

INFORMATION AND COMMUNICATION TECHNOLOGIES AND THEIR BENEFITS FOR MEDIUM AND LARGE-SIZED ENTERPRISES

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Abstract: *The primary research, which is brought by this paper, focuses on medium and large-sized enterprises in sectors of information and communication technologies (ICT). It investigates their attitude to the ICT that they use. Based on these ICT, the article is looking for trends set by the companies. Then, these trends could be considered as an inspiration for companies from other sectors of business.*

The research results have shown that the specially developed software belongs between the most often implemented ICT tools in the last seven years by the questionnaire companies. The research also showed that this ICT tool of all, which they have implemented, is the most beneficial at a tactical level.

Another part of analysis, where the companies should chose benefits that arose from the implementation, pointed out that they are focused on two basic clusters of benefits. The first contains: improved teamwork and increased efficiency and effectiveness. The other cluster contains: reduced costs, improved service quality and improved integration of business functions. The research also showed that the surveyed companies consider the ICT only as a tool, which simplifies work.

Keywords *Information and Communication Technologies, Organizational Structure, Company, Benefits.*

JEL Classification: *L860, L290, M150.*

Introduction

The main purpose of this work is to determine a role of information and communication technologies (ICT) in the Czech companies. These technologies have experienced pervasive development in recent years and the research, here, brings reasons, which led to their deployment in the selected companies and also tries to identify their benefits.

The companies that were selected for this research act in an ICT sector of business. These companies work with the ICT at a daily range. Therefore, they have an overview about the news in the sector and definitively some of them tested in their environment. Hence, this article may serve as an inspiration for companies from other sectors to determine the trend of deploying the new ICT in organizational structures of the companies.

The text is divided into two parts. The first is carried out by a secondary research of relevant literature. The second part presents the results of a primary research with theirs discussion.

1 Statement of a problem

An organizational structure is a certain organizational system, where the work is divided, grouped and coordinated in a company. Managers use the organizational structure as a tool for achieving targets. When they define or change it, it is called a design of company. This process includes six key elements: specialization of labour, division of departments, chain of command, dimension of control, centralization and decentralization, formalization.

The reasons, why it is important to have organized work, are based on historically verified facts. Whenever activities of a group of people were organized, those groups always achieved better results than the group that is not organized [18]. Over the years, the organizational structures were the subject of lots of researches, to find such a structure that would best help employees to perform their work.

Authors Dědina, Odcházal state that the main responsibilities of the organizational structure include: (1) to ensure the effectiveness of information flow within the organization, (2) to achieve effective coordination and integration of varied activities in the organization [4]. This effective performance of an organization defined for instance Vysušil: (1) a hierarchical link enables to achieve set objectives to a company, (2) a hierarchical link leads to fast and flexible decision making, (3) it allows management of production control by qualified employees, (4) on the basis of these relations could quickly identify managers who do not perform work in accordance with the objectives [20].

It may seem from the previous paragraphs that there is some kind of the organizational structure, which can be always successfully used, but it is not true. The organizational structure always depends on a selected business strategy [17]. In practice, the companies' organizational structures can be broken down according to various criteria, relationships or links. Therefore, we distinguish the structures, which are divided according to the degree of formalization, the degree of centralization or the degree of complexity [3]. It is also possible to divide them according to a specialization, according to an association of activities [15], according to a division of powers [2] and so on.

There is increasingly used so-called model of a virtual organizational structure in the last years. It is characterized by a flexible structure varies according to the requirements of business processes, activities and tasks [10], [15]. These modern organizational structures are directly dependent on information and communication technologies (ICT). It could not fulfil its basic function without their contribution.

The ICT caused major changes in companies in terms of social and economic issues [9]. Like many other inventions in the past, these technologies were developed in a military environment and gradually were spread to almost all economic activities [19]. Today, the ICT are a fundamental pillar of the knowledge economy [16]. Their main domain is that they apply knowledge and, at the same time, generate additional knowledge (some authors speak directly about the "third industrial revolution") [9]. Therefore, the ICT is considered as a vital source of a competitive advantage for companies. The ICT also enable companies to reduce costs and / or increase the

effectiveness of processes [1], [5], [8]. We can say that it completely changed the way, how the existing businesses operate [13].

