

## Article

# Performance Measurement System: Implementation Process in SMEs

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**Abstract:** There is still a considerable interest in the topic of business performance, both in scientific community as well as in managerial praxis. Especially, the area of performance measurement system (PMS) and its implementation is forming a considerable scope for improvement. However, the research of PMS implementation in small and medium-sized enterprises (SMEs) have been underestimated. Despite the significant contribution of SMEs to economic growth, employment share or predominance of SMEs over large companies, a very small amount of theoretical and empirical researches has been carried out focusing on implementation of PMS in SMEs. This paper is addressing the readiness and successfulness of SMEs in PMS implementation. The aim of our research was to analyze the process of PMS implementation in SMEs and to identify factors that influence the success and satisfaction with implemented PMS and to identify problematic factors that cause failure, dissatisfaction and create limits to PMS application. Sample of our research consisted of 336 SMEs operating in Slovakia of various ages, sizes, and different approach to performance measurement. Based on results of our research, we created suggestions and a set of the key success factors to each phase of PMS implementation process that respect the specifics and nature of SMEs. Within each phase, we found evidence that several factors significantly raise the potential of successfulness of PMS implementation, and others, in contrary, are contributing to the unsuccessfulness.

**Keywords:** performance; performance measurement systems (PMS); process of PMS implementation; key success factors (KSF); small and medium-sized enterprises (SMEs)



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## 1. Introduction

In today's rapidly changing environment, if companies want to stay successful, they need to ensure a flexible response to changing conditions. They need to regularly monitor and evaluate the level of their performance and make suitable decisions and actions. Therefore, it is not surprising that the preferred area of interest of managers since the end of the 20th century has been linked to the performance of their companies. The academic community also manifests their interest with a considerable number of papers regarding this topic [1–5]. Peter Drucker is famous for this statement: that businesses cannot improve what they do not measure. Therefore, performance measurement is one of the key aspects affecting growth and improvement of companies. If enterprises want to move forward and be competitive in the long run, they need to implement a suitable performance measurement system (PMS) to be able to measure and evaluate every area of their business activities systematically and continuously.

There are several tools and techniques to help managers to create and implement an effective PMS. There are already researches and examples of successful implementations of PMS. However, in most cases, large companies serve as examples of that successful implementation [6]. Small and medium-sized enterprises (SMEs) have often been underestimated due to consideration of being a smaller version of large companies [7], without attention to their specifics and needs in terms of performance management. However,

SMEs deserve attention regarding the level of their performance as they usually represent the significant part of every economy and play key roles in building growth and development of countries [8]. Due to their specificities, we consider that the area of PMS in SMEs is still insufficiently explored, as it was already confirmed by several authors [9,10]. Previous studies also pointed out [7,10–12] that literature specialized on SMEs, in most cases, focus on the development of new theoretical performance models, their descriptions, or characteristics, but often forget the guidelines or practical steps on how to implement these models in practice.

The main goal of our research is to analyze the process of PMS implementation in SMEs and to identify factors that influence the success and satisfaction with implemented PMS and to identify problematic factors that cause failure, dissatisfaction and create limits to PMS. The research is focused on SMEs operating in Slovakia. SMEs are especially important for the Slovak economy, as they represent 99.9% of all business entities in Slovakia. They generate more than 51% of value added and employ more than 70% of the population. Our research sample consists of SMEs of various size, age, industry, and different experiences with PMS (more description in Section 3). Our research questions were formulated towards these areas:

- What are the key success factors that affect the successful application of PMS in SMEs?
- What are the problem factors that affect the implementation of PMS in SMEs?
- Is there a difference in perception of success factors and problem factors in SMEs with different experience with PMS?
- Is there a difference in perception of success factors and problem factors in different phases of PMS implementation model?

The paper is organized as follows. Section 2 describes characteristics and possibilities of PMS implementation. We also point out the barriers and problems of SMEs connected to implementation of PMS based on previous studies. Sections 3 and 4 explain the methodology and results of our research on SMEs operating in Slovak Republic. Discussion and Conclusion as Section 5 summarize our main findings and recommendation for successful implementation of PMS in SMEs.

## 2. Literature Review

### 2.1. Business Performance

Business performance and its evaluation belong to frequently used terms in management theory. Despite its considerable popularity, we can find different views and definitions of business performance. Neely et al. defined performance as the efficiency and effectiveness of targeted action [13]. Dwight associated performance with the level of goal achievement [14]. Veber defined performance as a general measure of an individual's or group's effort [15]. Sink defined seven dimensions of performance as efficiency, effectiveness, quality, productivity, quality of working life, innovation and profitability [16]. For every enterprise, it is important to gain the best possible performance. As a necessary condition to achieve that, managers need to be able to effectively measure and evaluate business performance [17].

PMS serve as an important tool in the purpose of improving the business performance [18]. PMS can be defined as a balancing and dynamic system that is able to support the decision-making based on gathering, elaborating and analyzing of information [13]. Since the mid-1980s, growing interest has been seen on the study of PMS [19]. PMS is defined as the set of (financial and/or non-financial) metrics used to quantify the efficiency and effectiveness of past actions that enables to create decisions and take actions through the acquisition, collation, sorting, analysis and interpretation of appropriate data and information [13]. PMS affects communication processes by requiring and providing relevant information, which influences the way to think, act, and collaborate [20]. The use of PMS can bring many advantages and positive outcomes, including profit increase; cost reduction; internal strategy communication improvement; better focus on what is important to the organization; better achievement of results and organizational goals;

more effective management control; improvement of business processes and quality of performance information, and clearer vision of the members of the organization about their roles and goals they need to achieve [5].

## 2.2. Characteristics of PMS and Its Implementation

The importance of measuring the business performance as well as implementing a suitable PMS have already been subjects of many academic papers [2,4,13,21–23]. In late 1980s and early 1990s, the dissatisfaction of the traditional approaches to performance measurement based on accounting [1] led to development of new approaches to PMS and to demand for PMS to be more relevant, integrated, balanced, strategic and dynamic [2]. It also led to foundations of “multi-dimensional” performance measurement frameworks [1] and combinations of the multiple financial and non-financial performance indicators in PMS [2,21]. There are well-established models providing frameworks and guidelines for business practice, like Tableau de Bord, SMART Performance Pyramid System, Balanced Scorecard or Performance Prism [19]. Katic [24] distinguishes PMS into two groups of models: (1) models that emphasize self-assessment like the Deming Prize, the Baldrige Award, the EFQM Excellence Model; (2) models that are designed to assist management and to improve business processes: Capability Maturity Matrices, the Performance Pyramid, the Effective Progress and Performance Measurement (EP2M) and the Balanced Scorecard (BSC). Theory also suggests areas of KPIs and performance measures that are recommended for measuring performance in enterprises, mainly in areas of cost, quality, productivity, flexibility, and time. With changes coming with Industry 4.0, new measures are also suggested, like measuring innovation [25], intellectual capital [26], human interactions (e.g., reduced human effort, improved employee learning) and computing (e.g., computing skills, data reliability, data speed and information security) [27].

