

How internal processes benefit from IT investments and therefore enhance company's competitiveness – a case study of Slovenian small and medium sized companies

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Abstract: In the paper we presented a case of how IT impacts business process change and how can this enhance competitiveness. The case deals with implementation of internal server for use of documentation exchange in Slovenian small and medium sized companies and provides a framework of key factors of followed changes in internal processes that enabled better competitive position of the organizations taking part of the study.

Key-Words: Information Technology, Investments, Business Process Change, Competitiveness

1 Introduction

During the past two decades, information technology (IT) has become a major driver of economic change and restructured the landscape of a business organization [23]. IT now typically facilitates effective operational control within all organizational functions, support the organization's strategic planning and decision making, as well as increasingly managing the organization's interface with customers. The increased importance of IT means that investments in this area are accounting for a very significant proportion of organizational resources [35]. However, it is very important to keep in mind that IT as a rule does not directly generate benefits but these arise as a result of improved business processes. These improvements therefore, reflect through enhanced organizational effectiveness [8], improved productivity and efficiency [37] as well as enhanced competitiveness [34]. Nevertheless all improvements are crucial for an organizations' success, in this paper we closely examine how process change after adoption of IT enhances organization competitiveness.

The rest of the paper is structured as follows. The next section reviews the literature in the field, followed by discussion on IT and competitiveness, and the introduction of the case study. The research findings are presented in Section 5. Finally, some remarks and conclusions are summarized in last section.

2 Literature review

2.1 IT benefits

Broadly, information technology encompasses computer aided communications technology, databases and analytical software. Information technology comprises

of hardware, software, and electronically stored data [34]. More recently in research on information technology and business value using the resource-based view of the organization, IT has been separated into at least two components, technology resources and IT related human resources [26].

Organizational change using IT can begin with an analysis of existing organizational elements and an identification of ways to change the dependencies among them, especially between processes [18]. Therefore, IT is one of the fundamental elements of Business Process Change (BPC) [14], [7], [1], [20]. Its role is significant throughout the entire duration of process change: before the process is designed (IT as an enabler), while the process is being designed (IT as a facilitator) and after the design is complete (IT as an implementer) [1]. Therefore, building a responsive IT infrastructure [7] is the key factor for successful implementation of BPC. There is considerable anecdotal evidence that even small changes in the use of IT in an organization may require major restructuring of the organization to take full advantage of the efficiencies created by the technology [14], [15]. Conversely, there is also significant evidence that without major restructuring, the introduction of IT may not produce savings needed to justify the investment [30], [36]. Although the evidence for organizational restructuring to accompany technological change is strong, there is much less agreement on exactly what organizational changes are needed to take full advantage of the technology. The controversy includes both the macro and micro level changes. At the macro level, the most salient issue is the change in the degree of centralization of decision making, with related questions about the depth and shape of organizational

hierarchies. At the micro level, the most salient issue is the job definition and content, with related questions about communication patterns, job satisfaction of employees, and skill requirements. There is a remarkable degree of disagreement on the impact of IT on organizations in all of these areas. IT may be expected to increase centralization because it increases the information processing capacity of managers, hence, allowing them to centralize more decisions [38]. IT may also be expected to decrease centralization because it reduces the cost of communication and coordination, and allows decisions to be delegated [14], [38]. IT may be expected to decrease the depth of organizational hierarchies since it automates some of the middle management functions, facilitating the movement of information through the organizational hierarchy. IT may also increase the depth of hierarchies by reducing the delays and distortions introduced by the movement of information through the hierarchy [32]. IT may be expected to reduce job satisfaction and diminish skill requirements by routinizing work, by subdividing work into small, highly specialized and repetitive tasks, as well as by subjecting humans to machine control [38]. IT may also be expected to increase job satisfaction, enrich jobs, and replace low level clerical jobs with high-skill professional jobs by automating the most mundane tasks [2], [36].

One explanation for the inconsistency of the empirical evidence is that the impact of IT on organizations is nondeterministic. IT creates options for the organization, and the organizational choice among those options creates the variation in observed outcomes [24], [29]. This explanation is valuable in establishing the complexity of the interactions, but not very useful in prediction or prescription, and gives no guidance to the implementer of IT or BPC. A second explanation for the inconsistency of the empirical evidence is in the treatment of IT as one specific factor. In fact, IT contains many diverse technologies that can be used to automate a variety of organizational processes. What gets automated determines what would be the optimum structure for the remaining processes. Clearly, automating clerical tasks would have a different impact on the organization than building Executive Support Systems for the top management [12], [24].

