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IT SUPPORT TO MANAGEMENT CONTROL IN SMALL AND MEDIUM-SIZED ENTERPRISES

INFORMATYCZNE WSPARCIE DLA KONTROLI ZARZĄDCZEJ W MAŁYCH I ŚREDNICH PRZEDSIĘBIORSTWACH

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Summary: IT systems are seen as invaluable support to financial and accounting specialists, however, many enterprises are unable to use their analytical potential. The paper validates a positive contribution of the systems to the effectiveness of management control in small and medium-sized companies. The research included 129 Polish SMEs. Even though IT systems of ERP and BI classes were not commonly available (they were used by 18.6% of SMEs), it was observed that financial and management accounting received adequate IT support (in 58.1% of cases). Furthermore, sales and customer service were seen as domains where ITs contributed the most to the business. Finally of 51 SMEs which had no access to advanced software, only 7 found that situation negative.

Keywords: control, information systems, planning, small and medium-sized companies.

Streszczenie: Systemy informatyczne postrzegane są jako bezcenne narzędzie wsparcia dla służb finansowo-księgowych, jednak wiele przedsiębiorstw nie potrafi wykorzystać ich potencjału. Niniejszy artykuł weryfikuje czy systemy te pozytywnie wpływają na działanie kontroli zarządczej w małych i średnich przedsiębiorstwach. W badaniu wzięło udział 129 polskich przedsiębiorstw. Mimo niewielkiej dostępności systemów klasy BI/ERP (użytkowanych przez 18,6% badanych jednostek), zadeklarowano szerokie wsparcie dla zadań z obszaru rachunkowości finansowej i zarządczej (58,1%). Za najbardziej użyteczne uznano rozwiązania wspierające sprzedaż i kontakty z klientami. Niemniej 51 badanych MSP nie korzystało z zaawansowanych narzędzi informatycznych, ale tylko 7 uznało to za stan niekorzystny.

Słowa kluczowe: kontrola, systemy informatyczne, planowanie, małe i średnie przedsiębiorstwa.

1. Introduction

There is no doubt that business information systems (ITS) support accounting and financial staff in companies, including specialists in management control (MC), in performing their tasks. The latter group benefits from a capacity of ITS to overview all business processes and relations between them, what enables to detect inefficiencies in any functional area and suggest adequate remedial measures. P.-D. Kluge et al. [2005] emphasise that there are four prerequisites of effective management control, which include: comprehension of all core business processes, reliable data from inside and outside of a company, computer-aided tools and methods which process information used in management control, and creativity in transferring information into knowledge to be used by managers of a company in a decision-making process.

Research shows [Sedera et al. 2003] that in particular small companies fail to benefit from functionalities of ITS and tend to see less of a value added from an implementation of such systems than large enterprises. Nonetheless, IT providers witness growing income on implementation of ERP systems in small and medium-sized companies, and this revenue stream gains in importance in their overall sales figures (see, for example, quarterly reports of Comarch 2012–2016).

In the foregoing context the authors conducted the research in 2016–2017 which included 129 Polish SMEs. The results of the study, an in particular information on the scope of support received by SMEs from ITS, should enable to attain the goal of this paper, which is to determine whether planning, control, reporting and communication processes – all consisting major tasks of management control – are effectively supported by information technologies in small and medium-sized enterprises.

2. Integrated information systems versus the needs of SMEs

Implementation of IT systems in small and medium-sized companies requires matching organisational goals and limitations with capacities and cost of available IT systems, considering a business environment where particular companies operate. In this respect it should be noted that IT strategies and implementation methodologies being successful in large companies may not be so in case of smaller enterprises [Zach 2012]. That results from substantial differences between the two groups of companies in such areas as: an access to resources [Blili, Raymond 1993; Cragg, King 1993; Ghobadian, Gallear 1997; Gable, Stewart 1999; Bernroider, Koch 2001; Levy, Powell 2000; Wong, Aspinwall 2004; Buonanno et al. 2005; Raymond, Uwizeyemungu 2007; Seethamraju, Seethamraju 2008], management methods [Blili, Raymond 1993; Ghobadian, Gallear 1997; Gable, Stewart 1999; Wong, Aspinwall 2004], organisational structures and cultures [Blili, Raymond 1993; Ghobadian, Gallear 1997; Gable, Stewart 1999; Wong, Aspinwall 2004] as well as internal processes and procedures [Ghobadian, Gallear 1997; Wong, Aspinwall 2004].