There are many tools and techniques appearing in the literature, making it almost impossible to get an overall view of all of them, or distinguish between suitable and less suitable performance measuring instruments. Research and practice itself confirm the fact that models and techniques of PMS are not perfect as they do not provide solutions to all the problems that businesses face [28,29]. Each tool or technique has its specific performance measurement criteria, while the task of managers is to harmonize individual parameters into a functioning unit [30]. Additionally, there is no general structure or framework for the usage of PMS in the most effective and efficient manner in SMEs [31]. Therefore, to use PMS successfully, business managers need to know the given specifics and, based on them, to creatively incorporate the right tools into companies in the right way and at the right time. The point is not to discover one elementary solution for PMS but find out which mechanisms to use when and how. As Wasniewski [8] mentioned, PMS is specific to each enterprise in which it is implemented in, due to a unique set of subsystems and unrepeatable conditions of existence. Previous studies [7,10–12] pointed out that literature lacks the guidelines or practical steps on how to choose appropriate PMS and implement PMS in practice in SMEs.

Only well-developed and implemented PMS helps the organization to improve its performance [18]. PMS should be directly related to the organization strategy, to decision-making processes and communication processes. It should support processes of setting goals, developing a set of performance measures, collecting, analyzing, reporting, interpreting, reviewing and acting of performance data [32]. There are several authors who studied the implementation of PMS [1,3,5,11,33]. In our study, we follow Bourne et al. [1], who created a three phases model which allows enterprises to consider and implement suitable PMS to better match their environment, conditions and limits:

1. The design of the performance measures (what and how to measure).
2. The implementation of the performance measures.
3. The use of the performance measures.

There are already some factors suggested to successful implementation of PMS, like aligning PMS with strategy, and use of performance indicators for testing of strategic

assumption [1]. Brem et al. [10] suggested for SMEs to improve PMS implementation by limitation of problems in all phases of this process: (1) in design phase—missing formulated strategy, missing knowledge and personal sources; (2) in implementation phase—missing information system, missing technical structure, missing time and personal resources; (3) in use phase—missing resources through day-to-day operative activities, missing reporting tools, missing time and personal resources. To increase the likelihood of successful implementation of PMS, as well as for SMEs, Kaplan and Norton [2] recommended using the Balanced Scorecard aspects. A sustainable PMS should be a transformation process and not just a project of defining performance indicators. Meekings [34] recommended a top-down measurement architecture, a systematic review architecture, and an integrated budget and planning process to overcome barriers of implementation, which should help to develop a collective understanding of the purpose of PMS implementation. Bourne et al. [1] identified that the information system is an important factor in the success of PMS implementation process. Companies that already have a sophisticated IT infrastructure and a well-developed IT architecture are more likely to implement PMS. According to Eccles [35], there are three important factors for the successful application of PMS: the development of information architecture with supporting technology, the alignment of incentives with the new measurement system, and the way senior management is conducted. The ability of keeping the PMS continuously updated and relevant is a challenge for every enterprise, but particularly for SMEs, as they need to be extremely flexible and reactive to market changes while dealing with lack of recourses and expertise [9,17,36]. PMS should reflect the internal and external changes in the company's environment and allow goals to be reviewed and updated [7]. PMS is the most efficient when it is adjusted to elements such as business strategy, organizational culture, and the external environment [37].

### 2.3. Barriers of SMEs in Connection to PMS Implementation

Managing performance in SMEs requires understanding of its characteristics and limitations that can influence the process of PMS implementation [38,39]. SMEs are often limited by more factors [38,40,41]:

1. Human resources (SMEs have limited human resources, so employees often carry out diverse activities in enterprises and do not have the remaining time for other activities, such as implementing a PMS);
2. Managers and their capacity (SMEs are characterized by a flat organizational structure in which the owner is overwhelmed with operational or management functions and thus does not have enough time to perform all managerial activities);
3. Financial resources (it is more difficult for SMEs to implement a PMS compared to large companies as they have limited financial resources and find PMS implementation as costly);
4. Reactive approach (SMEs are characterized by a weak level of strategic planning along with informal decision-making processes; they lack explicit strategies or methods that promote short-term business orientation and a reactive approach to managing individual activities);
5. Little attention is paid to the formalization of processes (lack of management systems and formal processes increase the difficulty of collecting the information needed to implement and use PMS);
6. Incorrect perception and misunderstanding of PMS (PMS can only be effectively implemented and used if the company's employees perceive its benefits. However, top managers of SMEs often do not understand the potential benefits of implementation and perceive PMS as the cause of excessive bureaucracy or an obstacle to organizational flexibility).

Therefore, the question arises as to whether there are factors or essential requirements that SMEs should meet if they want to effectively implement a PMS. Scientific literature and authors' direct experiences with the development and implementation of PMS, as well as the percentage of failed businesses, suggest that successful PMS implementation

is not a simple matter [10]. Authors [1,2,42], in their work, described their experiences with implementation of PMS as often durative for several years. Implementation of a PMS is certainly not a short-term issue and there are several barriers that managers can come across during the whole process. Kaplan and Norton [2] identified four possible barriers of PMS implementation: (1) impossibility of applying vision and strategy—this is the case when a team of managers has not reached a consensus on vision. Different groups are thus striving for different agendas in the company, and their efforts are not coherent and linked to the strategy; (2) the strategy is not linked to departments, teams and individual goals—employees continue to follow the old traditional performance criteria and prevent the introduction of a new strategy; (3) the strategy is not associated with resource allocation—it is when long-term strategic planning processes and the annual budget process are separate. Funding and capital allocation are therefore not linked to strategic priorities; (4) feedback is tactical and not strategic—feedback focuses solely on short-term results (such as financial measures) and little time is reserved for reviewing performance indicators and strategy success. Meekings [34] added the fifth barrier: (5) lack of understanding and fear of employee personal risk. Further, Hacker and Brotherton [43] pointed out: (6) lack of leadership and resistance to change as another barrier. Other authors [10,44] contributed with more barriers influencing the design and implementation of performance measurement systems, such as: (7) difficulties in assessing the relative importance of performance indicators; (8) insufficient definition of metrics; (9) lack of time and cost; (10) insufficient focus on stakeholders; (11) large number of indicators causing rigidity and confusion in measurement and evaluation; or (12) the need for a highly developed information system.

