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Article

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Marketing i menedžment innovacij

Innovation Activity of Slovak SMEs Operating in the ICT Sector

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Abstract: The objective of this study was to analyse contemporary trends in innovation among small and medium–sized enterprises in Slovakia's ICT sector. The study explored different types of innovations, the factors that either promote or hinder innovation, and the innovative practices of small and medium–sized enterprises within this sector. To achieve this goal, a questionnaire survey was conducted between September 2021 and February 2022. The research sample consisted of 1,000 randomly selected small and medium–sized enterprises operating in the ICT sector, drawn from a total of 8,416 eligible companies. Ultimately, 124 respondents completed the questionnaire, including 73 microenterprises and 51 small and medium–sized enterprises. The research hypotheses were evaluated via descriptive statistical analysis and the Z score methodology. The findings revealed that the most prominent form of innovation in Slovakia's ICT sector was service innovation, followed by product innovation and the adoption of new production processes. The primary motivational factor driving innovation is the desire to achieve high customer satisfaction by meeting customer needs and enhancing service quality. Conversely, the most significant barrier to innovation was identified as a lack of time. The study indicated that approximately 75% of small and medium–sized enterprises intend to pursue innovation within the next few years. Moreover, innovation plans were more pronounced among small and medium–sized enterprises than among microenterprises. The primary areas of interest for future innovations included enhancing existing products and services, developing new products or services, and implementing new technologies or production processes. With respect to the research hypotheses, no statistically significant differences were observed between the innovation activities of microenterprises and those of small and medium–sized enterprises.

Keywords: SME; innovation; ICT sector; factors supporting innovation; factors hindering innovation.

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1. Introduction. Small and medium–sized enterprises (SMEs) play a fundamental role in driving economic development on a global scale (Kumar et al., 2023). Compared with larger firms, SMEs differ in terms of size, industry, management structure, historical background, growth dynamics, and national context (Vivier, 2013). In the highly competitive business landscape (Linan et al., 2019), SMEs face a range of internal and external challenges (Linan et al., 2019). These challenges are related primarily to increasing competitive pressures (Ceptureanu, 2015; Malega et al., 2019). Their activities are further constrained by several factors, including financial limitations (Ivanova, 2017; Ha et al., 2022; Belas & Rahman, 2023), inadequate information, limited negotiating power, insufficient resources, and a lack of international experience (Linan et al., 2019). Additional constraints include a shortage of knowledge, informal organizational structures (Sunil, 2017; Małkowska & Uhruska, 2022; Kot, 2023), bureaucratic challenges (Remišova & Lašakova, 2020), and limited public-sector support (Belas et al., 2019).

Nevertheless, SMEs possess several advantages, such as flexibility, adaptability, independence, and agility in business relationships. They also offer opportunities for job creation, foster individual creativity, facilitate the realization of innovative ideas, and respond effectively to market needs (Konstantopoulou et al., 2019). The growing economic significance of SMEs introduces not only economic and social challenges but also ethical dilemmas (Zvarikova et al., 2023; Khan et al., 2023), which are similarly encountered by the ICT sector in Slovakia.

Given their increasing importance and dynamic competitive environment, SMEs must actively engage in innovating their products and services. Innovation is a crucial determinant of competitiveness (Taçoğlu et al., 2019; Machova et al., 2023) and significantly influences overall performance (Dinu, 2022; Bratianu et al., 2022). SMEs represent a highly diverse group.

The adoption of new technologies across different areas of SME operations is vital for maintaining competitiveness (Konstantopoulou et al., 2019; Tomaškova & Kanovska, 2022; Ali et al., 2023). As noted by Kumar et al. (2023), leveraging open innovation and strategic approaches can enhance performance. Numerous scholars underscore the critical role of innovation in improving the competitiveness and performance of firms (Civelek et al., 2021; Dobrovic et al., 2018). High performance is typically the result of combining innovative practices with strategic planning (Rigtering et al., 2017; Kostiukevych et al., 2020; Gallo et al., 2023).

The primary goal of this research is to investigate the innovation activities of Slovak SMEs within the information and communication technology (ICT) sector. Specifically, the study aims to identify key areas of innovation for SMEs, examine factors that facilitate or hinder innovation, and explore anticipated innovation trends. The research also aims to compare the innovation activities of microenterprises with those of SMEs.

