, as each one received the questionnaire before the actual event. The questions were clearly explained during the interviews and the respondents could freely answer them. Considering the above mentioned factors, the results are valid.

The information was gathered from reliable sources as personnel and official documentation are considered reliable. The interviews were thorough, as each one was prepared individually according to the acquired documentation the organization had provided. The general questionnaire (Appendix A) was modified for each case organization separately. Furthermore, the questionnaire focused on both general and detailed information providing conclusive information of the subject matter. However, limitations existed as well. As mentioned before, the measurement issue requires further study. It is possible that the respondents are in such a high hierarchical level inside the organization that knowledge on actual measurement metrics utilized is not known. However, in all other aspects the respondents are to be considered knowledgeable in providing reliable information. Therefore, the results obtained are considered reliable.

Debate exists over the issue on the multiple case study generalizability. Various academics consider the information multiple case studies provide limited in a scale not achieving the ability for generalization (Yin, 2003). However, Yin (2003) states that multiple case studies create value supporting previous theory with empirical evidence and raising it to a more concrete level. The current study succeeds in accomplishing Yin's (2003) statement. The theory provided in the current study is supported by acquired empirical results. Therefore, generalizability may be performed to an extent. The current study raises previous theory to a more solid level. Moreover, the current study enables new perspectives to attend to in previous theories and answers previously unshed questions. However, thorough generalization with the limited current study sample size is not to be performed.

The current study requires evaluation in its practicality in conducting research on IT impacts on organizations. The framework by Mooney et al. (1996) is an efficient method of distinguishing IT impacts. It focuses on three key elements IT enables in organizations, which are automation, information, and transformation. These elements are the issues organizations seek for in implementing an integrated IT system (Chand et al., 2005). Therefore, the framework serves its purpose. However, the model is quite old to this date. As Chand et al., (2005) aimed for, the framework requires development. IT clearly impacts organizations in various aspects. Therefore, a more detailed approach to the framework is called for. The ERP scorecard perspectives act as an initial basis for further development. Furthermore, the case study method is efficient in the current subject matter. As quantitative studies have failed to distinguish factors involved in IT impact studies and measurement procedures utilized, the case study method provides deeper insight for future quantitative studies to consider these aspects as well. Moreover, the current study provides aid for future studies to perform conclusive IT impact generalization.

6 CONCLUSIONS

The following section draws conclusions from current study and discusses the main findings. The research questions are answered in perspective to research findings. A thorough analysis on the study contribution to the general trusted knowledge is performed. Finally, suggestions for further research are presented.

6.1 Main Findings

The following section discusses the main findings in perspective of the research questions. Issues revealed in the empirical study as well in literature are considered and their relevance to the research questions.

The research aims to distinguish cause and effect relationships on IT and business processes. The study perspective relies on the process oriented view. In other words, the focus is on the intermediate level of an organization. The objective is to concentrate on how the implementation of an integrated IT platform impacts business processes and therefore business performance. Moreover, attention is paid on the initial objectives and organizational factors and their influence on the IT business project and therefore IT business success.

The research has distinguished clear IT providing process improvements. The main improvements are related to efficiency and information transparency or the automation and information aspects in the framework by Mooney et al. (1996). Processes are performed more efficiently time, labor, and cost wise. The improved processes allow an organization to perform more efficiently and providing increased service to both the organization and its clientele. Furthermore, business performance increases as costs are reduced, processes are standardized

and centralized, and decision support is enhanced. The above mentioned factors enable an organization to control, manage and perform in a competent manner.

The enabler for competent business performance as described in the previous paragraph is not however IT but organizational strategy and management competence. Management distinguishes organizational requirements, visions, and objectives in order to create an optimal strategy for the organization. IT is rather the enabling support to perform in the strategical manner. Business and strategy are the driving forces for a new IT platform allowing an organization to perform in an increasingly efficient performance level.