### 3. Materials and Methods

As we previously mentioned, several authors pointed out that most attempts to implement PMS in the SMEs fail. In view of the characteristics and specificities of SMEs, the successful PMS implementation is particularly important for these enterprises, as failure can have a much more disastrous impact on SMEs than on large companies. As this area is still not widely researched, we focused on studying possibilities on how to improve PMS implementation in SMEs. Therefore, the main goal of our research was to analyze the process of PMS implementation in SMEs and to identify factors that influence the success and satisfaction with implemented PMS, and to identify problematic factors that cause failure, dissatisfaction and create limits to PMS. We focused the research on SMEs operating in Slovakia. There are not many researches specialized on PMS in SMEs in this country. However, SMEs are especially important for Slovak economy, as they represent 99.9% of all business entities in Slovakia. They generate more than 51% of value added and employ more than 70% of the population.

Our research sample consist of SMEs of various size, age, industry (Table 1) and different experiences with PMS (Figure 1). Our research questions were formulated towards these areas:

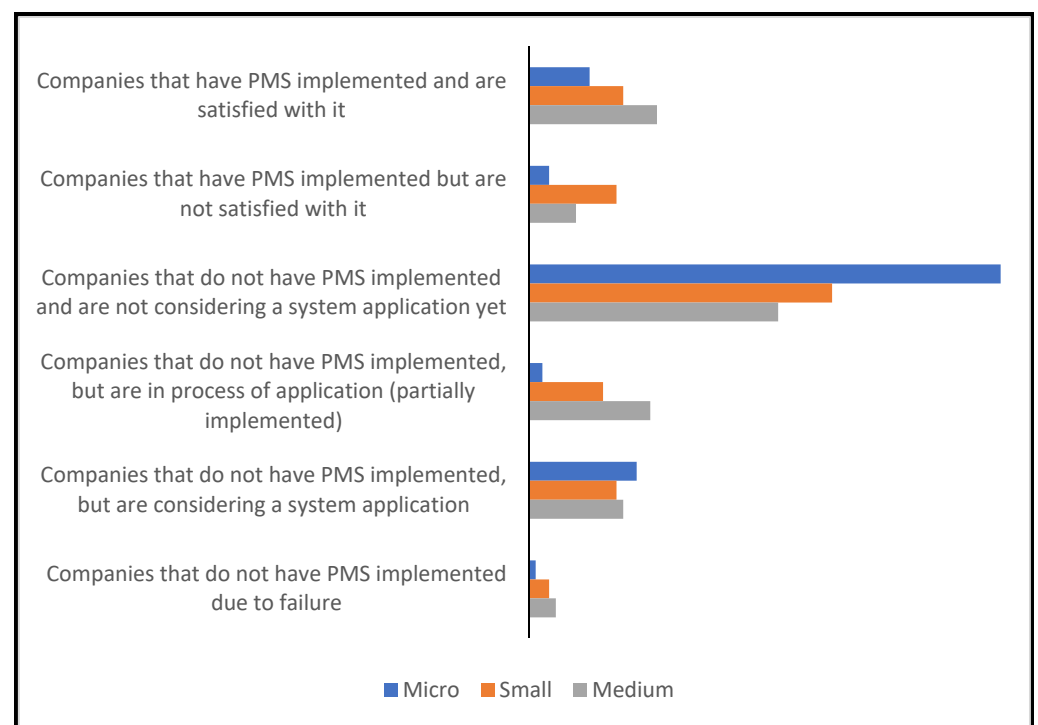
- What are the key success factors that affect the successful application of PMS in SMEs?
- What are the problem factors that affect the implementation of PMS in SMEs?
- Is there a difference in perception of success factors and problem factors in SMEs with different experience with PMS?
- Is there a difference in perception of success factors and problem factors in different phases of PMS implementation model?

Based on the PMS implementation model discussed in the Literature Review, we divided the research areas into three phases of PMS: (1) design phase, (2) implementation phase and (3) use of PMS phase.

**Table 1.** Research sample and its distribution.

Variable	Category	Frequency	Percent	Variable	Category	Frequency	Percent
SIZE	Micro	161	48%	AGE	Less than 3 years	17	5%
	Small	119	35%		3–5 years	27	8%
	Medium	56	17%		5–10 years	78	23%
	Total	336	100%		10 and more years	214	64%
SECTOR	Services	173	51%	LIFE CYCLE	Introduction	9	3%
	Agriculture	19	6%		Growth	214	63%
	Production	105	31%		Maturity	100	30%
	Non-profit org.	3	1%		Decline	13	4%
	Education, Research	36	11%		Total	336	100%
	Total	336	100%				

Note: The following size-class definitions are applied: micro firms (0–9 persons employed), small firms (10–49 persons employed), medium-sized firms (50–249 persons employed), and large firms (250+ persons employed). (Defined by the European Commission).

**Figure 1.** Research sample and its distribution by level of PMS implementation and size of SMEs.

Subsequently, we have studied:

- What factors have a positive/negative effect on the success of the PMS in design phase?
- What factors have a positive/negative effect on the success of the PMS in implementation phase?
- What factors have a positive/negative effect on the success of the PMS in use phase?

According to the experience and recommendations of several authors [1,7,9,40,45–48], we systematized the factors that affect the success of the application of PMS as given choices. We also created options of open questions for companies to indicate their opinion of factors if not listed.

To collect the data, we chose to use an electronic questionnaire. To formulate questions, we used theoretical review of previous studies and research. The object of the research was set as randomly chosen SMEs operating in Slovakia. There were 595,371 SMEs in Slovakia in 2019. We created the SMEs database of contacts from the FinStat portal and selected 18,043 SMEs to send questionnaires by e-mail. The questionnaire was correctly completed by a total of 336 respondents. The study was conducted during August 2019 until December 2020 as part of a research project.

### 3.1. Research Structure

For research purposes, SMEs were divided into groups based on size, age, industry sector, life cycle of the core business and the level of implementation of the PMS. The results of the SMEs' distribution are presented in Table 1.