This research addresses a timely and significant issue, as the SME sector and its innovation activities have recently attracted considerable attention from the professional community in Slovakia. Currently, a major challenge for Slovak SMEs is enhancing their innovative capacity, as their innovation performance significantly lags behind the European Union average. The research findings have potential implications for economic policymakers in Slovakia and SME practitioners. The study’s originality lies in its use of the authors’ proprietary data. The structure of the paper is as follows. The first section examines key theoretical concepts related to innovation. The subsequent section clearly outlines the research objectives, methodology, and data sources. This is followed by the presentation of empirical findings and a concise discussion. Finally, the primary conclusions of the study are articulated.

2. Literature Review. According to Rasner (2009), the innovation process within a company begins with the development of an original concept (invention), which progresses through several stages—such as recognizing opportunities for innovation—to create a competitive advantage for the product (Dzikowski, 2022). Innovation involves a sequence of activities that culminate in the development of new products and lead to beneficial structural transformations within the firm. This process follows a systematic approach that is aligned with a specific project or program rather than occurring randomly. Its objective is to strategically increase a company's production to satisfy increasing customer needs and demands. Typically, the innovation process comprises five stages: scientific research, research development, product development, production, and application. However, in cases where the innovation is a minor enhancement, some of these stages may be omitted. In such instances, smaller innovations or quality improvements often focus on essential stages to achieve the desired outcome (Cimo & Marias, 2006; Meyer & Meyer, 2017; Swiadek et al., 2022; Kuczewska & Tomaszewski, 2022).

Ivanova & Cepel (2018) highlight a macroeconomic perspective on innovation. As they note, "a key factor of the states' increasing competitiveness is assumed to be the innovation performance of enterprises, which is

projected through innovative business processes into the innovation performance of the economy as a whole". Scientific and technological advancements are crucial for the survival and growth of enterprises, serving as a cornerstone for achieving prosperity (Ma et al., 2022). Al Qershi et al. (2020) reported that strategic innovation significantly enhances SMEs' competitive advantage.

Malega et al. (2019) underscore the importance of incorporating modern management and marketing techniques, improving labor productivity, applying scientific research and technology to practical applications, and investing in human capital to bolster firms' competitiveness. Gomezel & Smolcić (2016) offer a clear perspective on the matter, stating that "the strong and positive relationship between innovativeness and growth explicitly presents the importance of innovativeness for the growth of a company". Similarly, Kim (2021) identified management, technological capabilities, and marketing proficiency as critical factors influencing SME performance. Research by Wall (2021) supports this, indicating that corporate strategy, as well as process, product, and organizational innovations, plays essential roles in enhancing SME performance.

The size of a company significantly affects its innovation activities. Larger enterprises typically have more financial and human resources to support innovation, allowing them to maintain substantial innovation teams, R&D departments, and venture capital investments. Conversely, smaller enterprises often exhibit greater flexibility and speed in decision-making and implementing innovations. Differences in the flexibility and innovative potential of small firms may depend on their specific industry (Lewandowska, 2021). Larger firms frequently pursue radical innovations that transform business models or create new products, whereas smaller firms tend to focus on incremental innovations, making slight modifications or improvements to existing products or processes (Acenoglu et al., 2022). Microenterprises, constrained by limited resources, often rely on owners who fulfil multiple roles, thereby restricting available time and finances for innovation. Moreover, microenterprises tend to be more isolated and less receptive to new ideas and technologies. In contrast, SMEs possess greater capacity to invest in innovation because of their larger workforce, enhanced access to external expertise, and superior financial resources. The success of innovation in these firms depends on their unique circumstances, strategies, and adaptability to dynamic market conditions. ICT firms, in particular, are predisposed toward service innovation due to their distinctive characteristics.

From the qualitative analysis, the following hypothesis was formulated:

H1: Product innovation, service innovation, and marketing innovation represent the most significant forms of innovation for SMEs in the ICT sector, with no statistically significant differences between microenterprises and SMEs.

SMEs often view innovation as a means to increase process efficiency and productivity, thereby increasing profitability. The introduction of new products, services, or processes can open new markets or allow for higher pricing and profit margins. Innovation also enables SMEs to respond promptly to trends, shifts in consumer preferences, and technological progress. A primary motivation for SMEs to innovate is to increase their market competitiveness. Through innovation, SMEs can offer superior products and services, attracting more customers. This can create a competitive edge through technological advancements, patents, brand recognition, or customer relationships, which are vital for long-term success. In this context, financial management plays a crucial role in funding innovation (Belas & Rahman, 2023).

