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Impact of the ICT tools on the Hungarian small and medium-sized enterprises (SMEs)

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Available information systems and IT solutions for the economic organization are crucial to the success of an enterprise. This study focuses on the Hungarian SMEs and aims to explore the regional differences regarding the ICT tools penetration and the way these tools can influence revenue. The examination is based on statistical analyses, using variance and regression analyses. With careful examination of the ICT tools connected to the processes of an enterprise, we reached the conclusion that enterprises operating in different regions rely on the ICT tools base to varying degrees in average, but no significant difference could be identified. This means that enterprises from each region do not rely on a particular tool to the same extent. Moreover, we can see that the ICT tools have an impact on sales trends, whether directly or indirectly. Hence it is important for enterprises to know their own business processes, because the ICT tools influence not only those processes, but revenue as well.

Keywords: business process reengineering, SME, ICT, ERP, service process.

JEL code: O32.

Introduction

After applying various process improvement tools, many companies felt disappointed. They felt it is not operating very good, but even after a series of BPR (Business Process Reengineering) projects or a traditional lean-type attempt, they realized that the reserves in the system do not seem to be enough to further improve it anymore. Studying the placement of each process within the economic system, their relationship to each other and the feelings of the individuals participating in the processes becomes particularly important in such

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cases, especially if the BPR has not brought any results. With that in mind, we must find a tool that does not involve drastic measures.

There have been significant discussions and debates both in the research literature and among the managers for almost two decades about the role, nature and interdependence of process "reforming" or "repairing" techniques, methods and strategies. Despite this long and deep debate, confusion is still prevalent among researchers and experts. Still, it is generally agreed that business processes need to be improved as the basis and core of competition is turning from a cost and quality oriented approach towards flexibility and sensitivity. Thus, the significance of process improvement tools is recognized in acquiring sustainable competitive advantages, but their application is seriously lacking in the service sector (Gubán–Kása 2013; Gubán et al. 2003).

Considering these facts, it becomes obvious why companies need process improvement. Organizations need to be engineered in a process-oriented way for the following reasons (Dobák–Antal 2010):

- customers expect not functional but process performance from companies, but often there is no responsible person for these processes,
- there is plenty of room for mistakes due to the lack of harmonization, and the consequent costs are high,
- there is no comprehensive customer service,
- innovation is almost impossible in a fractured process due to the resistance of other departments.

Despite their crucial importance, processes are often not examined systematically, not even today. It is not unusual for the top management of a corporation to be unaware of the precise execution of a key process or even the role of a side process. Nevertheless, these processes are carried out on a daily basis without clear guidelines, following only traditions that lose much of their rationality with changing circumstances (Dobák–Antal 2010).

To apply process improvements, we need to explore what type of Information and Communication Technology (hereinafter ICT) tools are used within enterprises. This paper aims to examine the Hungarian

small and medium-sized enterprises, with respect to the types of ICT tools used, differences in usage by regions and their effect on the profitability of the company.

Relevant studies related to process improvement

In the course of research 1151 studies related to process improvement, redesigning or management were examined between 1978 and 2013 (Gubán–Kása 2013). Most of these studies introduce cases where one or more process redesigning tool is utilized.

There are relatively few studies regarding applications and theory in relevant journals; one possible reason for this can be the decreasing number of new tools development. There is no doubt about the importance of continuous improvement of business processes. The driving forces of radical changes can be attributed to the expansion of competitive advantage by Porter (1980, 1985, 1990), as summarized by Hammer–Champy (1993):

- customers, who are now diverse and have individual needs,
- competition, which increases the satisfaction of customer needs in all niche markets, and
- change, which has become penetrative, constant and faster and became a prerequisite in some markets, as O'Neil and Sohal claim (1999).

Looking back at the development course of process improvement, its first appearance was between 1750 and 1970, at the beginning of the industrial age. Their main tools were the PDCA improvement cycle and financial modelling (Grover–Malhotra 1997).

The next generation of process improvement is the information age, between 1970 and 1990. This is the age of quality management and work efficiency with solutions such as Material Requirement Planning (MRP) and Management Information System (MIS) (Grover–Malhotra 1997).

We can call the second phase of the information age the third generation, with business process improvement in its focus. This age is covering the 1990's. This is basically the age of process innovation, in

which the slogans “better”, “faster” and “cheaper” might have been the best practices. This is the age when the ERP, CRM and supply chain models and enterprise architecture started to be utilized. New tools were developed such as Six Sigma, TQM, BPR and BPB (Gubán–Kása 2013).