The questionnaire was divided into two main parts. The first part was used to identify companies and factors for measuring performance (area and frequency, level, methods or reasons for measuring and evaluating performance). In the second part of the questionnaire, respondents identified problems based on their previous experience with PMS. This part was structured and very detailed, and consisted of three categories of companies: (a) companies with PMS implemented (satisfied, dissatisfied), (b) companies with experiences with PMS application (PMS partially implemented, PMS application failed), (c) companies with no PMS implementation (with plans or with no plans to implement PMS in the future).

As Figure 1 shows, our sample of SMEs consisted of six levels of PMS implementation. To analyze data, it was necessary to divide companies into two categories: whether SMEs have or do not have an established PMS. The first category (PMS implemented) consisted of companies that have PMS, and we distinguish between whether they are satisfied or dissatisfied with it. The second category (PMS not implemented) consisted of companies that do not have PMS, and again we distinguish whether they are or are not trying to implement the system or plan to implement the system in the future.

The respondents indicated the impact of the success factors within the numerical scale: no effect (1), low impact (2), medium impact (3), high impact (4).

### 3.2. Data Analysis Methods

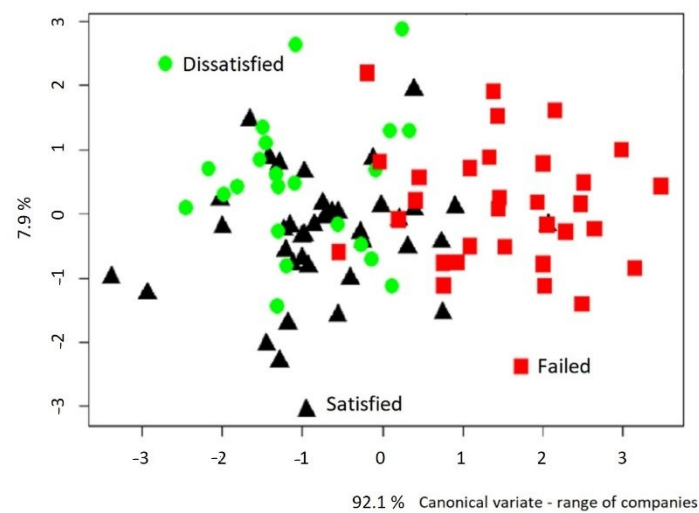
We processed data through two programs: MS Excel and RStudio. MS Excel was used in the calculation of arithmetic means and in the construction of tables and graphs. RStudio was used for statistical calculations and subsequent graphical interpretation.

We used several statistical tests for inference statistics. To determine statistically significant differences between selected groups, we used the Kruskal–Wallis test with a significance level of  $\alpha = 0.05$ . The nonparametric test was used in cases where the assumptions of one-way ANOVA were not met. Using the test, the assumptions were met in which samples from the population were taken randomly, the observations were independent of each other (there was no relationship between members within groups). Using this test, we examined statistically significant differences for continuous dependent variables through categorical independent variables. As the Kruskal–Wallis test does not identify where specifically statistically significant differences occur, or how many pairs of groups are different, a nonparametric post hoc Dunn's test was used to pair the groups. Using the Kruskal–Wallis test, we found that there was a statistically significant dependence within the examined set, but we could not determine where and in what number it is located. Only on the basis of Dunn's test were we able to identify exactly which compared groups had statistically significant differences.

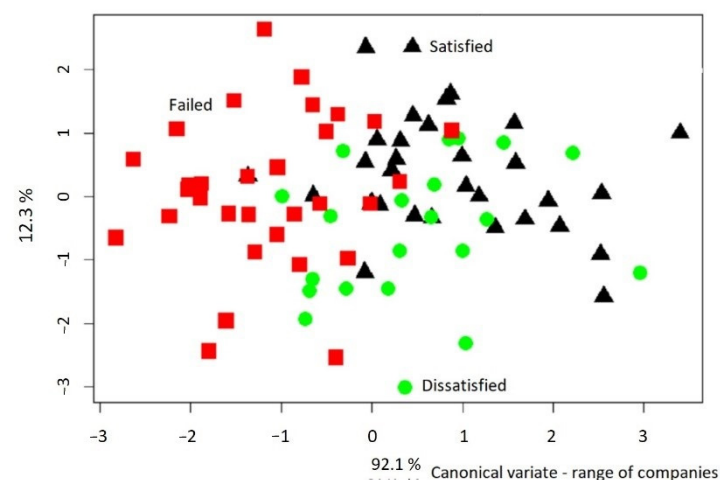
We used a nonparametric Spearman's correlation coefficient to determine the degree of strength and direction of the connection between the two paired variables. Using this test, the preconditions for use were also met, meaning that the variables were of the ordinal, interval, or ratio type, with a monotonic relationship between the two variables. The correlation coefficient ( $\rho$ ) takes values from the interval 0 to 1, while values closer to 0 indicate a weaker dependence and values closer to 1 indicate a closer dependence of the

variables. The coefficient in the range 0.00–0.19 is thus referred to as very weak, 0.20–0.39 as weak, 0.40–0.59 as medium, 0.60–0.79 as strong and 0.80–1.0 as very strong.

Canonical Discriminant Analysis was used to maximize variations between groups and to express the extent of differentiation between predefined groups (satisfied, dissatisfied, failed). To reveal the correlations of the characters with the canonical axes, the total canonical structure was calculated, which contained a linear combination of variables, i.e., a linear discriminant function. Discriminant analyses generally require a multidimensional normal distribution of features, but in this respect, we have shown that they are highly resistant to variance. Based on the Canonical Discriminant Analysis, we were able to determine whether and to what extent it was possible to distinguish specified groups of objects based on the features we had available and which features contributed to this distinction to the greatest extent. We graphically displayed (as it will be presented in Figures 2 and 3) the given findings through orthogonal projections of points of two-dimensional space on lines. The discriminant function was thus designed in such a way that the individual groups of objects were separated as best as possible after the projection.



**Figure 2.** Significance of factors in the design phase.



**Figure 3.** Significance of factors in the implementation phase.

#### 4. Results

This section provides a concise description of the research results, their presentations and interpretations. Our major results are connected to identified factors and significance



of factors and their impact on satisfaction of enterprises in our sample with PMS implementation. Based on PMS implementation process (design, implementation, and use), we present factors separately for each individual phase also with division of our sample (categories: satisfied, dissatisfied, failed).

#### 4.1. The Design of the Performance Measures

In Table 2, we can see a certain sequence, where companies that are satisfied with the PMS generally assigned a higher impact to the given factors than companies that are not satisfied with the PMS. Similarly, companies dissatisfied with the PMS again, as a rule, gave the factors a higher significance of the impact than companies that failed the implementation process.