2.2 IT and Competitiveness

Effective use of information technology is often heralded as a source of organization's competitiveness [34]. Despite the fact that information technology provides organizations with more competitive capabilities, investments in hardware, software, and business processes may also develop into core rigidities. As an example of information technology use, a large body of literature exists illustrating the benefits of strategic

information systems [6], [33], [20]. Therefore, many consultants still push strategic information systems as the vehicle for easier market access, product differentiation, cost efficiencies, and improved competitive positioning within an organization's industry.

Increasingly, technology is seen as redefining the competitive environment. Increased ability to process and communicate information has facilitated the rapid diffusion of technology and has produced organizations that are rich in information, computation and communication [16]. Many various variations of IT can be an enabler of this change. For example: Electronic data interchange (EDI) facilitates both efficiency and responsiveness, linking the computer systems of buyers and sellers to allow the transmission of structured data in a machine readable format using a standard communication protocol. The competitive advantage accruing to the leaders in the EDI movement is when organization takes only ten days to process orders, compared with an average of 125 days for other organizations. Moreover, inter-organizational systems (IOS) are types of information systems that permit the coupling of transactions between organizations, making them more efficient and responsive. With this system clearing the port, which formerly required two to four days, may after the implementation take as little as ten minutes, thus the efficiency and responsiveness gains are impressive. Another good example is use of intranet, which is web-based, firewall protected network that connect all employees through common, hyperlinked interfaces to documents, messaging, and multimedia information sources. They promote communication and information sharing across global boundaries and hence, enable organization to improve its competitive position [5]. Based on all these factors we can conclude that the competitive reality is, that in many cases information technology has become a competitive necessity [9].

Use of internal server as one variation of information technology has recently become very important in small and medium companies. Due to limited financial capabilities, lack of highly educated people and very strong competition they are often forced to use highly efficient and easy to use IT tools, which enable them to operate on global markets. Therefore we researched how use of internal server enhanced company's competitive position through flexibility, transparency, efficiency and information quality. Full explanation of the research is presented in the following paragraphs.

3 Research Methodology

This study, constructed from five sections, was conducted in Slovenia in 2006. In order to establish a representative sample we decided to contact Slovenian small and medium sized companies that as of the end of

2005 had between 1 and 100 employees. They were chosen from Slovenian Chamber of Commerce's database according to number of employees. Out of the total sample of 350 companies, 93 of them actively participated in the research which represents a response rate of almost 27%. Questionnaire used in the research was complex and long, therefore the response rate is consistent with that reported in previous organizational research [17].

Among all companies that were included in the research over 42% were manufacturing companies, almost 17% trade, while other industries presented a share less than 10%. According to the demographic data foremost companies had less than 10 employees, followed by medium sized companies with more than 45 people employed. The sample of companies profile is demonstrated in the Tables 1 and 2.

<i>Business field</i>	<i>Frequency</i>	<i>Percent</i>
Manufacturing	38	42,22%
Trade	15	16,67%
Financial service	9	10,00%
Construction	8	8,88%
Transport and communication	6	6,67%
Engineering	6	6,67%
Other	5	5,56%
Tourism	3	3,33%
<i>Total</i>	<i>90</i>	<i>100,00%</i>
Not answered	3	

Tab. 1: Industry field of participating companies

<i>Number of employees</i>	<i>Frequency</i>	<i>Percent</i>
Less than 10	34	36,52%
From 11 to 20	13	13,98%
From 21 to 30	12	12,90%
From 31 to 45	14	15,10%
Over 45	20	21,50%
<i>Total</i>	<i>93</i>	<i>100,00%</i>

Tab. 2: Number of employees of participating companies

The presented research depends on primary data. The questionnaire, completely structured, consisted of five sections. After carefully reviewing relevant literature and other exploratory findings when conducting this research [19], 14 different questions were developed to explore the topic. The questionnaire was reviewed by two independent experts and tested on three different companies. The same researcher carried out and analyzed all questionnaires. Data was gathered through contacting participating companies through e-mail and by telephone.

In the questionnaire participants were asked to provide the answers of how adoption of internal server affects a company's performance on a 4-point ordinal Likert scale [19] ranging from (1) does not have any impact to (4) it has major impact. Questions included the following the most important aspects of the investigated problem: the documentation is completed faster, better transparency, lower costs, higher information quality as well as enhanced control and efficiency of the company. The results were analyzed using descriptive statistics, including frequency, standard deviation and average.