Small and medium-sized enterprises are also characterised by their operations being geographically restricted to local or nation-wide markets, what may entail an access to a limited group of customers and dependence on influential partners within their logistic chains [Blili, Raymond 1993; Ghobadian, Gallear 1997; Wong, Aspinwall 2004; Seethamraju, Seethamraju 2008]. All the aforementioned factors cause that smaller enterprises are more vulnerable to business risks [Blili, Raymond 1993; Gable, Stewart 1999; Seethamraju, Seethamraju 2008]. Moreover, the discussed group of enterprises has less experience with modern information technologies, what causes lack of strategy of developing their IT infrastructure, including integrated ITS [Blili, Raymond 1993; Cragg, King 1993; Cragg, Zinatelli 1995; Levy, Powell 2000; Levy et al. 2001; Shiau et al. 2009; Chang, Hung 2010].

Integrated information systems, such as those of enterprise resource planning (ERP) class, resemble a nervous system, with data from various functional areas of a company acting as signal to be processed in order to inform about changes in the business environment that a company needs to react to [Ahmad, Cuenca 2013]. In that sense distorted or delayed signals cause no or inadequate response, exposing a company to new business problems or aggravating existing ones. Thus a successful implementation and use of an integrated system depend not only on technology but also on organisational factors, including: a support of the management, adequate IT project management methodology as well as change management before, during and after an implementation of a system [Gupta et al. 2014].

Small and medium-sized companies need to take their decision of implementing ITS systems, considering actual information needs and potential business benefits. Therefore, smaller enterprises prefer those solutions which are cost effective and may be implemented in a shorter time. Consequently, IT providers offer more compact solutions addressing requirements of SMEs and specific local (country-wide) business environment. Moreover, budgetary constraints of SMEs result in ITS being offered in a flexible pricing model, where only basic modules are initially installed and where a total cost of using a system is variable – depending on a number of register users and a period of subscription. Later on, when business benefits of ITS are already seen by a company, the system can be upgraded by adding more functionalities grouped in specialised modules and/or increasing a number of licences [Venkatraman, Fahd 2016].

IT providers react also to needs of small and medium-sized enterprises by offering convenient hosting options such as application service providing (APS), which may be seen as renting software with accompanying services using the wide area networks. In this model SMEs may count on economic, technological and organisational benefits. The first include lower acquisition cost and limited maintenance cost, the second are related to reliability of software i.e. high quality and security of information resources, and the last are linked to a quick access to data and data sharing within the whole organisation [Dziembek 2009]. Nowadays, APS evolves toward software as a service (SaaS) model, which differs from APS in this respect that instead of offering separate

resources (software and hardware) to individual clients, the same platform is used by multiple customers. Due to an economy of scale, SaaS should be seen as a more economical version of APS, since the same ITS is available to multiple geographically dispersed users.

3. Information support to management control in SMEs – the empirical evidence

The objective of the study presented in this paper was to determine whether and to what extent information systems of various classes supported planning, control, reporting and communication processes in small and medium-sized companies. In order to attain the goal a survey including 129 Polish SMEs was conducted at a break of 2016/2017. The survey included 20 questions blocked in five groups, related with: planning, evaluation, reporting, communication and information support. Every question was provided with 6 responses and a possibility to formulate another answer. Every close-ended question was followed by two open ones, aimed at evaluation of the examined area from two perspectives: organisational (whether a situation in question matched a size and scope of business operations of a company) and that of individual employees (whether it fulfilled employee's expectations). Beside open answers respondents were expected to quantify their opinions using 5-grade Likert scale. Finally, the authors formulated six questions which qualified examined enterprises to subclasses, according to their: legal form, industry, size (measured with employment, turnover, and total assets), time of operation at a market, geographical scope of activities and important changes observed in a company in the recent year.

Quantitative data collected in the study were processed with statistical software in order to obtain descriptive statistics and to test differences between mean values in those SMEs which used advanced ITS (of BI or ERP classes) versus those which did not. In addition, narrative answers to open questions about types of systems used and a scope of support they offered to a company (both from organisational and employees' perspectives) were analysed using text mining software (KH Coder). The input data were pre-processed by the authors so that Polish text could be analysed by the said system. The foregoing procedure was applied in order to obtain answers to the three research questions.

RQ1: Which classes of ITS are more and which are less often applied in SMEs?

RQ2: Which tasks belonging to those of management control receive better support when BI/ERP systems are available and which do not?