**Table 2.** Success factors in the design phase.

Factors Ranked with Respect to the Significance of Their Impact on the Enterprise Categories	<i>p</i> -Value	Satisfied		Dissatisfied		Failed	
		IQR	$\bar{X}$	IQR	$\bar{X}$	IQR	$\bar{X}$
Sufficient support from the middle management	<b><math>9.01 \times 10^{-10}</math></b>	3–4	4	3–4	4	2–3	3
Clearly defined and understandable strategy	<b><math>8.29 \times 10^{-7}</math></b>	3–4	3	3–4	3	1–4	3
A corporate culture focused on achieving results and continuous improvement	<b><math>4.97 \times 10^{-6}</math></b>	3–4	3	2–4	3	2–3	3
Identification of relevant key performance indicators	<b><math>3.45 \times 10^{-5}</math></b>	2–4	3	2–3	3	1–3	2
Not creating too many key performance indicators	<b><math>8.88 \times 10^{-5}</math></b>	3–4	4	3–4	4	1–3	2
Linking goals to lower levels of the organization	<b><math>8.92 \times 10^{-4}</math></b>	3–4	4	3–4	4	1–3	2
Identifying relevant critical success factors	<b><math>1.66 \times 10^{-3}</math></b>	3–4	3	3–4	3	2–3	2
Stable phase of the company	<b><math>1.98 \times 10^{-3}</math></b>	3–4	3	3–4	3	1–3	2
Sufficient expertise and professional skills	<b><math>1.11 \times 10^{-3}</math></b>	3–4	3	3–4	3	2–3	2
Thoughtful linking of causal relationships between strategic objectives and indicators	<b><math>2.37 \times 10^{-3}</math></b>	3–4	3	3–4	3	1–3	3
The company's managers were sufficiently involved in the system design phase	<b><math>3.85 \times 10^{-3}</math></b>	2–4	3	3–4	3	1–3	2
The company's managers have been involved for an adequately long time in the system design phase	<b><math>5.35 \times 10^{-3}</math></b>	2–4	3	2–4	3	1–3	2
Support from the consulting company that helped in preparing design proposal	<b><math>2.28 \times 10^{-2}</math></b>	3–4	4	3–4	3	1–3	2
Sufficient involvement of experts and specialists in the field of performance	$3.47 \times 10^{-1}$	3–4	3	2–3	3	1–3	3
Appropriate methodology for creating a design proposal	$9.63 \times 10^{-1}$	1–3	2	1–3	2	1–2	1

Numerical scale: no effect (1), low impact (2), medium impact (3), high impact (4). Indication of values: interquartile range (IQR); median ( $\bar{X}$ ). Level of implementation of the system: companies with PMS implemented and are satisfied with it (satisfied); companies with PMS implemented but are not satisfied with it (dissatisfied); companies with PMS not implemented due to failure (failed). Statistical significance: statistically significant factor (*p*-value lower than 0.05): bold numbers.

The differences in the assignment of the significance of the impact are clearly shown in the following graph (Figure 2).

In the graph (Figure 2), we can notice a clear separation of unsuccessful companies (they failed in the process of implementing the system) from companies that have PMS implemented. The percentages on the vertical and horizontal axes express the variability of the canonical axes, i.e., 92.1% range on the horizontal and 7.9% range of enterprises on the vertical. We also see some differences between satisfied and dissatisfied companies, but not as significant. The biggest difference is, therefore, between companies that have PMS implemented, whether satisfied or dissatisfied, and companies that have failed the implementation process.

In Table 2, we can see the three most important factors (factors with the highest impact) in the design phase of PMS implementation process: (1) sufficient support from management; (2) not creating too many key performance indicators; (3) linking goals to lower levels of the organization. These KSFs have a high impact on the success of the PMS design phase. Employees involved in the design phase should pay increased attention to the management of the organization to sufficiently support the system design phase. They should ensure that the companies do not set too many key performance indicators and that the goals are also linked to the lower levels of the organization.

The individual factors are listed in Table 2 based on the degree of significance of their impact on the success of the PMS design. Thus, the factors at the top of this table have the most significant impact in the design phase of the performance measurement system, and the factors at the bottom of the table are of negligible importance. The statement is also confirmed by the Kruskal–Wallis test, in which we can notice that the last two factors, which are ranked on the basis of the Canonical Discrimination Analysis, do not have a statistically significant difference between the various categories of SMEs.

At the same time, it is important to realize that the given factors are not ranked on the basis of the importance or significance of the impact assigned to them by companies, but precisely on the basis of the large differences in responses between individual respondents. This means that the factors at the top of Table 3 were most underestimated at the design stage by companies that failed to implement PMS, while companies with a successfully implemented PMS gave them medium to high importance.

**Table 3.** Problem factors in the design phase.

Significance of Factor	Key Problem Factors	Correlation Value
1.	Insufficient support from the middle management	0.848
2.	Not clearly defined and understandable strategy	0.715
3.	A corporate culture did not focus on achieving results and continuous improvement	0.676
4.	Not precise identification of relevant key performance indicators	0.572
5.	Creating too many key performance indicators	0.572
6.	Not linked goals to lower levels of the organization	0.478
7.	Identifying relevant critical success factors	0.469
8.	Not stable phase of the company	0.461
9.	Insufficient expertise and professional skills	0.452
10.	Not precise link of causal relationships between strategic objectives and indicators	0.451

Therefore, companies in the design phase should not underestimate sufficient management support, a clearly defined and understandable strategy, a corporate culture focused on achieving results and continuous improvement, identifying an adequate number of relevant key performance indicators and critical success factors, linking goals to lower levels of the organization or sufficient expertise of the staff involved in the design phase (Table 3).

#### 4.2. The Implementation of the Performance Measures

Similarly, the results of implementation phase are shown in Table 4. The more successful companies were in implementing PMS, the higher impact they attributed to the factors. Again, we can notice that SMEs satisfied with PMS usually assigned the highest

impact rates, SMEs dissatisfied with PMS assigned lower rates and companies that did not even have PMS, were assigned the lowest impact. While the average value of the impact of individual factors was low for unsuccessful companies, successful companies attributed a medium impact on the given factors on average, while successful and satisfied companies even identified two factors as very important (high impact).