In a competitive environment, SMEs prioritize long-term customer relationships, which enables them to deliver high-quality products and services and secure customer loyalty (Taçoğlu et al., 2019). Customer feedback on new products is critical for a firm's development, as it generates innovative ideas and solutions (Grimsdottir & Edvardsson, 2018). Marketing innovation refers to the pursuit of creative and novel solutions to challenges and needs. To remain competitive and enhance performance, SMEs must continually develop new products and strategies (Ungerman et al., 2018). Effective communication with customers is essential, as SMEs can tailor their innovations to customer needs. Consequently, companies often rely on networking for innovation purposes (Grimsdottir & Edvardsson, 2018).

H2: The primary motivation for SMEs in the ICT sector to innovate is achieving high customer satisfaction and meeting client needs, with no statistically significant differences between microenterprises and SMEs.

A lack of financial resources is a significant obstacle for SMEs. Ivanova (2017) noted that Slovak SMEs struggle to access external financing because of complex application procedures and stringent bank criteria for financial assessment. SMEs also face a shortage of skilled employees with the requisite technical and innovative expertise. Additionally, bureaucratic processes and regulations often delay innovation implementation. Limited information on new technologies and market opportunities, coupled with the inherent risk of failure, further hinders innovation.

Firms pursuing innovation-centric strategies or undergoing digital transformation face significant long-term risk (Grishunin et al., 2022). SMEs encounter greater challenges than do large firms when they adopt sustainable business practices through innovation (Dura et al., 2022). Although SMEs are adept at adopting new technologies and targeting niche markets (Prause, 2019), financial constraints remain a significant barrier to innovation (Ivanova, 2017; Ruiz-Palomo et al., 2022; Rozsa et al., 2021).

According to the Slovak Business Agency (2020), 75% of SMEs identify insufficient financing as the primary barrier to innovation. Other challenges include inadequate state support (38.2%), a shortage of skilled labor (25.7%), and limited knowledge and information (25%). Since business owners often serve as top managers, limited time due to operational priorities also hampers innovation.

H3: The most significant barrier to SME innovation in the ICT sector is lack of time, with no statistically significant differences between microenterprises and SMEs.

Slovakia's innovation performance falls significantly behind the European Union average (Slovak Business Agency, 2020). While Slovakia's ranking within the EU28 improved by one position, the overall innovation score declined, indicating stagnant innovation activity. Compared with European SMEs, Slovak SMEs invest less in skilled labor, product and process innovations, marketing, and research (Loucanova & Nosalova, 2020; Belanova, 2021). In 2020, only 65% of Slovak SMEs innovated, 20% planned future innovations, and 15% had no innovation plans (Slovak Business Agency, 2020).

Loucanova & Nosalova (2020) and Belanova (2021) observe that Slovakia's innovation performance remains below the EU average, showing minimal year-to-year progress. Major obstacles include financial constraints, taxation, and low R&D investment (Fila et al., 2020; Statistical Office of the Slovak Republic, 2022). Despite these challenges, ICT advancements and ecoinnovation represent areas of strength (Dubina et al., 2022; Androniceanu et al., 2021).

H4: Over 60% of SMEs in Slovakia's ICT sector plan to innovate within the next three years, primarily through improving existing products or services, with no statistically significant differences between microenterprises and SMEs.

3. Methodology and research methods. This study aims to emphasize current trends in innovation among SMEs within Slovakia's information and communication technology (ICT) sector. To achieve this objective, a questionnaire-based study was conducted between September 2021 and February 2022. The research involved contacting a random sample of 1,000 SMEs drawn from a total pool of 8,416 qualifying ICT companies. The selection data were sourced from the Finstat.sk website, and firms were contacted via email.

To identify the motivating factors and barriers to innovation, a response scale was employed: 1 – not at all motivating, 2 – less motivating, 3 – quite motivating, and 4 – fully motivating or very motivating. A weighted arithmetic mean was calculated from the participants' responses. For certain questions, respondents were allowed to select multiple answers. When queried about planned innovations over the next three years, participants could provide a binary yes/no response. In questions concerning the types of innovations planned within this period, multiple responses were also permitted.

Owing to the specific nature of the ICT sector, the number of firms within it is relatively small compared with the overall SME population in Slovakia. Consequently, only 12.4% of the contacted firms participated in the survey. A total of 124 responses were received, comprising 73 microenterprises and 51 SMEs.