Among the tools, the BPR can be mainly emphasized, a technology with a high degree of freedom, as several other techniques can be developed from it. When the BPR methodology was developed, not only e-business did not exist, but business life hadn't had even discovered the internet yet. Despite this, the special role of IT was noticeable, so the BPR obviously listed the creative application of IT as an important accessory of reorganization (Gubán 2013). Thus, we can see how big a role IT plays in process reorganization, making IT approach important for us as well.

The third and last phase of the information age is the fourth generation, focusing on Business Process Management (BPM). This age started around the year 2000. The main emphasis of this age is on continuous transformation, flexibility and modularity. The main technologies in this age are the Enterprise Application Integration (EAI), the Service-Oriented Architecture (SOA), the SOM, the Performance Management Systems (PMS) and the BPM systems. The tools may change from customization to the BPM procedure such as the IDBF, the Benchmarking-Oriented Process Redesign (BOPR), Business Process Standardization (BPS) and the Event-Condition-Activity (ECA) calculation. Some of these tools are strongly service-oriented, such as the Service-Oriented Architecture or the Event-Condition-Activity (Gubán–Kása 2013; Kovács 2012).

Besides the methods mentioned above, the organizational structure of a company should also be considered as it is by no means a negligible aspect in the process design. Moreover, activities in an organization are executed in close relationship with each other. These activities consist of longer coherent chains, which are called processes (Dobák–Antal 2010).

The study on organizational impacts of information technology started after computers, internet and IT consumerization became widely available. With the rapid development of ICT, forecasts of

potential organizational consequences started to appear. At first, only the centralization of management and changes in the content and quality of jobs were predicted. Another important debate was about the automatization based on electronics, i.e. how will the automatization of processes affect the content and quality of jobs (Dobák 2008).

IT consumerization refers to the phenomenon in the life of a company or enterprise when every person strives to apply the communication devices of their own use in workplace communication – and with the appearance of smart devices, even in accessing company IT service (Gubán et al. 2012).

The most important changes are data processing, data analysis and data mining becoming faster and more accurate, and the improvement of information connection between each part of the process with all the organizational and attitude consequences. We can often observe an organizational resistance of the company employees when information technology is introduced. Significant forces are applied so that organizational changes accompanying the introduction of new systems remain as small as possible. Consequently, the introduced solution will achieve lower efficiency than its potential would allow (Dobák 2008).

Summarizing the above statements, we can conclude that state-of-the-art systems create opportunities for organization design, but information technology might also raise the need for organizational change (Dobák 2008). Therefore, we must not ignore factors related to information flow within the organization, on the contrary, it is advisable to concentrate on the internal structure and influencing factors of information and data flow on a high degree.

Usage of the information and communications technologies within Hungarian small and medium-sized enterprises

Research studies show that exploring and improving internal problems of business processes is playing a central role in many analyses. In present-days economic systems the quality and completeness of research is exclusively determined by the quality of the IT background.

Small and medium-sized enterprises need to implement and utilize the latest technologies to keep and enhance their competitiveness (Avornicului 2013). For this, it is also important to examine what kind of IT equipment, information systems and IT solutions (cloud service, business intelligence, databases, data warehouses) can be identified in the economic organization in question. It is necessary to examine the causes influencing the IT environment.

From a process improvement point of view, we must first examine the types of IT equipment and IT solutions used by the companies, in this case the Hungarian SMEs. As for IT equipment, the ratio of enterprises using computers in 2014 was the highest in Central Transdanubia (93%), in other regions it was between 88-92%. Internet usage also had the highest ratio among companies in Central Transdanubia, in other regions it was scattered between 84-89%. There was no change in the number of laptops per enterprise (8 pcs), but the number of PDAs per enterprise (6 pcs) has slightly risen. There is no significant difference between the most used fixed broadband internet connection between enterprises in regional distribution. In 2014, the Central Transdanubia had the highest usage ratio (90%) while the North Great Plain had the lowest (84%) (Infoter 2015).

