

The essence and barriers to the use of controlling in the practice of manufacturing enterprises

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Abstract: The theory, but also examples from practice confirm the fact that the use of controlling in economic practice differs significantly in the context of understanding its essence. The ambiguity of the definition of controlling, two different thought concepts, the diversity of tools and approaches, but also other barriers prevent its use to a greater extent than this managerial approach would deserve. The current research is based on the understanding of the essence of controlling in German-speaking countries and is oriented towards a coordinated predictive management approach based on precise cost reports. The research question was aimed at identifying current use and barriers of controlling in manufacturing enterprises in relation to the understanding of its essence and impact of performance through a questionnaire survey and structured interviews with managers from 2021 to 2022. A population of 2,504 enterprises was addressed by means of stratified sampling. The chi-square goodness-of-fit test was used to test how well the characteristics of the research sample fit the final population. A total of 352 manufacturing enterprises formed the resulting sample representative – enterprise size and type of industry designated according to the European standard industry classification system. Methods of contingency analysis and interval estimates of the population proportion were used to test the stated hypotheses. The testing confirmed a dependence between the practical use of a broader scale of controlling tools and the performance of enterprises measured by the return on sales (ROS) indicator, as well as the difference in the perception of barriers to the implementation of controlling depending on the size of enterprises. Controlling with the assistance of software support of the management information system, with a detailed implementation process and precisely defined competencies of employees and controllable KPI, creates the potential to increase the complexity of management and performance of enterprises as well as the elimination of potential risks.

Keywords: Controlling, barriers, performance, return on sales.

JEL Classification: M11, M21, M40, P41.

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Introduction

The current development of the market economy places increasing demands on enterprises in terms of adaptation and anticipation of changing conditions. The business environment is highly competitive with unexpected changes in the cost structure; thus, it is necessary to constantly adapt to market requirements while not forgetting about product innovations or the management system. Controlling is one of the concepts that have the potential to help a company address these challenges. Baldi (2020) and Wijethilake et al. (2018) state that innovations in connection with controlling are the driving force behind the development of each sector. However, there is no single definition of controlling. Not only in theory but also in practice, there are differences in the definition of the content of business controlling. The term controlling and its understanding vary according to individual authors and users. Even in academic circles, the opinion on its content is not uniform. Eschenbach (2004), an important expert and innovator in the field of controlling, defined its essence as managing a business as a complex system and at the same time trying to maintain control over this management system. An interesting definition of controlling is offered by Robbins and Coulter (2018), who define controlling as a process of precise monitoring, subsequent comparing with the desired condition, and correcting actions in the context of business performance. The practical use of controlling concept can be identified in many areas, especially in finances (Kozarevic & Vehabovic, 2020; Wang & Shailer, 2022), investments (Agarwal & Chaudhry, 2022; Sekścińska et al., 2021), a wide range of costs (Behúnová et al., 2022; Nowak, 2016), but also in personnel (Nowak et al., 2020; Voynarenko et al., 2020) and also in quality areas (Dahlgaard et al., 2019; Nowosielski, 2018). Many companies of different industries and sizes often perceive controlling and its application in practice. This diversity of perceptions consequently results not only in differences in the complexity of controlling use but also in their performance.

This work aims to find the answer to the research question and identify the current use and barriers of controlling systems in the praxis of manufacturing companies in the context of perception of its nature and its impact on performance. The research is focused on testing the dependence of the real use of controlling

tools range and business performance, as well as on the direct identification of barriers and certain risks arising from the implementation of controlling. The orientation of the research thus fills a research gap in the given issue. The research seeks to initiate a discussion on the issue and to launch research and comparison of the authors' results in other European countries. The design of the study is structured chronologically. The review of relevant literature focuses on formulating the research question and research hypotheses. Subsequently, the methodology is presented, and based on the analysed results and discussion, certain recommendations, as well as limits and future orientations of research in the issue are proposed.