All the data collected from the questionnaire were treated anonymously. In terms of company size, microenterprises (0--9 employees) accounted for more than three-quarters of the respondents, which is consistent with the sector's typical profile of businesses with 1--3 employees. With respect to ownership structure, the majority of respondents were domestically owned ICT SMEs, with only 4% reporting foreign ownership. The highest recorded levels of foreign ownership were 60% and 80%, respectively. From a legal perspective, the majority of respondents operated as limited liability companies, which is the prevalent business form for corporate entities in this sector. Among the participants, 79% were male, most of whom were company owners; 69% held managerial positions, while 17% were employees.

To test this hypothesis, descriptive statistical methods, including unweighted and weighted arithmetic means, were applied. The statistical significance of the differences in the responses was evaluated via the p value for the Z score at the 0.05 significance level. If the reference p value was greater than or equal to 0.05, the null hypothesis was accepted. Conversely, if the p value was less than 0.05, the null hypothesis was rejected. The calculations were performed via the Z score calculator (Z score, 2023).

4. Results and discussion. Figure 1 shows the results of the questionnaire research aimed at identifying the most important forms of innovation.

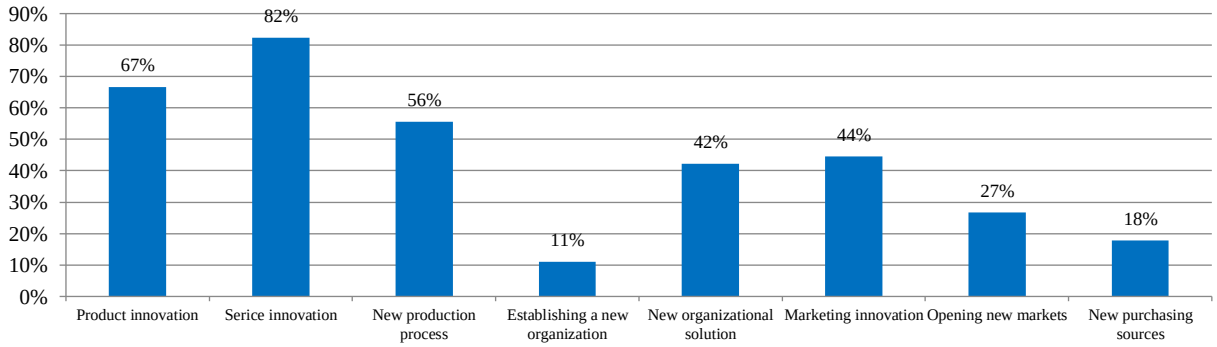

Figure 1. The importance of development innovation types in SMEs.
Source: Developed by the authors on the basis of the results of the questionnaire survey.

The most significant form of innovation in the ICT sector in Slovakia was the development of innovations in the field of services (reported by up to 82% of respondents), followed by product innovations (67% of respondents) and the introduction of a new production process (56% of respondents) (Figure 1.). The importance of marketing innovations was mentioned by 44% of the respondents. You can see the results of statistical calculations in the area of forms of innovation in the ITC sector in Slovakia in more detail in Table 1.

Table 1. Results of statistical calculations in the area of forms of innovation in the ITC sector in Slovakia.

Factor	TOTAL	MSMEs	SMEs	Z score/ p value
Product innovation	58	32	26	0.9601
Service innovation	84	53	31	0.1096
Introduction of new production methods, processes, modernization of technologies	66	33	33	0.3222
Creation of a new organization	10	4	6	0.3173
New organisational solution, application of new organisational-management system, application of new working conditions	40	20	20	0.4593
Marketing innovation, application of new marketing methods	50	32	18	0.1936
Market opening	26	13	13	0.5552
New source of supply of raw materials and semifinished products	30	15	15	0.5287
TOTAL ANSWERS	364	202	162	

Note: MSMEs-Micro, SMEs-Small and Medium Enterprises.
Source: Developed by the authors on the basis of the results of the questionnaire survey.

There were no statistically significant differences in the affirmative responses of microenterprises compared with those of SMEs, as confirmed by all p values. These results follow the conclusions presented by several authors in their studies. The views of several authors, such as Taçoğlu et al. (2019), Konstantopoulou et al. (2019), Wall (2021), Kumar et al. (2023), Malega et al. (2019), and Dobrovic et al. (2018), and Gomezel & Smolčić (2016), can be supported, who stated that changing competition forces SMEs to engage in the process of innovation of their products and services, as it enhances not only the competitive ability of SMEs but also their performance.