The ICT include for example networks, computers, PDA's (generally hardware), software and other systems for data / information processing and transmitting, for example a telephone [6], [7]. Plumb, Zamhir further argue that the ICT companies can improve a communication, the ability to exchange data, to enhance teamwork, to improve customer relationships, competitive advantage and so on [12]. According to them, it stems from the fact that the ICT enable obtain, process, accumulate and exchange information [12].

They further divide the ICT within organizations into three levels, depending on what benefits provide on a given level: (1) operational level, (2) tactical level, (3) strategic level [12]. The authors also specify each of these levels:

Operational level

- Improved data management
- Improved communication
- Improved decision-making
- Reduced paperwork
- Reduced labour costs
- Reduced rework
- Improved ability to exchange data
- Improved response time to queries
- Improved control of cash-flow

Tactical level

- Improved response to changes
- Improved service quality
- Improved teamwork
- Promotes pro-active culture
- Improved planning times
- Reduced time to compile tenders
- Improved integration with other business functions
- Reduced time to prepare cost plans
- Improved effectiveness and efficiency

Strategic level

- Improved growth and success
- Reduced marketing costs
- New technology leadership
- Improved market share
- Market leadership
- Improved customer relations
- Improved customer/supplier satisfaction
- Improved competitive advantage
- Improved organizational and process flexibility

2 Methods

The prior chapter contains the secondary research in a field of the ICT and their deployment in the organizational structures of companies. The next chapter

brings results from the primary research. It was drafted on the basis of combination of a qualitative and a quantitative research among companies, which operate in the Czech Republic. The medium and large-sized enterprises were chosen (the number of employees was chosen as a criterion of division, as it is often stated in the literature) in a sector of ICT.

It is expected that these companies follow the latest trends in the ICT (often developed by themselves). There were not selected small-sized enterprises, because their organizational structures are simple enough to not fully exercise benefits from the ICT, which are important for this research.

A list of companies was obtained from the Amadeus database⁶, where it is possible to sort them according to selected criteria. The selection criteria are reported in the Tab. 1.

Tab. 2: Selection criteria for the research

Criterion	Number of companies	
	1 criterion	Cumulative
State: Czech Republic	450 870	450 870
Status: Active	16 116	436 760
Sector: ICT	507 886	5 054
Number of employees: 51+	417 130	133

Source: Author

The database shows that there are a total of 450.870 companies in the Czech Republic (on November 15, 2011). There were chosen only active companies, from the ICT sector and those, in which the number of employees is at least 51. As a result 133 companies fits to the selected criteria. During the processing there were excluded 30 companies, which could not be traced or were not appropriate for the research⁷. The qualitative research was conducted with ten selected companies from the list. Subsequently, on its results the question for a questionnaire was compiled. The questionnaire was sent to the rest of 93 companies from the list with a request to fill. That formed the quantitative research⁸. The questionnaire involves these questions:

- Q1: Which the most important ICT tool was implemented in your company since 2005?
- Q2: Which of these ICT does your company consider the most beneficial and why?
- Q3: Contrary, which of these ICT did not bring expected benefits and why?

⁶ Amadeus is a database with a list of worldwide companies, more information can be found on: <http://bvdinfo.com/home.aspx>.

⁷ The list contained also organizational units of the state and so on.

⁸ A combination of a qualitative and a quantitative form of research is called „data triangulation“ [11].

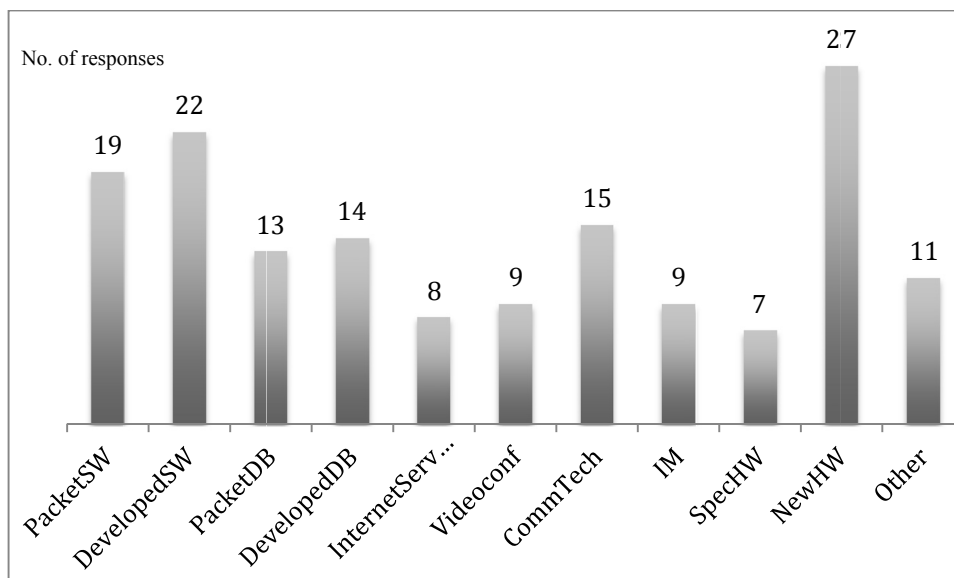
- Q4: Which benefits brought the ICT implementation that you have mark as the most beneficial? (Followed by a list of benefits inspired by the three levels of benefits, see above.)
- Q5: Has the organizational structure of your company been changed due to the implementation of the selected ICT, eventually how? (Followed by a choice of several options, see the next chapter.)