1. Theoretical background

In literature and practice, the essence of controlling is perceived differently with a number of recommended and used practical tools and approaches. According to the literary review, there are several definitions of controlling, which differ from author to author and their point of view. Often, however, such an individual view tends to predetermine a different meaning to controlling. In practice, every larger company applies a certain range of controlling tools in the management system. Still, due to its ambiguity in defining the content essence, there are several perspectives on what controlling should be principally focused on. Having joined many efforts to explain the essence of controlling (Baldi, 2020; Bieńkowska, 2021; Robbins & Coulter, 2018; Todorović et al., 2017; Tworek & Sałamacha, 2019), it can be stated that controlling is a managerial function that deals mainly with the financial management of the organisation in connection with its strategy. The essence of controlling is ideally defined by Gurčík (2018), who describes controlling as a specific concept of corporate management which connects areas of the planning and control process. The problems of ambiguity in the definition of controlling have their essence in the history and regional development of this managerial approach and impact its practical use. The history of controlling dates to the end of the 19th century when production became more complex and managers needed better information about their financial flows. As Goto et al. (2014) mention, especially in the USA, managers started to use systems for verification of production costs, which allowed them to monitor production

performance and costs of raw material, energy and labour in detail. In the 20th century, controlling became part of the management practice in various industries. New monitoring and cost management tools emerged during this time, such as budgeting and budgetary control. Otley et al. (2013) suggest that the process of improving the technology of data collection and analysis was noticeable, and already in the 1970s, controlling became an important part of corporate management in order to improve efficiency, reduce costs and increase the profitability of enterprises.

Today, controlling is a key part of managing organisations of all sizes and types because modern information technologies allow access to many data and give managers the possibility to quickly respond to changes in the business environment. In connection with controlling, there is often talk about the consistency of primary and secondary management coordination, which are interrelated and impact each other (Eschenbach, 2004). It is a primary and secondary coordination. Primary coordination integrates all business management activities, and secondary coordination creates a subsystem of information collection for decision-making in the planning system and implements the necessary control of the whole system. Based on historical development, it is possible to talk about two separate concepts of controlling, namely European and American, which impact the level of its practical use. The American approach focuses on quickly increasing profits and raising business performance. Emphasis is placed on innovation and market success, and benchmarking is used to set targets to improve performance. It is based on applying a wide range of financial indicators to measure performance, and ensure financial stability and productivity, especially in production, distribution and logistics. Financial performance indicators include profit, revenues, costs, return on investment and cash flow. As Dijkman (2019) and Belas and Rahman (2023) mention, the other performance indicators include productivity, efficiency, market growth rate, and competitive position. A different European approach often focuses on traditional values such as stability, responsibility and long-term sustainability. In its conception, the dominant factor is the principle of control and, in its connection, also the regulation and adoption of active measures. However, a strong focus on control

can be a major weakness. However, the control should focus on monitoring and evaluating whether the implemented activities are carried out in accordance with plans and standards. These are reactive management processes aimed at correcting of errors and deficiencies based on the past. Controlling, however, in its comprehensive understanding, focuses mainly on active management and performance planning to meet goals per the corporate strategy. These are predictive management processes oriented toward the future. The context of focusing on past performance management vs. active future performance management provides fundamental differences between control and controlling. If the focus of controlling on the control itself can be eliminated, this European approach has great potential to be a managerial approach that builds the competitiveness and performance of enterprises, as well as an approach that provides important information in decision-making. As part of the European approach, it should be noted that the understanding of the essence is also different in individual countries. Controlling is perceived and used more comprehensively in countries with a German language base. Research by Janka and Günther (2020) and Zeman et al. (2018) support the claims that costs and precise controlling reports are the main essence of the practical use of controlling for predictive management processes and decision-making processes. As Mocanu (2014) states, controlling in countries with an English language base is mainly used from a management approach as an information bases for supporting decision-making processes. Current research is based on understanding the essence of controlling in these countries and, consequently on Slovak theory and practice in manufacturing enterprises. These enterprises have been chosen because, in the highly competitive environment, the application of innovations creates a high potential for the application of controlling principles.

In the application of controlling, several main tools are predominantly used to monitor and manage the performance of enterprises. Several authors (Konsek-Ciechońska, 2017; Lositska et al., 2022; Mazaraki & Fomina, 2016; Reta et al., 2018; Štefko et al., 2019) point out the following tools: budgeting, benchmarking, balanced scorecard, cash-flow management, risk management and, in particular, various tools for cost, calculation and benefit analysis.