**Table 4.** Success factors of implementation phase.

Factors Ranked with Respect to the Significance of Their Impact on the Enterprise Categories	<i>p</i> -Value	Satisfied		Dissatisfied		Failed	
		IQR	$\bar{X}$	IQR	$\bar{X}$	IQR	$\bar{X}$
The implementation of the system had a clear goal in the company	<b><math>1.37 \times 10^{-5}</math></b>	3–4	4	2–4	4	1–3	2
The company supported the appropriate behavior of company members in the system implementation	<b><math>2.17 \times 10^{-4}</math></b>	2–4	3	3–4	3	2–3	2
The company's managers were sufficiently involved in the implementation phase of the system	<b><math>5.25 \times 10^{-4}</math></b>	3–4	3	2–4	3	1–3	2
Middle management and employees were sufficiently involved in the implementation of the system	<b><math>4.42 \times 10^{-4}</math></b>	3–4	3	2–4	3	1–3	2
The company's managers have been involved for an adequately long time in the system implementation phase	<b><math>2.02 \times 10^{-3}</math></b>	3–4	3	2–4	3	1–3	2
The company had linked indicators with specific departments /positions and responsibilities	<b><math>4.05 \times 10^{-3}</math></b>	3–4	3	2–3	3	1–3	2
The company had sufficient resources (material/financial) or capacity of people	<b><math>4.15 \times 10^{-3}</math></b>	2–4	3	2–4	3	1–3	2
The company had a properly or sufficiently linked performance measurement system with an employee remuneration system	<b><math>5.92 \times 10^{-3}</math></b>	3–4	3	2–4	3	2–3	2
Sufficient expertise and professional skills	<b><math>3.08 \times 10^{-3}</math></b>	3–4	4	3–4	3	2–3	3
Stable phase of the company	$4.79 \times 10^{-1}$	1–4	3	2–3	3	///	///
Sufficient support from the middle management	$6.81 \times 10^{-1}$	3–4	4	3–4	4	///	///
Appropriate methodology for creating an implementation proposal	$3.94 \times 10^{-1}$	2–4	3	2–4	3	1–4	3
The implementation of the system did not require more time and effort in the company than expected	$7.02 \times 10^{-1}$	2–3	3	2–3	3	2–3	3
Sufficient involvement of experts and specialists in the field of performance	$5.66 \times 10^{-1}$	2–4	3	2–4	3	1–4	3

Numerical scale: no effect (1), low impact (2), medium impact (3), high impact (4). Indication of values: interquartile range (IQR); median ( $\bar{X}$ ). Level of implementation of the system: companies with PMS implemented and are satisfied with it (satisfied); companies with PMS implemented but are not satisfied with it (dissatisfied); companies with PMS not implemented due to failure (failed). Statistical significance: statistically significant factor (*p*-value lower than 0.05): bold numbers.

The individual evaluations of companies are clearly shown in the following graph (Figure 3).

At the design phase, the biggest differences were between the two categories of enterprises, namely category of enterprises that had PMS implemented and category of enterprises that failed PMS implementation. Whereas the differences between satisfied and dissatisfied enterprises were low, in the implementation phase, we see a clearer separation of the different categories. We see differences in the perception of the significance of these factors not only between companies that have successfully implemented PMS and companies that have failed to implement PMS, but also between companies that were subsequently satisfied with implemented PMS and those that were not. The percentages on the vertical and horizontal axes also in the implementation phase express the variability of the canonical axes, i.e., 87.7% range on the horizontal and 12.3% range of enterprises on the vertical.

Based on the results in Table 4, we see that in the implementation phase, there were also three KSF: (1) the implementation of PMS in the company had a clear goal; (2) sufficient expertise; (3) sufficient support from the management. According to the respondents, these KSF have a high impact on the success of implementation, so employees at an implementation phase should pay increased attention to ensuring that PMS implementation in the company has a clear goal, management sufficiently supports this phase and employees involved into the process have adequate expertise.

Furthermore, in the implementation phase, similarly to the design phase, the individual factors in the Table 4 were based on the degree of significance of their impact on the success of the PMS implementation. Therefore, again, the factors at the top of the table have the most significant impact on the success, and the factors at the bottom of Table 4 have the least significant impact. In the design phase, there were only two factors (using the Kruskal–Wallis test) that have the difference in the perception of these factors in companies of different categories that were not statistically significant. In the implementation phase, we see five of these factors.

We can notice that the sequence of factors in the design and implementation phase is considerably different due to the different perceptions of the impact of the given categories of companies. The individual factors have specific degrees of impacts on a given phase at different stages of PMS implementation, and similarly, have specific degrees of different preferences of companies. As the two key factors changed during the implementation phase considering the design phase, so did the order of the factors that differed most in the assigned degree of impact significance. For example, two factors that express a sufficient degree and length of time for managers' involvement were in the third and fifth place in the implementation phase, while they were only in the second half of factors in Table 2 in the design phase. We can therefore assess that the involvement of managers is underestimated by SMEs, especially in the implementation phase.

Among the most underestimated factors that differentiate between companies satisfied with the implemented system, dissatisfied with the established PMS and companies that failed in the implementation process are factors such as underestimating a clear goal in companies, supporting appropriate behavior of company members in implementation process, the degree and duration of the involvement of managers, middle management and employees or the interconnection of indicators with specific departments, positions and responsibilities. Therefore, companies that want to be successful in the implementation phase should not underestimate the given factors and pay attention to their fulfillment (Table 5).

#### *4.3. The Use of the Performance Measures*

Compared to the design and implementation phase, we did not evaluate factors for the category of companies that were not successful in the previous phases, as they failed in the process of implementing PMS and thus have no experience with the use phase of PMS. Therefore, in Table 6, we present two categories of enterprises: enterprises that have PMS implemented and are satisfied with it and enterprises that have PMS implemented but are not satisfied with it. Unlike the tables showing the factors from the design and implementation phase, we do not present a significant difference between the significance of the impact attributed by companies in the two categories to the selected factor. Apart from the two factors in both categories of enterprises, the median impact of the individual factors is at the same level (4), which means that the enterprises adhere to the given factors and it has a positive effect on them.