Service innovation is a key element in entrepreneurial internationalization, as much of it actually occurs in high-technology areas (Vuorio et al., 2020). Belanova (2021) highlights that innovation performance in Slovakia is driven mainly by foreign-controlled firms. Kuivalainen et al. (2007) emphasize born globals in particular, who are knowledge intensive by nature and operate in service-oriented or software solution-oriented industrial sectors. Thus, service innovation in particular is very important in an increasingly digitalized trade in a global marketplace (Androniceanu, 2023). These conclusions are presented by Taques et al. (2021) and Vuorio et al. (2020). An important area is the issue of ensuring the quality of products and services through the use of a wide range of quality management practices. Potkany et al. (2020) present findings concerning the impact of quality management approaches on business performance. Figure 2 presents the results of research on the motivational factors for innovation.

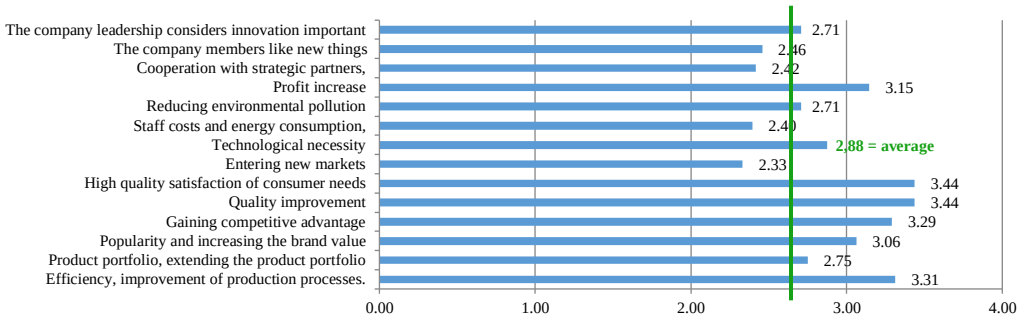

Figure 2. The importance of factors supporting and initiating innovation in SMEs.
Sources: Developed by the authors on the basis of the results of the questionnaire survey.

The most significant motivating factor (Figure 2) was high customer satisfaction through satisfying customer needs (mean 3.44) and improving service quality (mean 3.44), followed by increasing firm efficiency (3.31), gaining an advantage over competitors (3.29) and increasing profits. Above the average value of 2.88, factor popularity and increasing brand value (3.06) were still ranked. You can see more detail about the results of statistical calculations in the area of motivational factors of innovation in the ITC sector in Slovakia in Table 2.

Table 2. Results of statistical calculations in the area of motivational factors of innovation in the ITC sector in Slovakia

Factor	1	2	3	4	3+4*	Z score/p value
Efficiency, improvement/enhancement of production processes	15/12/3	8/5/3	47/29/18	54/27/27	56/45	0.2846
Product range/product assortment, expansion of product range	15/10/5	25/12/13	47/26/21	37/25/12	51/33	0.9601
Increasing reputation, brand value	6/2/4	10/6/4	35/19/16	73/46/27	65/43	0.9601
Gaining an advantage over competitors, standing up to competitive rivalry	5/3/2	7/6/1	42/25/17	70/39/31	64/48	0.4533
Improvement of quality	6/3/3	5/0/5	40/27/13	73/43/30	71/43	0.6745
Satisfying consumer needs at a qualitative level, increasing customer satisfaction levels	6/3/3	7/2/5	31/17/14	80/51/29	68/43	0.8493
Entering a new market	26/13/13	43/23/20	34/19/15	21/18/3	37/18	0.2891
Technological necessity	BBE	24/15/9	49/26/23	33/21/12	47/35	0.5485
Reduction of labour expenditure and energy consumption	24/16/8	34/21/13	38/20/18	28/16/12	36/30	0.3173
Reduction of environmental pollution	24/16/8	24/13/11	44/23/21	32/21/11	44/33	0.5419
Increase in profits	8/4/4	5/3/2	52/26/26	59/40/19	66/45	0.8259
Cooperation, collaboration with strategic partners	19/10/9	30/15/15	47/26/21	28/22/6	48/27	0.5157
Company members like to invent and try new things	16/8/8	40/17/23	42/30/12	26/18/8	48/20	0.0784
Management attaches great importance to innovation	15/7/8	22/11/11	47/30/17	40/25/15	55/32	0.5823
TOTAL ANSWERS					756/495	

Note: * sum of positive MSMES/SMEs responses.
Sources: developed by the authors.