3 Research results

SPSS was used to process the results. There were returned a total of 39 responses, it represents almost 38% of the relevant companies from the basic set. The results in individual questions are stated in the following paragraphs.

In the first question, the representatives of companies could choose from the offered ICT, which were relevant in this case. It is important to note that they could choose more than one choice, because they definitively implemented more than one in that time. The Fig. 1 brings overall results.

Fig. 1: The most important ICT in companies



Source: author

The “new hardware” was the most frequent response. However, this option is definitively related to the obsolescence of existing computers and their natural renewal. The figure also shows that the “specially developed software” was the second most frequent option. Taking into account described the natural renewal hardware; it is possible to consider this option as the most important ICT tool for the selected companies.

The first question’s result is reflected in a response to the second question, where the respondents should choose the most beneficial ICT. The Tab. 2 brings results and the “specially developed software” option also prevails.

Tab. 3: The most beneficial ICT for companies

Type	Frequency	Per cents	Cumulative per cents
Packed SW	5	13,2	13,2
Developed SW	9	23,7	36,8
Packed Database	5	13,2	50,0
Developed Database	6	15,8	65,8
Videoconference	1	2,6	68,4
Communication Tech.	3	7,9	76,3
IM Communication	5	13,2	89,5
New Hardware	4	10,5	100,0

Source: Author

In the third question, the respondents had to state, which ICT did not succeed. The results showed that almost 80% of respondents could not give the right answer, because everything works fine. They often argued that everything must be properly tested before the implementation. There has to be pointed out that the survey took place among the ICT companies, where mostly ICT experts are employed. So, it would be rather surprising, if the result were different. The Tab. 3 brings the overall results of the unsuccessful ICT.

Tab. 4: Unsuccessful ICT for companies

Type	Frequency	Per cents	Cumulative per cents
None	30	78,9	78,9
Packed SW	1	2,6	81,6
Developed SW	4	10,5	92,1
Packed Database	1	2,6	94,7
Developed Database	1	2,6	97,4
Videoconference	1	2,6	100,0

Source: Author

The fourth question takes into account strategic, tactical and operational benefits as it was described above. The respondents could choose from more than one offered claim (often without having the awareness of this possible division). The results are shown in the Tab. 4.

Tab. 5: ICT benefits for companies

Benefits	Option	Responses	Per cents
Operational	Reduced paperwork	8	21
	Management support (decision-making, data mining...)	17	45
	Improved control of cash-flow	7	18
	Improved communication	5	13
	Improved response time to queries	13	34
	Improved ability to exchange data	19	50
Tactical	Improved planning times	5	13
	Improved effectiveness and efficiency	29	76
	Improved integration with other business functions	8	21
	Improved teamwork	3	8
	Improved service quality	21	55
Strategic	Improved customer/supplier satisfaction	8	21
	New technology leadership	14	37
	Reduced marketing costs	0	0
	Improved growth and success	3	8
	Improved competitive advantage	13	34
Other	Offer new products	2	5
	New project	7	18
	Other	2	5

Source: Author

In order to determine, which benefits give the greatest weight to the companies there was established a formula. The formula is trying to capture the weight differences between categories, taking into account the differences in each category. This way, they could be compared. The formula is presenting in following:

$$\frac{\sum_{i=1}^N n_k}{39 \times N} [-] (1),$$

where N is the number of individual benefits in a given category (here, the table's rows in the category). n_k is the variable, which expresses the real answers for each contribution (within the same row in the table). And a total of 39 responses were obtained. The Tab. 5 presented results.