RQ3: What factors influence opinions on usefulness of ITS among a broad group of users in SMEs?

Before results of the study are introduced, brief characteristics of the research sample should be presented. Considering the size of an enterprise, small companies prevailed (accounting for 45.0% of the sample). However, numbers of microenterprises

(29) and medium-sized ones (42) were sufficient to prevent a size-related bias. Looking at a period of operations at a market, a balanced structure of the sample was obtained (with 45 SMEs which initiated their activities between 2001 and 2008, 40 before that period and 44 after 2008). A sectoral structure was dominated by service providers (42.7% of the sample), companies operating in trade and logistics (30.2%), and manufactures (14.7%). Other sectors, including: food industry, construction, ICT and finance were represented by a similar number of companies (making between 6.2 and 8.5% of the sample). It should be pointed out that more than one core industry could be indicated, and consequently 10 companies linked services and trade, 4 services and finance and 3 manufacturing and trade, with few other links observed. Considering the scope of operations, 41.9% of examined SMEs operated at a local market, 32.6% acted country-wide, whereas 25.6% conducted international operations. The presented characteristics entitle to state that the research sample was diverse enough to prevent an influence of a specific SME subgroup on ultimate results.

The first phase of the study was the analysis of dynamics of changes in terms of information support received by SMEs (see Table 1). It can be noted that in the recent period substantial changes in this respect were reported by 44.2% of companies, and in 34.9% of all examined SMEs the recent year brought positive changes to their business operations. Such intensive changes in IT domain evidence that information technologies should be seen as an important factor contributing to the growth of SMEs. It is important to point out that in most of the cases (79.0%) changes in IT infrastructure lead to positive changes in other functional areas already in the same year. In 19.3% of situations no influences were observed yet, and only one small company reported negative impact of ITS implementation on their business operations. It should be mentioned as well that intensity of changes in IT domain increased along with the size of a company. In case of microenterprise the share of companies which reported no improvements after an implementation of new ITS was the highest (13.8%), contrary to small companies where the same share of organisations stated that implementation of IT systems lead to much better situation in other functional areas of the company.

Table 1. Development of ITS in small and medium-sized enterprises (in %)

Size class	No implementation recently	Situation after implementation of ITS*			
		worse	the same	better	much better
Micro	65.5	– (–)	13.8 (40.0)	13.8 (40.0)	6.9 (20.0)
Small	56.9	1.7 (4.0)	5.2 (12.0)	22.4 (52.0)	13.8 (32.0)
Medium	47.6	– (–)	9.5 (18.2)	33.3 (63.6)	9.5(18.2)
SME sector	55.8	0.8 (1.8)	8.5 (19.3)	24.0 (54.4)	10.9 (24.6)

* The numbers in brackets refer to those enterprises only where changes were observed.

Source: own elaboration.

Table 2 presents results of the analysis on application of information technologies in Polish SMEs, including four areas: classes of ITS used, functional areas of a business where IT support was the most beneficial, functionalities of ITS applied and a use of office software. It was also indicated how capacities of various ITS used in small and medium-sized companies were perceived considering business effectiveness of an organisation as a whole and usefulness to individual employees (and differences between the two perspectives).

Table 2. Scope of IT support to small and medium-sized enterprises

Situation (all answer options)	Answers		Evaluation perspective		
	<i>n</i>	%	organisation	employee	difference
1	2	3	4	5	6
Classes of IT systems used in a company					
The company uses business intelligence systems	6	4.7	4.83	4.83	–
The company uses ERP systems	21	16.3	4.33	4.48	+0.14
The company uses specialised software	66	51.2	4.48	4.35	-0.14
The company uses financial and accounting software	66	51.2	4.21	4.21	–
The company uses small business software	30	23.3	3.87	4.00	+0.13
The company uses office software and openly-accessible tools	23	17.8	4.22	4.26	+0.04
Scope of support received in various functional areas of a business					
ITS supports production and service provision	61	47.3	4.44	4.51	+0.07
ITS supports sales and customer service	69	53.5	4.49	4.55	+0.06
ITS supports supply, inventory management and logistics	40	31.0	4.40	4.48	+0.07
ITS supports human resources management and work scheduling	53	41.1	4.40	4.38	-0.02
ITS supports finance, accounting and management control	75	58.1	4.45	4.49	+0.04
The company uses ITS to a very limited extent	23	17.8	3.83	3.83	–
Functionalities of ITS applied in a company					
ITS supports work mobility (cloud computing, mobile access)	43	33.3	4.42	4.19	-0.23
ITS supports decision-making (modelling, simulations)	11	8.5	4.55	4.27	-0.27
ITS supports business analyses and reporting (data mining, report generators)	43	33.3	4.49	4.42	-0.07
ITS supports work scheduling and project management	31	24.0	4.45	4.39	-0.06