There were no statistically significant differences in the positive responses of microenterprises compared with those of SMEs, as confirmed by all p values. Focusing on long-term client relationships, intensive integration of marketing approaches, application of customer relationship management principles, and marketing innovations enable SMEs to have appropriate information about their clients' needs and requirements and innovate their products and services on the basis of this information, potentially leading to revenue and profit growth (Taçoğlu et al., 2019; Grimsdottir & Edvardsson, 2018; Ungerman et al., 2018).

Wozniak (2021) stated that innovation within ICT projects is one of the key factors determining the level of client satisfaction and thus the project success rating. This is because the role of the client in the ICT sector represents a key issue in the management of ICT innovation projects in the context of the successful management of such projects. Therefore, in the ICT sector, the assessment of the type of client should be an essential element in the process of innovation implementation. Bathallath et al. (2016) declare that currently,

the approach to innovation projects in this sector is rather procedural and technical, which usually leads to a discrepancy with the client's requirements. Arias-Pérez et al. (2021) reached similar conclusions. This research highlights that satisfying customer needs, as a key issue of ICT project management, is the most significant motivating factor representing sustainability in ICT innovation project management. Figure 3 presents the results of research on the limiting factors for innovation. A lack of time (Figure 3) was identified as the primary factor impeding the innovation activities of SMEs in Slovakia's ICT sector, with an arithmetic mean of 3.06. The second most significant barrier was bureaucracy and excessive administrative requirements, scoring 2.90 points.

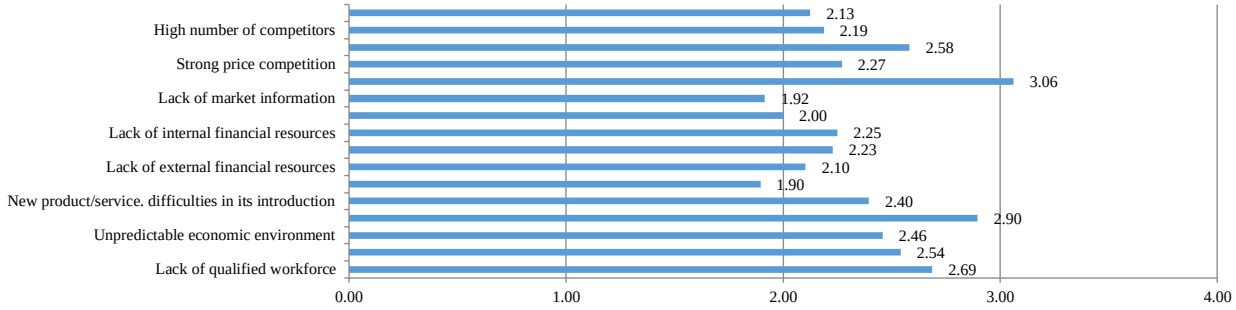

Figure 3. Factors hindering innovation in SMEs
Sources: Developed by the authors on the basis of the results of the questionnaire survey (average = 2,35).

This was followed by a shortage of skilled labour, which had a mean score of 2.69. Other notable barriers, all with above-average mean values (mean = 2.35), included the high cost of innovation (2.58), the rapidly changing legal environment (2.54), the unpredictable economic climate (2.46), and the challenges associated with introducing new products/services or adopting new technologies (2.40). Factors hindering innovation in SMEs– statistical results you can see in more detail in Table 3.

Table 3. Factors hindering innovation in SMEs—statistical results

Factor	1	2	3	4	3+4*	Z score/p value
Shortage of skilled labour	16/11/5	28/17/11	56/31/25	24/14/10	45/35	0.2846
Rapidly changing legal environment	18/8/10	33/18/15	44/26/18	29/21/8	47/26	0.6384
Unpredictable economic environment	11/9/2	33/15/18	42/26/16	38/23/15	49/31	0.9124
Bureaucracy, red tape, over operation	8/6/2	20/9/11	37/20/17	59/38/21	58/38	0.7642
Difficulties in introducing a new product/service/technology	22/17/5	48/23/25	36/20/16	18/13/5	33/21	0.9124
Difficulties in cooperation with external partners	26/15/11	58/33/25	30/18/12	10/7/3	25/15	0.9283
Lack of external funding sources	28/17/11	47/23/24	29/16/13	20/17/3	33/16	0.4122
Difficulties in obtaining grants or subsidies	42/25/17	25/12/13	31/16/15	26/20/6	36/21	0.8337
Lack of internal funding sources	29/19/10	43/24/19	32/13/19	20/17/3	30/22	0.5287
Lack of consumer demand for the new product	34/19/15	42/21/21	38/26/12	10/7/3	33/15	0.3125
Lack of information on markets	39/19/20	50/29/21	31/23/8	4/2/2	25/10	0.2340
Lack of time	29/16/13	38/26/12	33/15/18	24/16/8	31/26	0.2340
Strong price competition	20/13/7	42/25/17	34/13/21	28/22/6	35/27	0.3681
Innovation costs too high	20/15/5	37/17/20	41/23/18	26/18/8	41/16	0.1052
High number of competitors	25/13/12	48/29/19	35/20/15	16/11/5	31/20	0.8729
Low level of risk	30/21/9	55/29/26	30/17/13	9/6/3	23/16	0.7114
Total responses of MSEs/SMEs					575/355	