**Table 5.** Key problem factors of implementation phase.

Significance of Factor	Key Problem Factors	Correlation Value
1.	The implementation of the system did not have a clear goal in the company	0.742
2.	The company did not support the appropriate behavior of company members in the system implementation	0.609
3.	The company's managers were not sufficiently involved in the implementation phase of the system	0.598
4.	Middle management and employees were not sufficiently involved in the implementation of the system	0.595
5.	The company's managers were not involved for an adequately long time in the system implementation phase	0.550
6.	The company did not have linked indicators with specific departments/positions and responsibilities	0.527
7.	The company did not have sufficient resources (material/financial) or capacity of people	0.513
8.	The company did not have a properly or sufficiently linked performance measurement system with an employee remuneration system	0.485
9.	Insufficient expertise and professional skills	0.460

**Table 6.** Success factors of use phase.

Factors Ranked with Respect to the Significance of Their Impact on the Enterprise Categories	<i>p</i> -Value	Satisfied		Dissatisfied	
		IQR	$\bar{X}$	IQR	$\bar{X}$
Employees have a positive attitude towards the system, they do not feel threatened	<b><math>4.81 \times 10^{-2}</math></b>	4–5	4	4–5	4
The system is linked to the motivation and development of employees	$7.88 \times 10^{-2}$	4–5	4	4–5	4
The system is used to control and correct employee performance	$1.93 \times 10^{-1}$	3–4	4	3–4	3
Employees see sufficient benefits from using PMS	$2.02 \times 10^{-1}$	3–5	4	3–4	4
The company has no difficulty in obtaining and interpreting performance evaluation data	$2.74 \times 10^{-1}$	3–5	4	3–4	4
The system is stable, the system is not affected by a change in management	$2.32 \times 10^{-1}$	3–5	4	3–4	4
The system is under the supervision and responsibility of a specific employee	$2.62 \times 10^{-1}$	3–5	4	3–4	4
The system is linked to employee remuneration	$5.86 \times 10^{-1}$	3–5	4	3–4	4
Employees have sufficient knowledge and skills to use the system	$4.39 \times 10^{-1}$	3–4	4	3–4	4
The company has an interconnected PMS with the management	$5.22 \times 10^{-1}$	3–5	4	3–4	4
The system is regularly updated as needed	$3.88 \times 10^{-1}$	3–5	4	2–4	3
The system is used for internal reporting as an internal control system	$9.46 \times 10^{-1}$	3–5	4	2–4	4
The company's managers have been involved for an adequately long time in the use of PMS	$7.80 \times 10^{-1}$	3–5	4	3–4	4
The company feels that it measures appropriate key performance indicators	$7.78 \times 10^{-1}$	3–5	4	2–4	4
The company's managers were sufficiently involved in the system use phase	$9.45 \times 10^{-1}$	3–5	4	3–5	4
The information and communication system sufficiently support the PMS	$9.51 \times 10^{-1}$	3–5	4	3–4	3

Numerical scale: no effect (1), negative impact (2), no significant impact (3), positive impact (4), key impact (5). Indication of values: interquartile range (IQR); median ( $\bar{X}$ ). Level of implementation of the system: companies with PMS implemented and are satisfied with it (satisfied); companies with PMS implemented but are not satisfied with it (dissatisfied). Statistical significance: statistically significant factor (*p*-value lower than 0.05): bold numbers.

Thus, we examined the differences between satisfied and dissatisfied enterprises only in the interquartile range, where satisfied enterprises most often attributed no significant impact (3) to key impact (5) to the given factors, and enterprises dissatisfied with the system stated most often no significant impact (3) to positive impact (4). Companies that were satisfied with PMS were more likely to attribute a key impact on the factors than companies that were dissatisfied with the system. However, the difference between satisfied and dissatisfied companies is ultimately not statistically significant, except for the first factor (employees have a positive attitude towards the system, they do not feel threatened), with a correlation value of 0.444.

The attitude of employees towards the system in the company is thus the only factor that distinguishes companies satisfied with the system and dissatisfied to a statistically significant extent. Therefore, companies in the use phase should constantly ensure that employees have a positive attitude towards performance measurement systems, for example, through various trainings or workshops.

## 5. Discussion and Conclusions

Based on our research, we found out that only 20% of SMEs have implemented a comprehensive PMS. From this 20% of SMEs in our sample, only 64% are satisfied with PMS and 36% are dissatisfied. This is a very small number. However, it was confirmed by other previous researchers [3,4,13,49], that the most attempts to implement PMS in SMEs fail. According to Smith, Smart and Bourne [41], it is in up to 70% of cases. Of the total number of successful PMS implementations, in only about 50% of the cases where performance indicators originally planned were also implemented [7]. Therefore, we cannot be surprised that due to the relatively negative results, many of SMEs still do not even consider the application of PMS. In our sample, it was 55%.

One of the reasons of negative results of PMS implementation, or not even a consideration of PMS implementation, can lie in the size of SME and connected limitations. As mentioned in the Literature Review, many theories on performance measurement and performance management have been developed for large organizations, and these are hard to adapt for SMEs [7,13]. Another reason of failure can be connected to the process of implementation. As Bititci, Turner and Begemann [50] mentioned, managers often find out at the end of the process of implementation what is really needed to be measured and evaluated in their business. The successful implementation of PMS is particularly important for SMEs. If the implementation process fails at the end of the project, it has a much more disastrous impact on SMEs than on large companies because of the high resource load allocated to the entire implementation process [9].

In our opinion, the problem can be caused by the lack of a preliminary phase in the process of PMS implementation that would assess whether the current conditions in companies allow the successful application of PMS. The phase would thus extend the original three-step process of PMS implementation [1] to four phases. If, before the beginning of the whole process of PMS implementation (design, implementation, and use), managers do not perform any assessments of readiness for each phase, potential errors or problems will be noticed in the end. Failure of implementation process in the end can have more catastrophic consequences for SMEs with regard to a high load on the resources allocated for the creation, implementation and use of PMS. Therefore, if we want to increase the success rate of the implementation of PMS in SMEs, we recommend extending the model proposed by Bourne [1] to start with a preliminary phase, which consists of recommendations, which is in what condition SMEs should be before to start implementing PMS. The preliminary phase should be based on discussions of owners, managers and experts to evaluate the preparedness of a company and to draw clear major intentions and expectations before approaching next steps of PMS implementation. Not only has the current COVID-19 pandemic crisis and connected economic stagnation since 2019 put pressure on organizations and demanded changes in their internal processes, but visions of the digital transformation associated with the advent of Industry 4.0 has opened

the debate for necessary changes many years earlier. This is directly affecting demands on performance and improvements of internal processes and thus also on PMS. We have identified three major areas that should be part of the preliminary phase. The fulfillment of these default assumptions should subsequently increase the likelihood of successful application of PMS:

1. SMEs should link performance measurement to operational, tactical and as a priority to the strategic level of the organization.