1	2	3	4	5	6
ITS supports information (work) flow	33	25.6	4.58	4.52	-0.06
The company uses very simple IT tools	51	39.5	3.84	3.88	+0.04
Use of office software in routine tasks of a company					
A full capacity of office software is used (data bases, analytics, visuals, project management)	24	18.6	4.38	4.58	+0.21
Advanced business analyses are conducted (data bases, spreadsheets, programming)	16	12.4	4.25	4.31	+0.06
Office software is used to analyse data, prepare reports and presentations	46	35.7	4.30	4.48	+0.17
Office software is used to create simple calculations, charts and documents	82	63.6	4.33	4.34	+0.01
Office software is primarily used to edit documents and send e-mails	73	56.6	4.37	4.38	+0.01
The company does not use office software	3	2.3	3.33	3.33	-

Source: own elaboration.

As types of systems used are concerned, specialised software together with finance and accounting systems prevailed. The examined enterprises often combined the two solutions. As many as 24 SMEs (18.6% of the sample) used enterprise resource planning and/or business intelligence systems. The companies participating in the study supported their activities with small business software or with office software together with openly-accessible programmes. However, only in few cases (8 and 13, respectively) those were the only forms of IT support to their business operations. The most beneficial IT solutions, in both perspectives, were those belonging to BI class, nonetheless in overall very high or high satisfaction level with any type of IT solutions was reported by the examined SMEs.

When application of ITS in functional areas of enterprises is analysed, one can see that SMEs benefit from a comprehensive support of such systems. The primary area in this respect is that of finance, accounting and management control, however, sales and customer support as well as manufacturing and service provision – covering critical processes for the value generation – are not far behind. There were no differences observed in usefulness of ITS in all the examined areas, nor the perspective of evaluation – organisational versus that of employees’ – lead to any significant discrepancies. All that suggests a good match between an offer of IT providers and information needs of SMEs.

The examined SMEs benefited also from a broad range of IT functionalities, with an exception of decision support tools, including modelling or simulations. Systems supporting information (work) flow turned out to be seen as the most effective, however, the usefulness of ITS in this respect did not differ substantially from other options examined. One should note that, having all the functionalities listed,

a significant share of companies declared they did not use advanced IT solutions. The share of such indications more than doubled that of the previous question when the application of IT solutions (not only sophisticated ones) was investigated. It means that SMEs are aware of the existence of better IT tools than the ones they use.

Finally, it may be observed that nearly all the examined SMEs had office software installed, however, in majority of cases only basic functionalities were applied. Nonetheless, every third SME declared using that software to analyse data, prepare reports or presentations, and 24.0% conducted advanced analyses or benefited from the whole range of office programmes (databases, VBA, project management), what was very positively assessed by employees (score of 4.58).

With regard to the research question 2, a comparative analysis of those SMEs which used advanced information systems of BI / ERP classes versus all other was performed. The analysis included questions on such functions of management control as: planning, evaluation, reporting and communication. Results of the comparison, indicating statistically valid ($p < 0.05$) differences between mean values in the two groups, are presented in Table 3. Considering the four management control functions there existed 24 potential areas of discrepancies between the two groups.

Table 3. Advantages of using BI/ERP systems in small and medium-sized companies

Situation (selected answer options)	Frequency		p^*
	SMEs using BI/ERP (%)	other SMEs (%)	
1	2	3	4
Planning and budgeting			
Strategic plans are formulated by the management and passed to employees for their information	66.7	41.0	0.022
Objectives are formulated in a comprehensive way, referring to a strategy, KPIs and operational plans	29.2	8.6	0.005
Employees perform the same tasks in regular intervals	0.0	36.2	0.000
The company installed top-down budgeting, however, operational units and teams are consulted	45.8	16.2	0.001
The company does not set up budgets, but it has developed general rules on incurring expenses	0.0	23.8	0.008
Evaluation and control			
The company has a specialised control unit	16.7	2.9	0.007
The company has developed procedures for performance and cost control	79.2	49.5	0.008
The company applies financial ratios in its control processes	54.2	22.9	0.002
The company within its control processes confronts plans (budgets) with their execution	66.7	38.1	0.011
The company within its control processes surveys customers and/or employees	37.5	17.1	0.027