4 Research findings

Investments in IT, such as information systems and other computer-based applications, provide resources that enable a firm to respond to rapid market change and adapt to shorter product life cycles by designing and producing high-quality, custom designed products.

As already explained, many studies about positive IT payoff can be found in the literature [10], [21]. Thus, positive IT-productivity relationship as well as positive IT investment, productivity, and growth correlation were found [22]. The implementation of internal server for use of documentation exchange was the key factor of followed changes in internal processes that enabled better competitive position of the company. These process changes were examined with questions reflecting throughout four main process changes: (1) flexibility, (2) transparency, (3) efficiency and (4) information quality (see Table 3).

Flexibility. In the new economy companies are ought to be able to adapt to differing customers' demands and fast changing environments. Thus, flexibility of a company is a fundamental factor that enhances competitiveness as a result to fast adjustment to their diverse demands and requirements [25]. This factor was measured through two sub-questions: Faster creation of documentation; and faster process flow with fewer mistakes made. Over 67% of the companies believe that faster creation of the documentation has greater or major impact on competitiveness (see also Table 4). On the other hand, less than 9% companies questioned expressed that use of internal server does not show benefits in companies' flexibility. Moreover, second sub-question also proved that flexibility does have important role in achieving enhanced competitiveness. According to over 90% of the answers received use of internal server greatly and considerably fasten process flow with not as many mistakes done as before. Among all companies only 1 company disagreed with this finding, which presents less than 2% of the total sample. More to the point, means of both sub-questions are close or even higher than 3, which give us the confirmation that exchange of documentation with use of internal server greatly affects flexibility of the company.

Therefore, we can conclude that improved companies' flexibility has a positive impact on competitive position on the market.

Process change factor	MIN	MAX	Mean	Std. Dev.
(1) Faster creation of documentation.	1	4	2,89	0,94
(2) Enhanced transparency of documents.	1	4	3,16	0,85
(3) No need to reenter the same data in various different tables.	1	4	3,18	0,76
(2) Data, information and documents are available at the same time to all on one media.	1	4	3,39	0,72
(3) Work is done with less number of people.	1	4	3,06	0,81
(3) Lower costs of operation.	1	4	2,91	0,87
(3) More work done with the same number of people.	1	4	2,99	0,84
(1) Faster process flow with fewer mistakes made.	1	4	3,24	0,66
(2) Data and information about products are available promptly.	1	4	3,31	0,74
(4) Enhanced control upon business operation.	1	4	3,18	0,76
(4) Improved productivity and less external disturbances.	1	4	2,80	0,85
(4) Fewer mistakes done when creating new document.	1	4	3,10	0,79
(4) Enhanced rightness and correctness of data and information.	1	4	3,20	0,83

Tab. 3: Process change factors

Faster creation of documentation	Frequency	Percent
Does not have an affect	7	8.8%
The affect is small	19	23.8%
The affect is greater	30	37.5%
The affect is strong	24	30%
Total	80	100%

Tab. 4: Faster creation of documentation

Information quality (IQ). Internal use of IT makes the supplier's processes more reliable because it supports decision making, production planning, and quality management by improving the scanning and monitoring of the internal and external environment [11]. Hence, quality of information as one of the fundamental elements of this process change has a significant impact on evaluation of company's competitiveness [31]. When organizations create a formal plan to improve information quality it is useful to separate information quality attributes into two categories: data quality attributes and information quality attributes. This gives us a better understanding of the level of information quality and also helps us identify problems with information quality and propose solutions.

Information quality was evaluated with last four sub-questions presented in Table 3. Adoption of internal server has positive impact on enhanced control as well as

monitoring the process operation. This noteworthy put forward almost all companies. Furthermore they also agree (over 70%) that IQ is also improved significantly by improved rightness and correctness of data and information. Nevertheless all sub-questions supported the core findings, improved productivity along with less external disturbances play the least important role in achieving enhanced competitiveness. Companies positioned the greatest importance on rightness and correctness of data and information (mean 3,2), followed by enhanced control (mean 3,18) and fewer mistakes done (mean 3,1). According to all findings, we can bring to a close that only with positive combination of all aspects achievement of enhanced competitiveness is possible.