Tab. 6: Weight benefits for companies

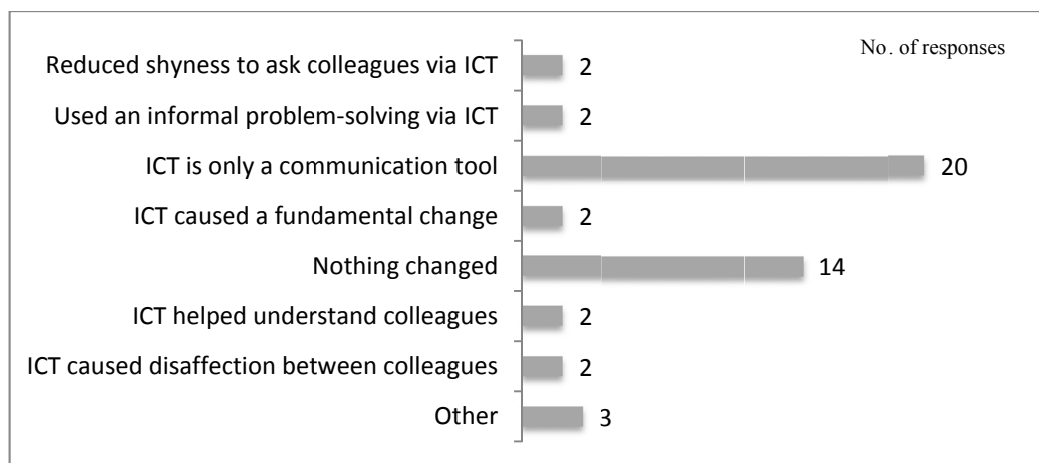
	Benefits		
	Operational	Tactical	Strategic
Results	0,29	0,34	0,19

Source: Author

The table shows that the companies focus especially on medium-term goals represented by the tactical benefits (those have the highest weight). The operational benefits (short-term goals) follow and the strategic benefits (long-term goals) have the lowest importance.

Another question examined whether the ICT lead to change in the organizational structure of the selected companies within two years after their implementation. Here, the respondents could select from several options. The Fig. 2 brings these options and the results.

Fig. 2: ICT and change in an organizational structure



Source: Author

The results show that the selected companies use the ICT especially as a communication tool, which simplifies work or any change was registered. Other options are not significant.

3.1 Benefit analysis

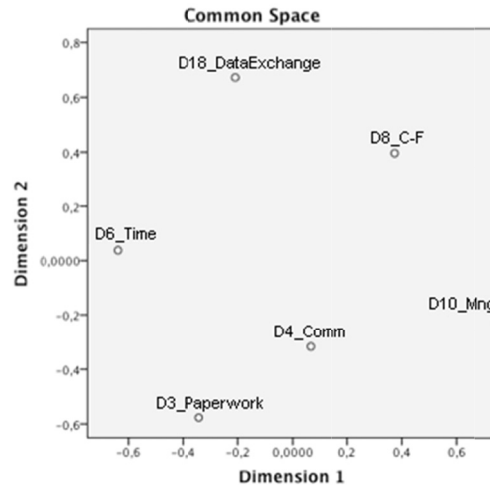
The benefits, which were used in the fourth question, were also the object of a multidimensional scaling. The analysis is focused on a cluster of benefits, which the companies follow with the ICT implementation.

The multidimensional scaling allows showing the relationship between categories using multiple variables. An aim of the analysis is to reduce the multidimensional space of variable vectors into a smaller space dimensions, usually a two-dimensional space. Then, the output of analysis enables to identify groups of similar categories. During the interpretation, it is being stated: the more individual points in a space are closer, the greater similarity is between the corresponding categories. The location of individual points are often being interpreted toward to the main axes [14]

3.1.1 Operational level

The Fig. 3 shows that all benefits are quite different at the operational level. As a conclusion can be said, that the operational level does not have the prevailing trend. Every company deals with their own specific operational requirements without any sector's obvious trend.