1	2	3	4
Employees of the company have their bonuses linked with a performance of the whole enterprise	33.3	15.2	0.040
Remuneration and promotion of employees depend on their individual performance	54.2	28.6	0.016
Information flow and reporting			
The company prepares comprehensive, openly-accessible statements on its activities, including financial and non-financial (e.g. social, environmental) issues	20.8	1.9	0.000
The company generates management reports directly in its information system	29.2	8.6	0.005
The company prepares regular management reports on performance, goals achievement etc.	54.2	15.2	0.000
The company prepares annuals activity reports	50.0	25.7	0.019
The company passes various data analyses and performance-related information to its employees	45.8	9.5	0.000
Internal and external communication			
Communication between organisational units is effective	87.5	63.8	0.025
The company presents information on its achievements and performance on its website	58.3	30.5	0.010
The company created a special investor, partner or customer zones within its website	29.2	8.6	0.005

*Value calculated for theoretical variables of continuous probability distributions.

Source: own elaboration.

Considering planning activities one should note that advanced ITS supported not only operational planning but also strategic one. They also helped in formulating goals with a reference to KPIs, supported top-down budgeting and enabled flexible delegation of tasks to employees, what proved to be more difficult otherwise.

Looking at control and evaluation tasks, a broad range of benefits resulting from application of BI/ERP systems was observed. First of all, performance and cost control was much more comprehensive. Secondly, such evaluation methods as: financial ratios, analyses of variances between plans and executions, as well as surveys on satisfaction of customers or employees were used much more frequently. Consequently, information collected by management control allowed for developing remuneration and promotion systems based on individual performance. Finally, it should be noted that implementation of BI/ERP was more frequent in those SMEs which created a specialised control unit.

The examined SMEs enjoyed advantages of BI/ERP software also in the area of management reporting. Obviously, implementation of advanced ITS enabled generation of reports directly from those systems, without additional workload needed. An important observation was that more than a half (54.2%) of SMEs using advanced

ITS prepared regular management reports, what happened only in 15.2% of other examined companies. The improvement in information flow to internal and external stakeholders was observed as well, since significantly higher a share of SMEs provided performance-related information to their employees (+36.3%) or prepared annual activity reports (+24.3%) and shared them online (+18.9%) when they used BI/ERP software, which made their information systems more mature. Finally, BI/ERP also improved communication in examined SMEs, making horizontal information flow between organisational units very effective.

The identified contributions of business information systems, including those belonging to BI/ERP classes, to the effectiveness of management control in SMEs may be understood better when answers to open questions included in questionnaires