In surveys carried out by the Ipsos Mori public opinion polling company in 2015, more than 300 Hungarian SMEs were asked what kind of difficulties they were facing. According to these, one specific problem for Hungarian small and medium-sized enterprises is the shortcomings of internal communication, as sometimes employees of a company are not well connected with each other even within the company. Furthermore, it was also revealed that more than one third of the SME's execute their business fully on paper-base, offline. However, the research has not only revealed the problems but also showed the direction of potential solutions. Among the Hungarian SME's participating in the research, more than 30% of the respondents said that they are convinced that with the application of the state-of-the-art ICT solutions – primarily cloud services – internal information flow would improve, thus making internal cooperation and knowledge sharing more efficient and all of these would improve employee productivity (Trademagazin 2015).

Based on a research by Microsoft Hungary (2016), 76% of the Hungarian small and medium-sized enterprises that use the advantages of digitalization and at the same time start an intensive IT equipment use, think that their innovation skills have increased, while in the case of paper-based companies this ratio is only 58%. Moreover, 66% of the employees consider that technology contributes to customer relations and successful client retention. 57% of the Hungarian small enterprises support the use of own devices in the office, which is a significant progress compared to the 38% measured in 2014. This attitude is even more widespread among micro-enterprises, their ratio being 67 percent as opposed to the 51 percent of medium-sized enterprises. Regarding IT solutions, cloud-based services are growing in popularity; more than half of the companies working with data (54%) use them. Furthermore, significant results can be reached with only the introduction of Office 365, as internal processes become more transparent and easier, and the system becomes more efficient and customer needs could be satisfied faster (Microsoft Hungary 2016).

Based on a study on the ICT tools by the Hungarian Central Statistical Office (HCSO 2013) if we examine the use of the ERP (Enterprise Resource Planning) and CRM (Customer Relationship Management) systems within the ICT tools among the enterprises, we can see that the application of both ERP and CRM systems increased in recent years on a national level. The usage ratio of the ERP systems increased to a greater degree in comparison with the CRM systems. Almost two thirds of the enterprises with more than 250 employees were already using enterprise resource planning systems in 2013. The ERP system was used to the largest extent by enterprises of electricity, gas and steam supply, air conditioning (34%), information and communication (28%), while customer relationship management systems were mostly used by enterprises operating in the fields of information, communication and financial activities. In 2012, Hungarian enterprises reached 16% of their total net sales with the use of a computer network (HCSO 2013). If a company implements and properly uses an ERP system, the benefits are worthwhile (Kovács–Avornicului 2010).

Based on the HCSO (2013) data, the use of the ICT tools (e.g. ERP, CRM) was regionally balanced in 2013. The difference between regions

of the highest and lowest usage ratios is not significant. The use of the ERP and CRM systems increased among enterprises in Western Transdanubia region to the largest degree (between 3-7%) (HCSO 2013).

According to Serkan et al. (2012) larger companies are able to benefit more from the use of IT tools than smaller companies, and the size of an enterprise moderates the relationship between IT and corporate income. This means that the business value of IT has different impact on small and large enterprises.

Research methodology

The analysis focuses on the penetration of the Information and Communication Technologies (ICT) tools in small and medium-sized enterprises in Hungary. Our aim was to explore regional differences regarding the ICT tools penetration and the way these tools influence the revenue.

Before starting the examination, we should define our meaning of the ICT tools. Economic ICT is defined as IT and communication services, technologies and techniques associated with business and economic systems that support and serve the organizations to reach their targets (Gubán et al. 2012).

Database features

For our empirical analysis, we used the database[4] created within the "Complex examination and modelling of the company competitiveness, municipal, regional and macroeconomic effects of energy generation, energy use and waste management technologies" research project in 2013, collecting data from 818 Hungarian small and medium-sized enterprises via a questionnaire survey. The composition of the sample according to the companies' headcount is the same as the composition of the operating Hungarian companies (Szerb et al. 2014).

[4] Downloaded from http://old.energia.pii.pte.hu/menu/19.html, referred in the following as SME database.

We examined the degree to which the companies in the available database reflect the ratio of regions and headcount categories of the current enterprises operating in Hungary. We examined the representativeness in two dimensions, based on regions and headcount categories collectively. In the distribution of enterprises based on regions and headcount categories (Table 1), we can see that 36% of all operating enterprises are based in Central Hungary and are employing 1 to 4 persons.

Before establishing a representative sample, companies that were missing some values in the variables relevant for the examination were excluded. Exclusion conditions were the incomplete information related to the ICT tools, headcount and revenue.