The recommendation is based on current criteria for measuring and evaluating performance, according to which SMEs should not only measure performance but also link the results of performance indicators into interrelationships at all levels of management, in order to support the creation and change of strategy or learning of the organization. It is mentioned also by other authors, that performance measures support the alignment between people's actions and company strategy [2,7,9,51,52]. Linking the results allows regular feedback, an overview of causal relationships between indicators' performance, supports the continuous improvement of the organization and the evolution of strategic goals. According to our results, SMEs with successful implementation of PMS have better linked performance measures with tactical and strategic objectives by 10% than the other companies.

2. SMEs should automate the measurement and evaluation of performance, while it should use an in-house information system. Performance measurement should be fully automated and able to operate without excessive human intervention.

The recommendation is based on current trends in the automation of performance measurement, according to which the existence of a properly implemented and effective information system significantly affects the success of the application of PMS [53].

Automation delivers timely and efficient measurement that is based on well-defined algorithms that minimize the risk of error. According to our results, in 8.4% of SMEs, a direct relationship was found between the automation of performance measurement and the success of the system application. In PMS with digital and automated environment, decision-making is highly data-driven and can be significantly shortened [53], but it requires some degree of stability and streamlined processes to enable automatization [54].

3. SMEs should implement process management, at least at the level of described and graphically-processed process maps, and optimally, at least at the level of measurement and evaluation of processes.

The recommendation is based on trends in performance measurement and evaluation, according to which a PMS should be developed on a process approach [55]. The process approach is considered as the basis for improving the organization, as it affects the performance of processes in the organization, but also has the effect of reducing time, improving the quality of products or services, reducing costs, improving financial performance, increasing quality and customer satisfaction or increasing employee productivity. According to our results, the level of process management has a direct positive effect on the level of PMS application in 14.4% of SMEs. The highest stages of the process approach were most often achieved by SMEs with a comprehensively implemented system, while the lower levels were achieved by SMEs with a partially implemented performance measurement system, and the lowest levels of the process approach were achieved by SMEs that did not have a performance measurement system applied.

Based on the research results, the main implications for practice are the following. The research and the way of formulating research questions were conducted in order to point out the difference between successful and unsuccessful PMS. This different view of factors brings the necessary arguments for SMEs and possible inspirations for praxis. According to our findings, PMS failure is also a consequence of these statements:

1. Businesses do not have a clearly defined goal.
2. Management does not sufficiently support the implementation of PMS.
3. Barriers are also the expertise of employees involved in the process.

The authors Ates, Garengo, Cocca and Bititci [56], in their study, point to the difference in short-term and long-term goals in setting PMS. According to them, planning is perceived by entrepreneurs and managers of small companies as a bureaucratic burden, while flexibility and quality in production and services are perceived as a critical factor of success. There is a difference between a business and managerial approach and a mindset. A relationship is also identified based on what is the main driver of PMS implementation, whether it is of primary interest to HR, manufacturing or sales. Based on the interest in measuring performance and using indicators in the work of line and top managers, the relationship of managers to PMS and perceived benefits for their own managerial work is formed [57]. The importance and contribution of PMS for managerial praxis is a strong motivator for managers to engage in PMS implementation. Ates, Garengo, Cocca and Bititci [56] also mention in their study the importance of planning and linking systems to business goals, including a formalized strategy, with a top-down approach to breakdown indicators from strategic priorities and important goals of companies. The other main findings of these authors [56] are also in line with our findings, although they interpret them as a problem of internal communication and managerial work in SMEs based on traditional command and control approach.

Although SMEs' managers make the decision about their interest in PMS, their failure is currently in the implementation phase. As our research shows, it is not about the intensity or duration of action in the implementation phase, but about interest and support. SMEs that were satisfied with the implementation had the support and effective involvement of managers. As Lee, Townsend and Wilkinson [57] point out, there is a difference in the focus and use of PMS, whether it is formal or informal PMS. As stated by Urbancová, Stachová and Stacho [58] in their research, formal PMS are used mainly by companies with global operations or international connections in Slovakia and Czech Republic. In these companies, the formalized system is also connected to the employee appraisal. The openness of the Slovak economy presupposes the formalization of PMS, but a large part of SMEs are suppliers and subcontractors of Slovak large companies, which may not exert enough pressure to formalize PMS. The necessary involvement of managers also depends on this. Moreover, on the basis of different expectations, possible conflicts or dissatisfaction may also arise. Sardi, Sorano, Ferraris and Garengo [59] emphasize the developments in companies related to the development of managers' relationship to information systems and data. This factor can play a significant role in involving managers in the PMS implementation process, and with the advent of a new generation of managers and the improvement of their IT skills and Data Literacy, we can expect greater commitment. Already in our previous research by Stachová, Papula, Stacho, Kohnová [60], we have referred to the needs of engaging in knowledge networks and using external partnerships. The ever-expanding possibilities of education and development in the external environment, together with the intensification of the activities of clusters and interest groups, is an opportunity for companies to overcome these obstacles. Sardi, Sorano, Ferraris and Garengo [61] highlighted the development of enterprise performance systems in the context of their knowledge activities.

This research and the presented conclusions have several limitations, as well as possibilities in continuing research work. The limiting factor is undoubtedly the size of the examined sample, and the relative short time interval of the research. Research on the topic of performance and the answers of respondents can be influenced by a subjective attitude to the current performance of the company across individual sectors. The sample size did not allow to analyze deeper differences and agreement between respondents from different sectors or regions. As Silva, Sousa, Moreira, Amaro [62] pointed out, PMS can also be affected by the external environment, which differs depending on the sector and industry in which the company operates. Impacts and pressures, especially from external stakeholders, also have a significant impact on managers' motivation to make decisions on performance management issues. These recommendations were written by Lorincová, Bajžíková, Oborilová, and Hitka [63] as well. Given the specifics of the structure



of the Slovak economy, it is therefore our intention in the follow-up research to specify the findings in the industry sector.

As analysis of results from the use phase of PMS did not point out any significant findings, therefore, we want to focus our further research on a deeper analysis in this aspect. We are aware of the limitations of this research. Our research was focused only on the implementation of PMS, and therefore, we did not address other issues related to performance in the research. Finally, we want to point out other open (so far unresolved) issues that need to be addressed and that go beyond the scope and focus of this paper. These areas would be exploring how to develop appropriate performance indicators that SMEs should measure in their performance measurement systems, e.g., according to research, 50% of the proposed indicators will prove to be unnecessary in the use phase. Another area of research would be to focus on the creation of other specific tools and techniques designed and adapted for SMEs, as according to several authors, there is still a lack of suitable tools or techniques for the environment, and as our research showed, SMEs were most often satisfied with the system.

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