Various factors enable the outcome of an IT business project and thus intended business performance. Management capability, change management, and clear objectives rise above all. As mentioned previously, management initiates the process inside the organization with a clearly set strategy and objective for the particular requirements in the company. Management initiates the communication inside the organization about the objectives, project details, and personnel roles from feasible perspectives. Along with these actions, management is required to enable commitment throughout the organization, as new strategies and an enterprise wide IT system concern the whole organization. More importantly, the new standardized processes and work methods concern the daily functioning of each unit and employee. Therefore commitment is required in order to gain IT business success. As noted above, beyond management capability, change management, and clear objectives, issues such as communication among others are to be acknowledged thoroughly.

IT benefits measurement processes and metrics provide serious issues for organizations. Costs and process cycle time metrics are fairly straightforwardly acknowledged if and as initial values are available for comparison. However, metrics such as quality, service and process level increases are difficult to distinguish. Various methods may be utilized depending on set objectives. Furthermore, as different methods are utilized by organizations, difficulties arise in comparisons between organizational IT business success levels. For most organizations, if process performance metrics are issued, the technique utilized is performed in a manner

providing the best possible results. Therefore, the established IT business success level reliability is questionable.

Determining IT business success prevails unknown to this date. As objectives vary among organizations, measurement methods and requirements vary as well, making it difficult to conduct comparisons between organizations. Though business IT projects may be distinguished as similar between organizations, the organizational factors determine the true nature for the project and its business performance success. Relying on only few process or even financial measurement units provides a harsh generalization. Organizations, objectives, motives, and enabling factors distinguish the true outcome for IT business project, its success, and effect on business performance. Distinct areas inside organizations may benefit from IT, but the overall performance and various factors enabling it distinguish the actual business performance. Due to the complex nature of both organizations and business in itself, it is highly intricate to distinguish IT business success. However, as measurement techniques and objectives in deeper organizational process levels are distinguished, the process is possible.

The main findings in the current study clearly recognize how IT impacts organizations and its business process. Why IT impacts business processes is answered to some extent. Clearly IT impacts process methods or simply methods of working. However, why does IT impact business performance is not as distinct. It is recognized how processes become more efficient with an integrated IT platform and information becomes transparent. However, the link between business performance and its clear increases are hazy due to mismeasurement and abstract recognition of enabling factors. Various factors enable business performance. The current study focuses on initial organizational factors. However, the direct linkage fails to be distinguished as recognized by Mooney et al. (1996) in their process based view. On the other hand, clear recognition is provided supporting that initial organizational factors have high influence on IT business projects and thus the outcome business performance.

6.2 Striking Issues

Two issues rise as striking in the study. Firstly, previous studies have neglected objective distinction. IT business success has been performed by comparing financial figures or other aggregate measures. The current study distinguishes objectives being a key factor in determining IT business success. IT business success is not higher profit or other financial figures. IT business success is determined according to the achievement level of set objectives. Objectives act as yardsticks for IT business success. Success is achieved as set goals are accomplished according to detailed measurement. Secondly, measurement metrics are to be paid special attention to. Two case organizations in the current study are large multinational companies. However, objective measurement procedures are mostly not performed. The finding is highly concerning. As several previous researches have performed quantitative studies on similar organizations, the measurement procedures distinguishing IT business success have clearly not been attended to. Though, the sample size in the current study is rather small, it already notices that measurement procedures should be paid more concrete attention to. Previous researches have relied on IT business success estimations, as measurement has not been performed. Estimations do not provide results for generalization. Therefore, future research should scrutinize IT business objectives and measurement procedures. Measurement metrics are to be set according to set goals in order to measure correct and concrete performance. Only then may true IT business success be determined. Serious improvements are required in research methods in the subject matter. Practical level consideration is required instead of purely theoretical.

6.3 Contribution to the General Trusted Knowledge

The following section analyzes and discusses the current study contribution to the present general trusted knowledge. The emphasis lies on how the current study adds value to the literature review presented previously.

A multiple case study has benefits and weaknesses. The most often heard criticism towards multiple case studies is the impossibility to generalize. However, as discussed previously, according to Yin (2003: ch 1) generalizations may be made in support to literature. In the particular subject matter a multiple case study provides great benefits. As several quantitative studies have faced severe difficulties in providing concrete results in the subject matter and thus not being able to generalize, a multiple case study is justified for providing in-depth analysis. Only by conducting a multiple case study, more evidence may be provided in distinguishing factors necessary to consider in the IT business success matter. As these factors are distinguished in a multiple case study, more sound quantitative studies may be performed. Therefore, future quantitative studies utilizing findings in a multiple case study benefit in concentrating on the essential factors, issues, and measurement metrics provided by an in-depth analysis.