Note: * sum of positive MSMES/SMEs responses.
Sources: Developed by the authors on the basis of the results of the questionnaire survey.

No statistically significant differences were detected between the perceptions of microenterprises and those of SMEs. This finding was supported by the p values associated with each individual factor. The empirical research results did not corroborate findings from several studies, which identified a lack of financial resources

as the primary barrier to innovation for SMEs. This conclusion has been documented by various authors and organizations, such as Ivanova (2017), Ha et al. (2022), and the Slovak Business Agency (2020).

Conversely, the research findings align with the conclusions drawn by Belas et al. (2017). These authors reported that empirical data did not substantiate the claim that innovative SMEs face significant financial constraints. Instead, Belas et al. (2019) suggested that other factors may be responsible for the lack of innovative activity. These factors include limited internal knowledge and experience related to innovation or a lack of interest among SMEs in modifying their product offerings. Additionally, insufficient quality marketing information may also serve as a constraint in this context.

Table 4. SMEs' future innovation intentions

Does your company plan to implement any innovations in the next 3 years?	TOTAL	MSMEs	SMEs	Z score/ p value
Yes	91	51	40	0.2891
No	33	22	11	
Total	124	73	51	
Percentage of positive answers in %	**73.38**	**69.86**	**78.43**	

Source: Developed by the authors on the basis of the results of the questionnaire survey.

Among the total respondents (Table 4), 73.38% said that they were planning to innovate in the next three years. SMEs (78.43%) showed a higher level of future innovation activities. Microenterprises declared interest in innovation activities to a lesser extent (69.86%).

Table 5. Planned innovation activities of SMEs and statistical evaluation (comparison of microenterprises with SMEs)

Factor	TOTAL	MSMEs	SMEs	Z score/p value
Making a new product/new service	49	26	23	0.5029
Improvement of an existing product/service	66	38	28	0.9522
Introduction of new technology, new production process (technology, software, equipment)	40	18	22	0.0854
Creation of a new organization	3	3	1	0.4715
New organisational solution, application of new organisational-management system, new working conditions	11	6	5	0.8493
Opening of new markets	22	13	9	0.8572
Marketing innovation, new marketing methods	27	19	8	0.1443
Use of new sources of supply	15	11	4	0.1936
Total	233	134	100	

Source: Developed by the authors on the basis of the results of the questionnaire survey.

Empirical research indicates that SMEs show the greatest interest in enhancing existing products or services. Specifically, 66 SMEs expressed this preference, including 38 microenterprises and 28 small and medium–sized enterprises (SMEs). This was followed by the development of new products or services, with a distribution of 49 respondents (26 microenterprises and 23 SMEs). The third priority was the adoption of new technologies or production processes, with 40 respondents (18 microenterprises and 22 SMEs). See the data in more detail in Table 5 (red bolds).

These findings support the validity of Hypothesis H4. Toomsalu et al. (2019) emphasize that innovation is a critical driver of the growth and development of SMEs, significantly influencing their success and profitability. Their research identified factors such as increased competition, technological investment, and process optimization as key enablers of innovation. Conversely, obstacles such as outdated equipment, insufficient human resources, and financial or administrative challenges hinder innovative efforts. The authors recommend that SMEs enhance their internal structures, management practices, skills, and strategic ambitions to establish a clear innovation strategy necessary for growth and competitive success.