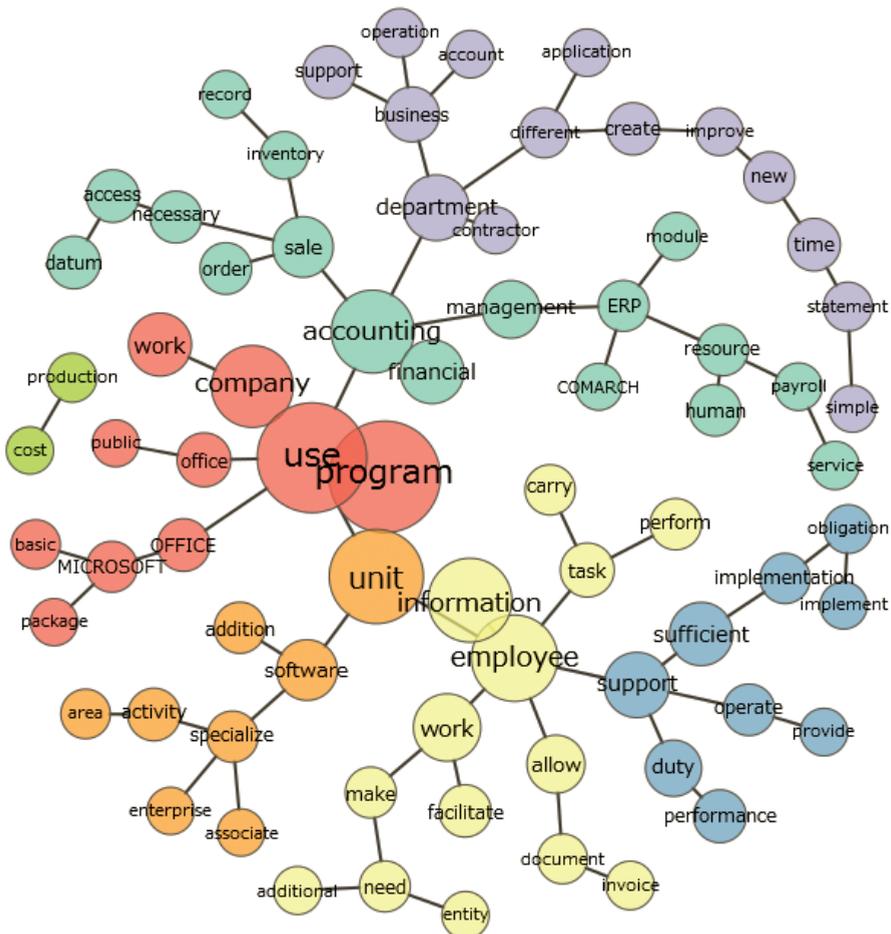


Figure 1. Major areas of interest related to application of ITS in small and medium-sized companies

Source: own elaboration based on visualization in KH Coder.

are analysed. The results of text mining using KH Coder software are visualised in Figure 1, representing the so-called minimum spanning tree. Words remaining in closest relations, measured with Jaccard correlation coefficient, are linked, and groups of such words are presented in different colours. The narrative data were pre-processed by the authors, so that the analysis of Polish text was possible.

The first topic related to a use IT software (keyword: 'program') is that linked to office tool, as in particular to the most popular Microsoft Office suit. Such support is seen as indispensable but very basic. However, as indicated in another word cluster (keyword: 'unit') particular units of an organisation require additional, more specialised software, and this specialisation needs to be adequate to the specific activity area of an enterprise. Another topic related to ITS in small and medium-sized companies is information provided to employees so that they can perform their tasks effectively (keyword: 'employee'). The emphasis in this respect is on the access to sales documents, such as invoices. The fourth area (keyword: 'support') leads to external information obligations (resulting from legal regulations) which SMEs need to fulfil.

Another branch of the minimum spanning tree emphasises information needs of accounting staff (keyword: 'accounting'). Even if financial accounting is the priority in this respect, it is strictly related to sales management (including management of sales orders and inventories). On the other hand, the management requires an integrated picture of a company, which can be obtained by using ERP software and diverse modules it offers. It is expected that ERP also improves human resources management. Interestingly, the examined SMEs in majority rely on systems provided by one Polish developer what causes that terms 'ERP' and 'Comarch' are strictly related one to another. The final identified area of interest is that related to the IT strategy of an SME dictated by information needs of particular departments (keyword: 'department'). As can be seen, the vital issues mentioned by respondents are those related to optimising support to business operations of particular units by combining various applications and implementing new software which shortens time of generating statements. All that head for the idea of business intelligence.

4. Conclusions

The research on application of business information systems in small and medium-sized companies and support of those systems to management control, which was presented in this paper, leads to numerous conclusions. First of all, it was observed that companies belonging to the said group are actively looking for IT support to their operations, since in more than every third examined SME there were positive changes in this respect observed recently. Secondly, the SME sector looks for more advanced software. The IT systems belonging to ERP or BI classes were available to 18.6% of Polish SMEs which participated in the research. The study showed that those systems generated visible effect both on organisational scale and in the perspective of individual employees. Nonetheless, a smaller scale of business

operations in many examined enterprises caused that informatisation level was not always high. Of all examined SME as many as 51 declared lack of access to more advanced ITS. Interestingly, only in seven companies this situation was perceived as negative.

Finally, it should be emphasised that investigation of an influence of information technologies on management control is particularly relevant, since it was the accounting (financial and managerial) which primarily received technological support in SMEs (58.1% of all examined enterprises). According to the narrative analysis a match between management control and business information systems could result in a better overview of sales and inventory management on the one hand, and human recourses on the other one – all in an integrated environment of ERP systems.

The authors are aware that conclusions drawn need to be perceived with some cautiousness, since all benefits of IT systems to examined companies and their links to management control had declaratory character. Even if not only choices in close-ended questions, but also evaluations of usefulness using Likert scale, as well as narrative answers to open questions seem to be consistent, it was not investigated how ITS changed the way in which particular organisations operated over time or what value they actually generated. Nonetheless, the list of potential benefits obtained in this study may serve as a direction for longitudinal analyses either related to individual companies, or to a representation of the SME sector.

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