Table 1. The composition of the enterprises by headcount categories [Npopulation=579 579, Nsample=122]

Region		1–4 persons	5–9 persons	10–19 persons	20–49 persons	50–249 persons	250+ persons	Total
Central Hungary	Population	36.3%	2.7%	1.3%	0.7%	0.3%	0.1%	41.4%
	Sample	36.9%	2.5%	1.6%	0.8%	0.0%	0.0%	41.8%
Central Transdanubia	Population	8.6%	0.6%	0.3%	0.1%	0.1%	0.0%	9.7%
	Sample	9.0%	0.8%	0.0%	0.0%	0.0%	0.0%	9.8%
Western Transdanubia	Population	8.4%	0.6%	0.3%	0.1%	0.1%	0.0%	9.6%
	Sample	9.0%	0.8%	0.0%	0.0%	0.0%	0.0%	9.8%
Southern Transdanubia	Population	7.2%	0.5%	0.2%	0.1%	0.1%	0.0%	8.1%
	Sample	7.4%	0.8%	0.0%	0.0%	0.0%	0.0%	8.2%
Northern Hungary	Population	7.5%	0.5%	0.2%	0.1%	0.1%	0.0%	8.4%
	Sample	7.4%	0.8%	0.0%	0.0%	0.0%	0.0%	8.2%
North Great Plain	Population	10.3%	0.7%	0.3%	0.2%	0.1%	0.0%	11.6%
	Sample	10.7%	0.8%	0.0%	0.0%	0.0%	0.0%	11.5%
South Great Plain	Population	9.9%	0.8%	0.3%	0.2%	0.1%	0.0%	11.3%
	Sample	9.8%	0.8%	0.0%	0.0%	0.0%	0.0%	10.7%
Total	Population	88.3%	6.4%	2.9%	1.5%	0.8%	0.2%	100.0%
	Sample	90.2%	7.4%	1.6%	0.8%	0.0%	0.0%	100.0%

Source: SME database, HCSO (2013)

After performing the exclusions under these conditions, 660 companies remained in the database, which were used to establish a representative sample on a regional and headcount level. As a consequence of the bottlenecks, it was only possible to establish a representative sample of 122 elements.

Looking at Table 1, we can see that the established sample accurately reflects the population ratios at regional and headcount-category level.

Description of the variables

Table 2 shows the variables related to the ICT tools relevant for the research. Variables related to the ICT tool penetration are dichotomous, i.e. 0 indicates the lack of an attribution, and 1 indicates its presence. The dependent variable is the average revenue.

Table 2. Variables of the ICT tools in the database of SME

Variable code	Name
B09Q01_1	One or more computers, laptops without network
B09Q01_2	Computers connected to the internal network
B09Q01_3	Not broadband Internet access (e.g. ISDN)
B09Q01_4	Broadband internet connection
B09Q01_5	Mobile Internet connection
B09Q01_6	Usage of email for internal or external business purposes
B09Q01_7	Own website in Hungarian
B09Q01_8	Own website in foreign language
B09Q01_9	Own interactive website
B09Q01_10	Active e-commerce to enable online presence
B09Q01_11	Special software applications (e.g. Accounting, CAD, CRM)
B09Q01_12	Billing, warehouse registry software related to sales
B09Q01_13	Usage of the enterprise resource planning (e.g. KulcsSoft, Armada, Libra, SAP)
B09Q01_14	Interactive banking
B09Q01_15	Online advertising
B09Q01_16	Others (e.g. Intranet, servers, etc.)

Source: SME database

We examined the relationship between the information flow and the average revenue, as well. The variables related to the information flow are presented in Table 3.

Hypotheses derived from test history

· H1: The penetration of the ICT tools is the highest in the Central Hungary region and shows a significant difference when compared to other regions.

· H2: There is an (are) ICT tool(s) which increase(s) revenue significantly.

Table 3. Variables related to the information flow

Variable code	Name
B04Q16_1	Consult with stakeholders, seek their opinion
B04Q16_2	Consult with participants in the Board of Management
B04Q16_3	Consult with owners
B04Q16_4	Extensive consultation with employees
B04Q16_5	Consult with external people as well
B04Q17_1	Everyone knows the required information, there is no need for other methods
B04Q17_2	There is no evolved method. If necessary, they announce the necessary information with stakeholders.
B04Q17_3	Hold irregular meetings
B04Q17_4	Regular meetings
B04Q17_5	Sending necessary information in writing and by email
B04Q17_6	Exchange information with internal mailing
B04Q17_7	IT platform application for internal information exchange (e.g. Intranet, teamwork supporting)
B04Q17_8	Usage of mobile application