The range of use of these tools was also part of the presented survey, which identified the essence, benefits, barriers, and future interest in using controlling in the practice of industrial enterprises. Research by Weber and Schäffer (2019) and Jánská et al. (2017) support the claims that controlling by using a range of tools can create benefits that many managers will appreciate. This managerial approach allows the identification and elimination of unnecessary costs and inefficient processes. It can also provide managers with important decision-making information in the areas of finance and investment. Controlling has the potential to create better collaboration between departments to adequately identify and evaluate risks and plan measures to eliminate them, as well as to contribute to greater employee motivation and performance through feedback on their assessment. The relationship between controlling vs. business performance is definitely interconnected. This is evidenced by the results of several studies (Bieřkowska, 2020; Fecková Škrabuláková et al., 2019; Todorović et al., 2017; Weber & Schäffer, 2019). Some authors emphasise the very justification of the importance of financial control in their studies. Interesting examples are the authors' studies Kozarevic and Vehabovic (2020) and Khudyakova et al. (2019), but their research has not yet shown whether the using of a wide scale of controlling tools influences any indicative performance parameter.

Indeed, the application of control mechanisms in practical scenarios anticipates specific advantages, and at the same time, it also entails risks and barriers linked to its implementation. These challenges predominantly encompass financial and human resources considerations, along with the requisite technical expertise and analysis of pertinent data. Since controlling also requires a certain change in thinking and management philosophy, the fear of carrying out such change is a natural obstacle to its implementation. Another barrier is the fear that the implementation costs will outweigh the possible benefits of controlling. Incorrect analysis, large data volumes, and an over-emphasis of financial indicators that underestimate other aspects of performance, such as customer satisfaction or innovation, can also be problems. The research of some authors points individually to certain barriers to the implementation

of controlling, but without further identification of their meaning and importance and possible causal factors (Sedliačiková et al., 2019; Teplická et al., 2020; Vacekova & Pavlik, 2013). In this research, the assumed and examined causal factor identifying barriers to the implementation of controlling was the size of enterprises. These assumptions became the basis for defining one of the research hypotheses.

Based on the presented information from the literature review, which confirmed the absence of conducted research and analyses in relation to the practical use of controlling, the following research question (RQ) was specified in the context of fulfilling the goal of the contribution:

RQ: What is the actual level of use and barriers of controlling in manufacturing enterprises in the context of perception of its practical essence?

2. Research methodology

The paper's main goal is to define the range of accessible controlling tools and barriers in Slovak manufacturing enterprises. The size of enterprises is examined as a factor determining the difference in the scale of the use of controlling in manufacturing enterprises. A possible effect is the different level of the company's performance indicator – return on sales (ROS).

For the collection of input data, the primary quantitative survey was the main method. Using the available Google form platform, the questionnaire survey was carried out in 2021 and additionally in 2022, and the data was also obtained through structured interviews with managers of selected industries of manufacturing enterprises. Targeted contacts were made with manufacturing enterprises whose number of employees was more than 10. These enterprises formed the basic population of industrial enterprises registered by the Statistical Office of the Slovak Republic. The enterprises were divided into three groups according to enterprise size, based on the European Commission Directive No. 2003/361/EC (European Commission, 2003) and into the industries based on the NACE codes (European Industry-Standard Classification System, section C – Manufacturing).

Yamane Taro's formula for a population of a finite size was used to identify the minimum sample size (Drew, 2022). For the population with a size of 2,504 enterprises (N) and

an acceptable error 0.05 (e) the minimum sample size of 345 enterprises (n) was derived.

$$n = \frac{N}{1 + N \cdot e^2} \tag{1}$$

$$n = \frac{2,504}{1 + 2,504 \cdot 0.05^2} = 345$$

To ensure the representativeness of the research sample, a stratified sampling pattern was followed. The questionnaire was

distributed by individual e-mail contacts to 2,504 manufacturing enterprises with locations in Slovakia. Out of the total number of respondents, the return rate of the questionnaires represented 14.06%, which is 352 manufacturing enterprises. The structure of the research sample by industry is shown in Fig. 1. European industry standard classification system, section C Manufacturing (NACE codes) was used to denote individual branches of industry. In terms of enterprise size, the research sample consists of 173 small, 135 medium-size, and 44 large enterprises. The sample is shown in Fig. 1.