The current study adds value to the general trusted knowledge. The research provides new aspects to be considered in an IT business success study. The current study clearly recognizes that initial organizational factors influence IT business projects and therefore IT business success crucially. Most importantly, objectives are a requirement in order to determine success or making comparisons between organizations in quantitative studies. Viewing plainly financial figures, ratios, or other process metrics is not sufficient enough when comparing organizations and their IT business success. Only as objectives are known, the correct metrics are distinguished and provide the tools required to determine IT business success. The method to perform IT business success comparisons, is to categorize organizations according to objectives and utilize measurement metrics according to objectives for analysis. Thus, organizations' IT business successes may be determined. Though many organizations are similar in size and business, and may perform a large scale ERP project, the objectives for the project may differ. Therefore, instead of concentrating on for example profit figures after the implementation, objectives should be analyzed and measurement metrics utilized accordingly. IT business success may be determined as it seen if objectives match with outcomes.

6.4 Future Research

The following section discusses areas for further research under the current subject matter. Possibilities are presented according to the current research literature and empirical findings.

The current study enables the possibility to conduct a quantitative research on IT business success in considering initial organizational objectives. Organizations are chosen and categorized according to set objectives. The outcomes would therefore be analyzed and compared according to the objectives. Certain measurement indicators would aid in the process. The measurement metrics are distinguished according to the set objectives. Furthermore, future research requires the analysis of possible and utilizable measurement metrics. A multiple case study would provide in-depth evidence in the subject matter. Analysis would not be limited to academic literature but would also investigate measurement procedures at lower hierarchical levels inside organizations, as it is clearly shown that higher hierarchical levels do not necessarily acknowledge measurement procedures. This particular matter is highly interesting yet seemingly complex to conduct.

In order to distinguish the linkage between business performance and IT, a thorough multiple case study is required. Evidence would be gathered on the process level. The process includes the analysis of employee performance and modifications in their working methods. Furthermore, investigations require the acknowledgement of how each individual process impacts organization performance, as it remains in the open currently. Clear linkage between IT and business performance is still to be revealed. Again, the issue is highly interesting, but difficult to distinguish.

The reason for presenting multiple case studies as methods for realizing particularly complex issues is in fact the reason that these issues are highly complex. As in the current study, in-depth analysis provides new insights and aspects to the current generally accepted knowledge.

Further multiple case studies supported by strong theory are to open new insights towards the subject matter. The new aspects provide concrete evidence and direction for quantitative studies to be performed and allowing strong generalization. Thus, the generally accepted knowledge would be raised to a more concrete level.

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APPENDIXES

Appendix A: Interview Questionnaire

1. What are the organizational circumstances before and after the IT project?

- Industry
- Business areas
- Organization size
- Competition

2. What is the main objective for the IT project?

- Driving forces for the project
- Strategy modification or enforcing current strategy
 - Cost efficiency
 - Replacing old IT system
 - Enforcing organization competitiveness
 - Process efficiency and cycle time reduction
 - Quality improvements

3. Have the objectives been achieved?

- What are the objectives for business performance improvements?
 - Short-term vs. long-term
 - Inside the organization
 - Business processes
 - Reporting
 - IT system
- Was objective achievement measured?
 - If objectives were not measured, why not?
 - What measurement instruments could have been used?
- Have objectives been achieved and in what scale?

- When where objectives achieved?
 - How often where objectives measured?
 - Who is responsible for project follow-up and objective measurement?
 - If objectives where not achieved, why not?
 - What is done in order for objectives to be achieved?
 - Have objectives been achieved in general?
 - In what scale have they been achieved (%)
4. What were the three most important factors enabling the IT project outcome?
- Management commitment
 - Communication
 - Motivation
 - Objective setting
 - Resources
 - Industry
 - Driving forces for the IT project
 - Other, what?
5. How has objective setting and follow-up changed in later projects?
- What are improvement areas in the project?