Source: SME database

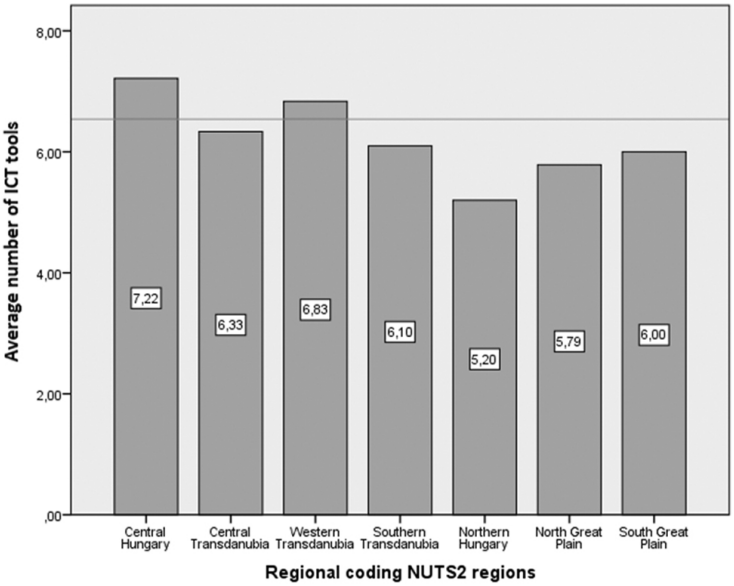
We applied the variance analysis for testing the first hypothesis, during which we examined whether there is a significant difference between regions in the ICT penetration, and if there is one, which regions have an outstanding value.

For the second hypothesis, we used the regression analysis, during which we wanted to know what effect the ICT tool penetration has on the revenue.

Testing the hypotheses

In the first hypothesis, we assumed that, since Central Hungary has the biggest ratio of operating enterprises, it seems inevitable that the penetration of the ICT tools should be also the highest in this region. We tested this assumption in the frame of the variance analysis, based on the number of the ICT tools (as the indicator for the ICT tool penetration).

Figure 1 shows the average ICT tool penetration, and we can clearly see that as assumed, the average ICT tool penetration in Central Hungary stands out from the other regions. In this region, an average of



Source: authors' own design based on SME database

Figure 1. Average ICT tool penetration by regions

7.2 ICT tools is used by the enterprises. The line represents the national average, namely 6.5. Based on this, the Central Hungary and Western Transdanubia regions are above average, while Southern Transdanubia, Northern Hungary, North and South Great Plain show below average values when compared to the national average.

Based on the Levene Statistic variance the ICT penetration of each region cannot be considered identical, because the significance level of the test is lower than 5% (Levene Statistic=2.710, df1=6, df2=115, sig.=0.017).

As the condition of variance identity has not been met, the Tamhane test (see Appendix 1) can provide some relevant information, which reduces the correlation to partial tests. Based on that we can say there is no significant difference between the regions regarding the ICT tool penetration.

We can only accept the assumption of the first hypothesis partially, because while the enterprises of Central Hungary did indeed have the highest value in the ICT tool penetration, these values did not differ significantly from the penetration in other regions. This hypothesis examined whether there is a difference in the ICT tool penetration overall, so it considered all combinations identical. However, the degree to which each region uses various ICT tools was also examined (see Table 4).

Table 4. Usage ratio of the ICT tools within companies in the Hungarian regions [N=122]

	Central Hungary	Central Trans-danubia	Western Trans-danubia	Southern Trans-danubia	Northern Hungary	North Great Plain	South Great Plain	Total
One or more computers, laptops without network	65%	75%	75%	70%	40%	79%	62%	66%
Computers connected to the internal network.	65%	58%	83%	20%	80%	50%	69%	62%
Not broadband Internet access (e.g. ISDN)	16%	25%	8%	0%	0%	29%	8%	14%
Broadband internet connection	82%	83%	100%	100%	100%	57%	85%	84%
Mobile Internet connection	45%	50%	50%	80%	30%	57%	31%	48%
Usage of email for internal or external business purposes	78%	67%	92%	80%	40%	79%	54%	73%
Own website in Hungarian	67%	50%	50%	70%	70%	64%	69%	64%
Own website in foreign language	29%	25%	0%	10%	10%	14%	8%	19%
Own interactive website	33%	8%	17%	0%	0%	7%	0%	17%
Active e-commerce to enable online presence	29%	8%	17%	40%	0%	7%	8%	20%
Special software applications (e.g. Accounting, CAD, CRM)	39%	42%	50%	30%	40%	7%	38%	36%
Billing, warehouse registry software related to sales	51%	42%	17%	30%	50%	36%	62%	44%
Usage of enterprise resource planning (e.g. KulcsSoft, Armada, Libra, SAP)	24%	8%	8%	0%	0%	0%	23%	14%
Interactive banking	55%	75%	83%	70%	60%	71%	62%	64%
Online advertising	43%	17%	33%	10%	0%	21%	23%	29%