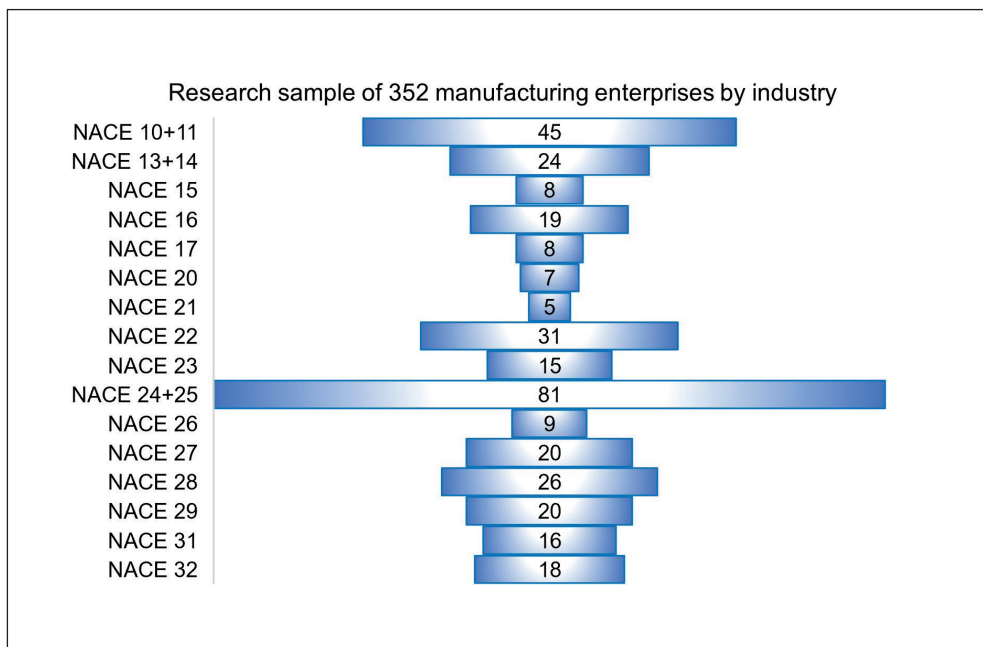


Fig. 1: Research sample by industry

Source: own

As a test of representativeness, the chi-square goodness-of-fit test was applied to check significant differences between the research and the target population. The test was also applied for contingency testing. The measure of dependence between two qualitative variables is based on the observed and expected frequencies (Kohler, 1988):

$$\chi^2 = \sum \frac{(f_0 - f_e)^2}{f_e} \tag{2}$$

The test statistics follow approximately chi-square distribution, assuming that only 20% of the expected frequencies are below five. In case of significant dependence, its strength

is assessed by the coefficient of contingency. It is an index with values from 0 (complete independence) to 1 (perfect dependence).

Interval estimates for population proportion with 95% confidence were calculated following the formula (Lind, 2020):

$$p - u_{\alpha} \cdot \sqrt{\frac{p(1-p)}{n}} < \pi < p + u_{\alpha} \cdot \sqrt{\frac{p(1-p)}{n}} \tag{3}$$

Statistica 12 software was used for data processing. When testing hypotheses, a significance level of 0.05 was chosen as a decision rule for comparability with similar studies.

The tables containing the output analyses were edited in Microsoft Excel for better clarity.

Based on the research question identified at the end of the Theoretical background, the authors formulated the following hypotheses:

H1: The scale of use of controlling tools in manufacturing enterprises affects their performance level (measured by the ROS indicator).

H2: The perception of barriers to the implementation of controlling varies according to the size of manufacturing enterprises.

3. Research results and discussion

The literature review describes the essence of controlling, emphasising the scope of use of controlling tools, certain benefits, and barriers preventing its implementation. However, the published research does not include a more detailed analysis of the impact of understanding and using the essence of controlling on performance. This

Tab. 1: The test of representativeness by industry of research sample

Industry	Share of industry in the population (%)	$\chi^2 = 6.69; sv = 15; p = 0.966$			
		O_i	E_i	$O - E$	$(O - E)^2 / E$
NACE 10 + 11	12.03	45	43.30	1.70	0.07
NACE 13 + 14	7.11	24	25.02	-1.02	0.04
NACE 15	1.76	8	6.19	1.81	0.53
NACE 16	4.91	19	17.29	1.71	0.17
NACE 17	2.00	8	7.03	0.97	0.13
NACE 20	2.08	7	7.31	-0.31	0.01
NACE 21	0.68	5	2.39	2.61	2.85
NACE 22	8.99	31	31.63	-0.63	0.01
NACE 23	4.55	15	16.03	-1.03	0.07
NACE 24 + 25	23.88	81	84.06	-3.06	0.11
NACE 26	2.84	9	9.98	-0.98	0.10
NACE 27	6.03	20	21.23	-1.23	0.07
NACE 28	8.63	26	30.36	-4.36	0.63
NACE 29	6.23	20	21.93	-1.93	0.17
NACE 31	3.31	16	11.67	4.33	1.61
NACE 32*	4.71	18	16.59	1.41	0.12
Total	100.00	352	352.00	0.00	6.69

Note: * specific NACE 32 also includes industry NACE 5, 7, 8, 9, 18, 19; O – observed frequencies; E – expected frequencies.