Fig. 3: Multidimensional scaling at an operational level

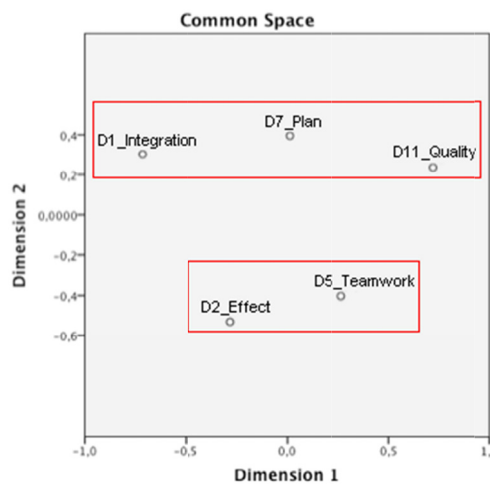


Source: Author, SPSS Output

3.1.2 Tactical level

The Fig. 4 represents the tactical level of benefits. There may be a horizontal axis used as a dividing parameter. It can be said that the companies focus on two basic trends, which are represented by two clusters of benefits. The first consists of: improved integration with other business functions, improved planning times and improved service quality. The other contains: improved effectiveness and efficiency and improved teamwork.

Fig. 4: Multidimensional scaling at a tactical level

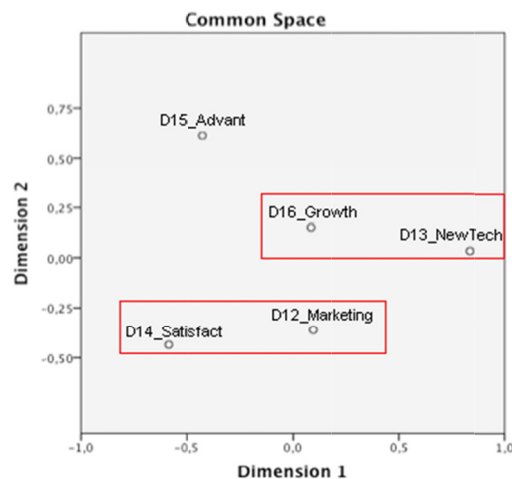


Source: Author, SPSS Output

3.1.3 Strategic level

At the strategic level, represented by the Fig. 5, the horizontal axis could also be used as the dividing parameter. Then, there are also apparent two basic trends, which are represented by two clusters of benefits. The first cluster contains: improved growth and new technology leadership. The second one consists of: improved customers / suppliers satisfaction and reduced marketing costs. The option “improved competitive advantage” does not fit any cluster therefore it was excluded.

Fig. 5: Multidimensional scaling at a strategic level



Source: Author, SPSS Output

4 Discussion

In today, the vast majority of companies are focused the short-term goals (especially earnings) and that is why the author of this article expects that the operational benefits will gain more importance in future and at the operational level there will be apparent the cluster of: reduced paperwork, management support and improved communication. In other relationship authors Plumb, Zamhir also pointing out day-to-day managerial practices as the most important option [12].

The author fully agrees with the result, which shows that the companies consider the ICT only as a communication tool. Everybody, who expects for example the fundamental change, has to take into account that the ICT are developed mostly to simplify people's work.

5 Limitations and further research

The limitations of the research lie in the limited number of responses; therefore the results cannot be generalized.

There is no possibility of running further research in this field, whereas there had been used the whole basic set of the companies from the Czech Republic. On the other hand, further research would try to examine the differences in these trends between the Czech Republic and other countries. Definitely, interesting research would verify set trends by this article in other sectors of business after a couple of months. Another

possible research could be carried out after several years. This way, the trends' development in the ICT implementation in companies could be captured.

Conclusion

This research showed that medium and large-sized enterprises in the ICT sector focused mainly on the specially developed software. They consider it as one of the most important ICT tool that they have implemented in the last seven years. In this regard, almost 80% of the respondents state that there is not any significant technology, which did not proved in their practise.

This article also tried to identify benefits that have been followed in the implementation of the most important ICT. Subsequent analysis determined that the selected companies focused mainly on the benefits at the tactical level. Especially, there are two basic clusters of trends. The first said that companies want to improve teamwork and increase their effectiveness and efficiency. The second cluster of the benefits said that companies want to improve integration with other business functions, improve planning times and improve service quality.

The results also show that companies consider the ICT only as a tool that simplifies work. This result, however, is in opposition to the EU's effort. In fact, the EU considers the ICT as an engine of economic growth in the near future and therefore supports it from its funds.

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