Source: authors' own design based on SME database

Although there was no significant difference overall, on the level of each ICT tool enterprises operating in each region rely on each ICT tool to various degrees. Western Transdanubia was ranked first among the regions according to the usage ratio for the highest number of ICT tools in question (five), but the ICT tools are applied to the highest extent on average by enterprises from Central Hungary. This further strengthened the result that the enterprises from the Central Hungary region stand out mostly on a national level in application of the ICT tools.

An ICT tool can be considered the primary tool in process improvement. As it could be seen in the previous test, the application ratio of each ICT tool is very different between the regions. So, when applying a BPI or BPR or any other improvement method due to the differences between the ICT tools a mutation of each method must be used regionally.

In the second hypothesis, we examined whether there is (are) an ICT tool(s) that significantly increase(s) revenue.

When establishing the regression models, we applied the STEPWISE method. As a result, the only variables that remained in the model are those that have a significant influence on sales trends.

Based on the ANOVA table (Appendix 2), the null hypothesis stating that the regression equation can be considered a coincidence can be rejected, because the significance level of the regression test is lower than 5%. That is why the model exists.

The optimal regression model was reached in three steps. The significant explanatory variables that were included in the test were only able to explain 12.6% of the total variance of sales, the rest can be explained by other factors.

Three ICT tools that affect sales trends significantly were included in the optimal regression function. First was the use of the enterprise management software (ERP), second was an interactive banking option, and third was the application of computers connected to an internal network.

$$\hat{y} = 72865.780 + 106287.717x_1 - 59206.990x_2 + 57819.781x_3 \quad (1)$$

x_1 = Enterprise Resource Planning (e.g. KulcsSoft, Armada, Libra, SAP) usage;

x_2 = Interactive banking;

x_3 = Computers connected to the internal network.

Based on the priority coefficients by PRATT, the importance of each significant variable can be determined compared to each other. In this case, we can determine that the degree to which an enterprise management software contributes to sales trends is almost as high as the other two tools together (Appendix 3).

Furthermore, based on the parameters of the optimal regression line it can be claimed that if an enterprise is using an enterprise management software, or operates computers that are connected to a common internal network, then that will in average result in higher sales. Among others, these two factors help different departments communicate with each other efficiently.

Based on the regression analysis, we accept the second hypothesis, i.e. the use of an enterprise management software or computers connected to an internal network have an increasing effect on sales.

In addition to the above hypothesis, a variable related to the information flow[5] was involved to the regression model, which indirectly assumes a degree of ICT penetration. We examined the relationship between the information flow and the average revenue as a dependent variable.

The optimal regression model was reached in one step, the explanatory power of the model is 0.06. The significant explanatory variables that were included in the test were only able to explain 6% of the total variance of sales (Appendix 4).

One ICT tool was included in the optimal regression function: if the company uses an internal IT platform for internal information exchange, in any case it has a positive impact on revenue. The internal mailing list has an administrative part, where it is documented, who, when and what to read. This could be the reason that it has effect on average revenue in the regression model.

[5] The variables related to the information flow are mentioned in Table 3.

The traditional, standard information flow tools might distort the information, so these should be given special attention. Furthermore, the undocumented flow may also distort the information flow. Information flow is precise in the document management system, and it is recorded, so any changes can be followed. Beside the ICT tools, the flutter of the information is less.

Conclusions

In recent years, the importance of improving business processes has become evident. We aim to correct errors found in business processes. However, the first step towards doing this must be to take into account available IT devices, information systems and IT solutions for the economic organization, as these factors are crucial to the success of an enterprise.

Our study focused on the ICT tool penetration in the Hungarian SMEs. By examining the ICT tools tightly connected to the processes of an enterprise – those that help process mapping by being connected to internal information sharing – we reached the conclusion that enterprises operating in different regions rely on the ICT tool base to a different degree in average, but a significant difference could not be found. There was no significant difference between enterprises operating in different regions in total (neither in average, nor in the number of applied ICT tools), but when looking at the degree to which enterprises actually use each ICT tool regionally, a difference was found between different regions, meaning that enterprises from different regions do not rely on a particular tool to the same extent.