Source: own

is also the basic reason for the interest in the issue in question in the Slovak business environment of manufacturing enterprises. As part of the primary survey, a total of 2,504 manufacturing enterprises within the population in the Slovak business environment were addressed. A final data set of 352 manufacturing enterprises entered the study as a representative subset of the target population with a margin of error of 5%. The representativeness of research sample by industry was tested by the chi-square goodness-of-fit test. Results of testing presented in Tab. 1 indicate that the distribution of single industries in the sample is in very good

accordance ($p = 0.966$) with the distribution in the target population.

The representativeness of the research sample with the population according to the size of the company was tested in a similar way. Population and sample distribution according to size of enterprises is presented in Fig. 2. The observed differences are not significantly different from the target population ($\chi^2 = 0.21$, $df = 2$, $p = 0.898$). Also, according to the size of the enterprise, the assumption of representativeness is met.

The partial results of the given research confirmed that the approximate share of Slovak

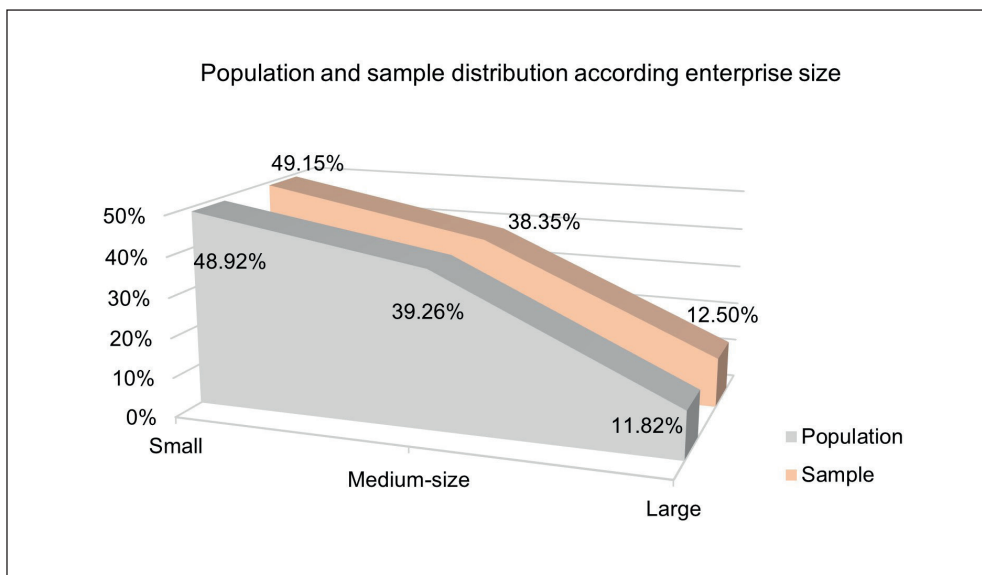


Fig. 2: Representativeness of research sample by enterprise size

Source: own

manufacturing companies that apply controlling approaches in their practice is at the level of 50%. The presented results of the study by Potkany et al. (2022) confirmed that controlling tools are much more often used in the practice of large and medium-sized enterprises in industries with a higher level of added value (NACE 26, 28, 29).

The interpretation of research findings is organised within the formulated hypotheses, with a discussion separately evaluating each

of these hypotheses and research questions. Based on the understanding of the essence of controlling in German-speaking countries focused on reporting and costs, the following controlling tools and approaches were analysed in the research: compilation and control of plan (production, revenues and costs) compared to a plan/reality, control of the quality and quantity of production, control of cost consumption, flexible pricing of products, use of benchmarking principles, and also budgeting.