Transparency. Location of information and analysis is one of the critical aspects of underwriting and servicing company's clients [3]. Digitizing location information enables automation in storing, retrieving, analyzing and even cleaning this information, thus effectively and efficiently improving business processes [3]. Therefore, developing transparency in the organization about the availability and use of the various IT should be built into the key processes [15].

Adoption of internal server allows companies to experience a change in availability of documents needed. This change is consequently key factor for process change and thus enhanced competitive position achievement. This aspect has been verified in this research throughout 3 sub-questions: Enhanced transparency of documents; data, information and documents are available at the same time to all on one media; and data and information about products are available promptly. Over 80% of the companies agreed that improved transparency enhances competitive position; on the other hand no more than 4 companies disagree with this statement. Furthermore, companies are even more convinced that availability of information and data on one media has an impact on its enhanced competitiveness. In addition, only one company believes that data and information availability has no effect (see also table 5) whereas over 51% of the people questioned expressed that they can categorize this affect as significant. According to the results from the last sub-question, prompt availability of data and information has been recognized by 71 companies as factor with greater or major impact on company's competitive position.

Efficiency. The efficiency of any business or service area primarily lies in the efficiency of business processes in the certain field, therefore when examining and improving efficiency, business process analysis and efficiency improvement cannot be avoided [15]. For example, adoption of information technology and e-business enable the reduction of costs as a result of decreased errors in processing orders and shipping

errors; delays in receiving payments; improved process and track orders; checks of the status of goods; and confirmations of delivery schedules [28], [31]. Thus, companies may achieve more value from their customers' relationships through internal efficiencies brought up by IT.

Improved business control, lower number of mistakes done as well as less number of external disturbances were also in this study selected components of enhanced company's competitiveness influenced by internal IT benefits. Based on the findings, 65 companies agree that competitive position is greatly or severely influenced by fewer mistakes done when creating new document as well as enhanced correctness and rightness of data and information. Moreover, in each of four sub-questions 5 or less companies disagree with this conclusion, which consequently even strengthen our research outcomes. Therefore, adoption of internal server firstly benefits in improved control; secondly in less external disturbances and mistakes done and; finally in improved rightness of data.

Data, information and documents are available at the same time to all on one media.	Frequency	Percent
Does not have an affect	1	1.3%
The affect is small	8	10%
The affect is greater	30	37.5%
The affect is strong	41	51.3%
Total	80	100%

Tab. 5: Availability of data and information

5 Conclusion

Few researchers would disagree that IT impact analysis is a complex task, particularly when there is an expectation that in order to be valuable, IT must contribute to firm performance in a way that can be detected in the financial statements [4].

In the paper we presented a case of how IT impacts business process change and how can this enhance competitiveness. The implementation of internal server for use of documentation exchange was the key factor of followed changes in internal processes that enabled better competitive position of the company. With identified process change factors we showed some of the major areas of change the introduction of internal server brought about. The changes reflected improvement in both process (flexibility, transparency, and efficiency) and decision support fields (information quality). The changes are summarized in Figure 1.

Our future work will focus on the presented business process change factors, especially those dealing with information quality. We'll try to explore business value of IT through analyzing the connection between information quality and business process improvement and how this can enhance business performance.

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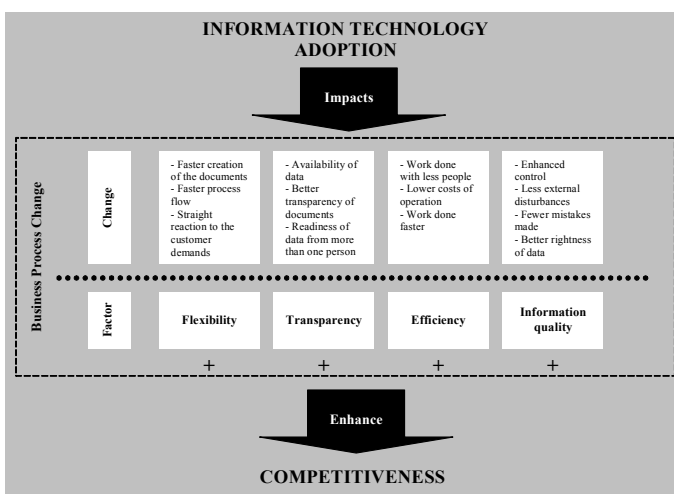


Fig. 1: IT benefits and competitiveness

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