Furthermore, there are ICT tools that directly or indirectly have an impact on sales trends. An enterprise management system such as SAP is a tool that increases revenue.

Among various ICT tools – although it did not appear as a significant parameter – teamwork and project supporting software can be considered as best examples, because the information will be built in the system and it cannot be modified or ignored.

Besides the above, we should also highlight consumerization which changed the IT approach and has a huge role in revenue trends,

because communication with an own device is more convenient and cheaper, which can be an important aspect. Moreover, enterprises that use the services of some software service company that ensures consumerization with a cloud service do not need to invest in significant hardware equipment. From these results, we can conclude that the level of IT penetration has an effect on the quality of business processes, too.

As a further step, we should expand the data collection to involve more variables such as cloud computing, business process systems, data warehousing and data mining tools to get an overview of the Hungarian SMEs. From these examinations, we may get information on the innovativeness of the Hungarian enterprises. The companies need to develop and to understand their business processes in order to reduce costs and be more effective.

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Appendices
Appendix 1. Testing of expected value – Tamhane

Regional coding NUTS2 regions		Mean difference (I-J)	Std. error	Sig.	Confidence	
					Lower Bound	Upper Bound
Central Hungary	Central Transdanubia	.88235	.87232	1.000	-2.1336	3.8983
	Western Transdanubia	.38235	.78550	1.000	-2.2784	3.0431
	Southern Transdanubia	1.11569	.66533	.902	-1.0967	3.3281
	Northern Hungary	2.01569	.79260	.340	-.7423	4.7736
	North Great Plain	1.42997	.64900	.508	-.6656	3.5256
	South Great Plain	1.21569	.77967	.947	-1.3978	3.8292
Central Trans-danubia	Central Hungary	-.88235	.87232	1.000	-3.8983	2.1336
	Western Transdanubia	-.50000	.97830	1.000	-3.8574	2.8574
	Southern Transdanubia	.23333	.88472	1.000	-2.8747	3.3414
	Northern Hungary	1.13333	.98401	.998	-2.2780	4.5446
	North Great Plain	.54762	.87250	1.000	-2.5061	3.6013
	South Great Plain	.33333	.97362	1.000	-2.9971	3.6637
Western Trans-danubia	Central Hungary	-.38235	.78550	1.000	-3.0431	2.2784
	Central Transdanubia	.50000	.97830	1.000	-2.8574	3.8574
	Southern Transdanubia	.73333	.79924	1.000	-2.0487	3.5154
	Northern Hungary	1.63333	.90793	.853	-1.5194	4.7861
	North Great Plain	1.04762	.78570	.990	-1.6634	3.7586
	South Great Plain	.83333	.89666	1.000	-2.2193	3.8860
Southern Trans-danubia	Central Hungary	-1.11569	.66533	.902	-3.3281	1.0967
	Central Transdanubia	-.23333	.88472	1.000	-3.3414	2.8747
	Western Transdanubia	-.73333	.79924	1.000	-3.5154	2.0487
	Northern Hungary	.90000	.80623	.999	-1.9759	3.7759
	North Great Plain	.31429	.66556	1.000	-1.9793	2.6078
	South Great Plain	.10000	.79351	1.000	-2.6373	2.8373
Northern Hungary	Central Hungary	-2.01569	.79260	.340	-4.7736	.7423
	Central Transdanubia	-1.13333	.98401	.998	-4.5446	2.2780
	Western Transdanubia	-1.63333	.90793	.853	-4.7861	1.5194
	Southern Transdanubia	-.90000	.80263	.999	-3.7759	1.9759
	North Great Plain	-.58571	.79280	1.000	-3.3947	2.2233
	South Great Plain	-.80000	.90289	1.000	-3.9205	2.3205
North Great Plain	Central Hungary	-1.42997	.64900	.508	-3.5256	.6656
	Central Transdanubia	-.54762	.87250	1.000	-3.6013	2.5061
	Western Transdanubia	-1.04762	.78570	.990	-3.7586	1.6634
	Southern Transdanubia	-.31429	.66556	1.000	-2.6578	1.9793
	Northern Hungary	.58571	.79280	1.000	-2.2233	3.3947
	South Great Plain	-.21429	.77987	1.000	-2.8783	2.4497
South Great Plain	Central Hungary	-1.21569	.77967	.947	-3.8292	1.3978
	Central Transdanubia	-.33333	.97362	1.000	-3.6637	2.9971
	Western Transdanubia	-.83333	.89666	1.000	-3.8860	2.2193
	Southern Transdanubia	-.10000	.79351	1.000	-2.8373	2.6373
	Northern Hungary	.80000	.90289	1.000	-2.3205	3.9205
	North Great Plain	.21429	.77987	1.000	-2.4497	2.8783