If a company uses three or more controlling tools and approaches, it is possible to state on wider scale. The proportion of enterprises that apply less than three controlling tools was estimated in the four groups of Slovak manufacturing enterprises according to the indicative parameter of company performance measured by the level of ROS. From the results in Tab. 2, it can be observed that the proportion of enterprises that do not apply controlling tools is over half in the first two groups. In the group with values ROS up to 2.5%, the estimated population proportion is even from 81% to 91%. In the group of enterprises with values of ROS from 2.6% to 5%, the estimated population proportion is from 28% to 49%. In the last group with values of ROS more than 5% is the estimated population proportion of enterprises not applying a wider range of controlling tools maximum of about a third (from 8% to 33%).

The relationship between the insufficient use of controlling tools and the level of return on sales achieved was tested using Pearson's chi-square test at the 5% significance level. The final results of the contingency testing

are presented in Tab. 3. The contingency was evaluated as significant ($p = 0.000$) with a moderate strength of 0.46. These results confirmed the first hypothesis ($H1$). The results of studies by some authors, such as Bieńkowska (2020), Fecková Škrabuľáková et al. (2019) and also Todorović et al. (2017), confirmed a positive relationship between controlling and business performance. The authors essentially agree that controlling can be an effective tool in monitoring and managing financial flows within a business. It can contribute to the creation of a transparent environment that enhances investor confidence. Moreover, it particularly supports flexible adaptation to business changes and trends within decision-making processes. However, these works did not examine in detail the scale of tools for the practical use of controlling. As Kral (2018) mentions, controlling with its approaches and tools represents a conceptual foundation based on the plan-control-report framework, enabling the enhancement of business process effectiveness as well as overall performance. Similar conclusions were presented

Tab. 2: Insufficient use of controlling tools in the population of manufacturing enterprises according to return on sales (95% interval estimates)

Return on sales	p (point estimate of proportion; %)	n (sample size)	95% interval estimate	
			Lower limit (%)	Upper limit (%)
Lost	64.58	48	51	78
Up to 2.5%	86.03	179	81	91
From 2.6% to 5%	38.37	86	28	49
More than 5%	20.51	39	8	33

Source: own

Tab. 3: Results of Pearson chi-square test for hypothesis $H1$ (contingency between variables insufficient use of controlling tools and return on sales)

Chi-square test	Degree of freedom	p-level	Contingency coefficient
94.480	3	0.000	0.460

Source: own

in their study by Weber and Schäffer (2019), who emphasised that improving forecasting based on controlling data analysis provides a foundation for accurate planning of future steps and decisions. This can minimise business risks and contribute to long-term

sustainability in performance. The work of Eschenbach (2004) also discusses the relationship of controlling, its broader understanding of its essence and, in particular, its real use in the context of increasing the performance and competitiveness of enterprises.

Tab. 4: Results of contingency analysis for hypothesis H2 (individual barriers of controlling versus enterprise size)

Barriers	Chi-square test	Degree of freedom	p-level
The need for increased funding and a long time for implementation	26.96	2	0.000
The benefits of use will be less than the cost of implementation	11.00	2	0.004
The lack of technical equipment and skills	54.40	2	0.000
Non-acceptance by employees	8.62	2	0.013
Fear that the implementation will not bring the expected effect	2.94	2	0.230

Source: own

Tab. 5: Perception of potential barriers for controlling implementation in the population of Slovak manufacturing enterprises according to company size (95% interval estimates)

Barriers to implementation of controlling	Enterprise size	p (point estimate of proportion; %)	95% confidence interval	
			Lower limit (%)	Upper limit (%)
The need for increased funding and a long time for implementation	Small	36.42	29	44
	Medium	18.52	12	25
	Large	2.27	0	7
The benefits of use will be less than the cost of implementation	Small	27.75	21	34
	Medium	15.56	9	22
	Large	9.09	1	18
Lack of technical equipment and skills	Small	45.09	38	53
	Medium	13.33	8	19
	Large	2.27	0	7
Non-acceptance by employees	Small	9.25	5	14
	Medium	2.96	0	6
	Large	0.00	–	–

Note: Values in bold – the highest values among all interval estimates.

Source: own

According to Jánská et al. (2017), controlling is able to activate measurable benefits that many managers will appreciate. The positive relationship between the utilisation of a broader range of controlling tools and financial benefits, particularly performance, is indeed evident. This correlation was confirmed by the findings of the study conducted by Kozarevic and Vehabovic (2020) and also by Khudyakova et al.

(2019), at least within the domain of financial controlling tools. Despite the relatively wide range of benefits, not all of them are fully utilised in practice. There are several barriers that prevent this from happening. In the context of the second research hypothesis, the relationship between individual barriers to controlling and the size of manufacturing enterprises was tested (Tab. 4). The company's size can

significantly influence the perception of four of the five examined barriers ($p < 0.05$). Dependence was not observed only in the case of fear that the implementation would not bring the expected effect ($p = 0.230$).

A more detailed examination of dependence based on calculations of residual frequencies showed, that the given barriers are obstacles to using of controlling, mainly in small manufacturing enterprises. This fact can also be observed in Tab. 5 based on 95% interval estimates of the population proportion of enterprises for which the given barriers represent a problem in the implementation of controlling. The highest values among all interval estimates are observed in the population of small-size manufacturing enterprises (bold text in Tab. 5). The lack of technical equipment and skills is the most frequent problem (from 38% to 53%) in the implementation of controlling for small-size enterprises.

By comparing the results of available research dealing with the issue in question, it is possible to conclude that several authors have also partially dealt with identifying barriers to the implementation of controlling. Verburg et al. (2018) and Čambalíková and Mišún

(2017) state that a significant barrier is the time to prepare the implementation, the necessary finances and changes in the software support for reporting, but especially the resolution of the issue of the importance and orientation to the different levels of control. Similar research aimed at analysing the interaction between the enablers and barriers to successful project control system was carried out by Jawad and Ledwith (2021). In the research, several barriers preventing the successful implementation of controlling principles were identified, especially the lack of standard processes, vague contract deliverables, disparate control system between owner and contractor and lack of information communication. The study by Sedláčiková et al. (2019) deals with the identification of barriers to the implementation of controlling in the conditions of industrial production in the wood-working industry. Vacekova and Pavlik (2013) identified several problems of controlling implementation (need and lack of funds for implementing control systems, insufficient management support, and reluctance of employees to accept changes in terms of understanding the essence of controlling). The problem lies

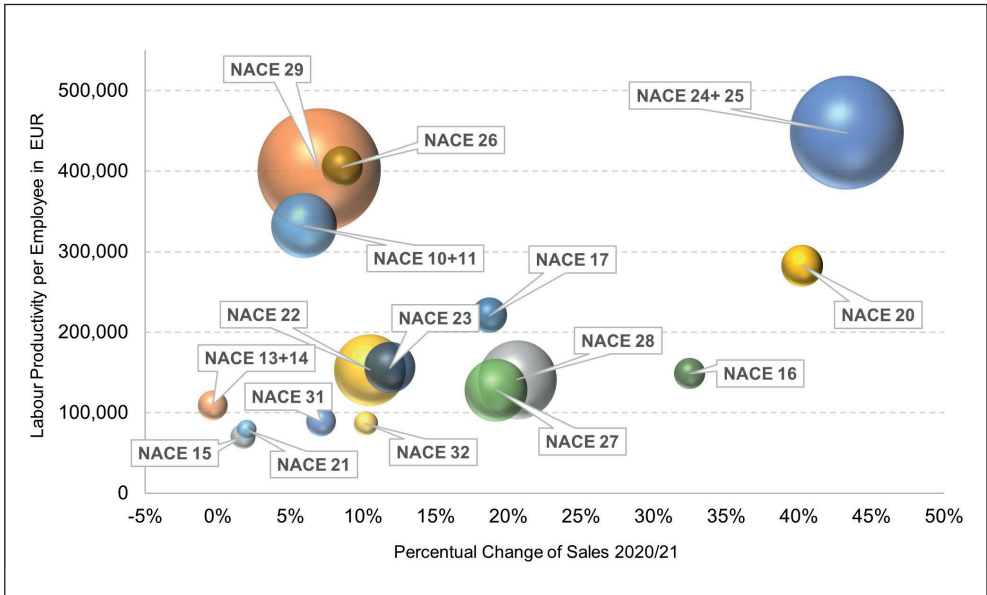


Fig. 3: Value added and changes in sales according to labour productivity per employee in Slovak manufacturing sector in 2021

Source: own

in the fact that none of the available studies have examined the causal relationship between the identification of implementation barriers and other variables. This represents a significant research gap, which the informational database and the results of the presented study aim to support.