Source: authors' own design based on SME database

Appendix 2. Testing the existence of regression
ANOVA (a)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	143671471640.076	1	143671471640.076	7.324	.008(b)
	Residual	2354035725894.590	120	19616964382.455		
	Total	2497707197534.670	121			
2	Regression	220431617227.785	2	110215808613.893	5.759	.004(c)
	Residual	2277275580306.880	119	19136769582.411		
	Total	2497707197534.670	121			
3	Regression	313980832651.216	3	104660277550.405	5.655	.001(d)
	Residual	2183726364883.450	118	18506155634.606		
	Total	2497707197534.670	121			

a. Dependent Variable: Average revenue

b. Predictors: (Constant), Enterprise Resource Planning (e.g. KulcsSoft, Armada, Libra, SAP) usage.

c. Predictors: (Constant), Enterprise Resource Planning (e.g. KulcsSoft, Armada, Libra, SAP) usage, Interactive banking.

d. Predictors: (Constant), Enterprise Resource Planning (e.g. KulcsSoft, Armada, Libra, SAP) usage, Interactive banking, Computers connected to the internal network.

Source: authors' own design based on SME database

Appendix 3. Model matching
Model Summary (d)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Confidence					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.240(a)	.058	.050	140060.57398	.058	7.324	1	120	.008	
2	.297(b)	.088	.073	138335.71333	.031	4.011	1	119	.047	
3	.355(c)	.126	.103	136037.33177	.037	5.055	1	118	.026	1.932

a. Predictors: (Constant), Enterprise Resource Planning (e.g.KulcsSoft, Armada, Libra, SAP) usage.

b. Predictors: (Constant), Enterprise Resource Planning (e.g. KulcsSoft, Armada, Libra, SAP) usage, Interactive banking.

c. Predictors: (Constant), Enterprise Resource Planning (e.g.KulcsSoft, Armada, Libra, SAP) usage, Interactive banking., Computers connected to the internal network.

d. Dependent Variable: Average revenue

Source: authors' own design based on SME database

Appendix 4. Parameters of the final model

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.	Correlations			Collineary statistics	
	B	Std. error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1 (Constant)	72033.455	13668.512	.240	5.270	.000					
ERP (e.g. Armada, Libra, SAP) using	99093.707	36616.490		2.706	.008	.240	.240	.240	1.000	1.000
2 (Constant)	104046.081	20922.377		.4973	.000					
ERP (e.g. Armada,	114158.472	36939.499	.276	3.090	.002	.240	.273	.271	.959	1.043
Libra, SAP) using,	-53554.377	26640.138	-.179	-2.003	.047	-.123	-.181	-.175	.959	1.043
interactive banking										
3 (Constant)	72865.780	24812.219		2.937	.004					
ERP (e.g. Armada,	106287.717	36494.057	.257	2.912	.004	.240	.259	.251	.950	1.053
Libra, SAP) using,	-59206.990	26326.533	-.199	-2.249	.026	-.123	-.203	-.194	.949	1.054
interactive	57819.781	25716.655	.196	2.248	0.26	.202	.203	.194	.977	1.024
banking, computers connected to internal network										

Source: own edition

Testing the existence of regression - ANOVA(a)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	146472430490.019	1	146472430490.019	7.476	.007(b)
	Residual	2351234767044.650	120	19593623058.705		
	Total	2497707197534.670				

a. Dependent Variable: Average revenue

b. Predictors: (Constant), IT platform application for internal information exchange (eg. Intranet, teamwork supporting)

Source: own edition

Parameters of the final model

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.	Correlations			Collineary statistics	
	B	Std. error	Beta			Zero-order	Partial	Part	Tolerance	VIF
(Constant)	77292.933	13052.943		5.291	.000					
IT platform application for internal information exchange (e.g. Intranet, teamwork's supporting)	148990.960	54492.828	.242	2.734	.007	.242	.242	.242	1.000	1.000

Source: own edition