Through the given estimates (Tab. 5), it is possible to state that in the population of medium-sized enterprises, the most common barrier (from 12% to 25%) is the need for increased funding and a long time for implementation. Large-size enterprises are showing some concern (from 1% to 18%) that the benefits of use will be less than the cost of implementation. From the presented facts, it can be stated that the perception of barriers also differs in the size relation of enterprises, and therefore, hypothesis *H2* can be confirmed. In particular, large enterprises and partly medium-sized manufacturing enterprises, often with a mixed or foreign capital structure and know-how in the field of controlling, do not perceive possible barriers to implementation as fundamentally as small enterprises. Of course, the industry also plays a role, as well as the possible level of its technology. These enterprises also show higher sales, labour productivity per employee and added value indicator. The data in Fig. 3 present arguments that support this statement. Fig. 3 visually, with a three-dimensional view, presents information on the change in sales in 2021, expressed as a percentage compared to 2020. At the same time, the analysed companies are classified according to labour productivity per employee. Crucial is the fact that the size of the circle characterises the share of value added by the industry within the whole industry. The information from the yearbook of industry, presented by the Statistical Office of the Slovak Republic (2022), can be confirmed that the highest percentage change in sales with a focus on the value added was recorded in the following industries: the manufacture of basic metals or fabricated metal products (NACE 24, 25) and also manufacture of chemicals (NACE 20). Taking into account the growing level of labour productivity per employee, these sectors apply the highest rates of use of controlling tools and approaches in manufacturing enterprises and have a dominant representation in the categories of medium and large enterprises: manufacturing of motor vehicles (NACE 29), manufacturing of computer products (NACE 26),

and manufacturing of food products (NACE 10). These survey results also support the validity of both hypotheses, i.e., the real dependence between the range of application of controlling approaches and the business performance, as well as the dependence on the perception of barriers preventing the implementation of controlling and their size.

Conclusions

The main goal of this study was to identify current use and barriers of controlling at the praxis of manufacturing companies in Slovakia and their potential impact on the business performance. In a broader context, a research gap has been identified in this area, which indicates a lack of studies explaining the impact of the scope of controlling tools on performance, as well as the perception of implementation barriers depending on the size or industry of industrial enterprises. Based on the results presented in the previous sections of this paper, it can be concluded that this study supports the theory of a positive relationship between the utilisation of a broader range of controlling tools and corporate performance, parameterised by ROS indicators. Using the methods of contingency analysis, the moderate strength of the dependence between the application of a range of controlling tools and the business performance measured by ROS was confirmed. The sector analysis was mainly dominated by large and also partially medium-sized enterprises with a higher level of value-added and labour productivity per employee. At the same time, these enterprises are also more resistant to the perception of potential barriers preventing the implementation of controlling in practice, what was derived on the basis of interval estimation theory. The lack of technical equipment and skills of potential users of controlling approaches and the fear of need for increased funding and a long time for implementation were perceived as the most serious barriers. However, examples of good practice on the comprehensive use of controlling in the corporate management system with the assistance of the use of software support of the management information system prove that barriers and risks can be eliminated. Nevertheless, the implementation process should also include a specification of the expected benefits, a detailed schedule with exactly defined competencies of responsible employees, and controllable key

performance indicators. The results of the research also partially confirmed the results of research conducted by other authors on the impact of controlling on business performance in general (Bieńkowska, 2020; Fecková Škrabuřáková et al., 2019; Weber & Schäffer, 2019). Research by Janka and Günther (2020) suggest that particular emphasis of controlling was placed on supporting the essence for planning and coordinating subsystems. Zeman et al. (2018) support the argument that controlling coordinates the management system to address various types of decision-making tasks. These conclusions are consistent with the recommendations of this paper.

The study has identified specific limitations that suggest avenues for further potential research. The limiting factor of this study is the implementation of this research on a national scale of manufacturing enterprises in Slovakia, which makes it difficult to generalise the results for a wider global environment. The presented results may initiate a discussion on the issue in a broader context for other authors and in other European countries. Future research will therefore focus on efforts to disseminate source data in a wider European area as well as other than industrial sectors. The research plan is focused on the possible identification of dependencies of other controlling variables (perception of benefits, complexity of controlling reports, targeted focus on the essence of controlling) for some alternative but available indicators of business performance. The current global crisis has emphasised the need to continue exploring and raising awareness of the essence, effects, and barriers of controlling due to the challenges and uncertainties in the business environment. This includes the requirement to identify cost savings, reassess investments, and make other critical decisions.

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