In alignment with this, Ivanova (2017) noted that in Slovakia, enterprise profits are the primary source of funding for innovation, cited by 50% of Slovak companies. This reflects a reciprocal relationship between innovation and profit: sufficient profits enable SMEs to invest in innovation, whereas well-directed innovation investments can generate higher profits. SMEs must fully recognize that scientific and technological innovation is essential for their survival, growth, and prosperity. Ma et al. (2022) argued that SMEs need to

be led by highly educated managers, as managers with advanced education are more likely to promote technological innovation and enhance the firm's innovation capabilities.

Considering these insights, and consistent with the conclusions of Dubyna et al. (2022), it can be deduced that innovation in the ICT sector plays a pivotal role in driving Slovakia's innovation performance. Innovation, particularly in ICT-related services, is a critical factor for economic growth and competitiveness.

This perspective underscores the importance of client-focused service innovation for ICT companies aiming to enhance economic performance, as customers are central to innovation initiatives in this sector. In terms of performance analysis, accurate reporting is vital. Potkany et al. (2022) highlight the importance of understanding the practical essence of controlling in this context. Furthermore, Louchanova et al. (2022) and Bathallath (2016) advocate adopting a customer-centric approach to innovation to effectively meet client needs. However, strategic barriers to innovation adoption in the ICT sector remain, including constraints such as insufficient time, lack of staff, and shortages of skilled employees, as identified in this study. This contradiction underscores the need for a comprehensive evaluation of the strategic factors affecting innovation adoption in Slovakia. Štofkova et al. (2017) and Yi (2020) stress the importance of a holistic approach to innovation strategy. Developing employees' e-skills, staying abreast of rapid technological changes, and mastering digital tools for stakeholder collaboration (including client interactions) will provide the ICT sector with enhanced competitive advantages and sustainable growth. This conclusion is also supported by Dubyna et al. (2022).

5. Conclusions. The objective of this article is to present contemporary trends in innovation among SMEs in Slovakia's information and communication technology sector. The empirical research specifically examined the various forms of innovation, the factors that encourage or hinder innovation, and the overall innovation activities of SMEs in this sector.

The findings revealed that the most prominent form of innovation in Slovakia's ICT sector was the development of service innovations. This was followed by product innovations and the implementation of new production processes. Notably, no statistically significant differences were detected between the responses of microenterprises and those of SMEs. The primary motivating factor for innovation was achieving high customer satisfaction by addressing customer needs and enhancing service quality. Additional motivating factors included improving the efficiency of the business, gaining a competitive advantage, and increasing profitability. For SMEs, enhancing brand popularity and brand value are also significant incentives.

The most critical barrier to innovation identified by SMEs in Slovakia's ICT sector was a lack of time. Other notable obstacles included bureaucratic processes and excessive administrative burdens, a shortage of skilled labor, high innovation costs, a rapidly evolving legal environment, economic unpredictability, and challenges in introducing new products/services or adopting new technologies. The survey results indicated that approximately 75% of SMEs intend to innovate within the next few years. SMEs demonstrated stronger innovation plans than did microenterprises. The primary focus for future innovations included enhancing existing products and services, developing new products or services, and incorporating new technologies or production processes. This research has certain limitations. The study was conducted within a single SME sector in Slovakia, using a sample that, while limited, was representative. Despite these constraints, it is reasonable to suggest that the findings contribute valuable insights to the scientific and professional discourse on SME innovation.

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Інноваційна діяльність словацьких МСП, що працюють у секторі ІКТ

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Метою цього дослідження є аналіз сучасних тенденцій інноваційної діяльності серед малих та середніх підприємств (МСП) у секторі інформаційно-комунікаційних технологій (ІКТ) Словаччини. У дослідженні розглянуто різновиди інновацій, чинники, що сприяють або перешкоджають інноваційній діяльності, а також практики впровадження інновацій в МСП цього сектора. Для досягнення поставленої мети в період з вересня 2021 року по лютий 2022 року проведено опитування. Дослідницька вибірка включала 1 000 випадково обраних

МСП, що працюють у секторі ІКТ, із загальної кількості 8 416 відповідних компаній. У підсумку, анкету заповнили 124 респонденти, серед яких 73 – мікропідприємства, а 51 – малі та середні підприємства. Гіпотези дослідження перевірено за допомогою описового статистичного аналізу та методології Z-критерію. Результати дослідження показали, що найпоширенішою формою інновацій у секторі ІКТ Словаччини є інновації у сфері послуг. На другому місці – продуктова інновація, а далі – впровадження нових виробничих процесів. Основним мотиваційним фактором для впровадження інновацій було прагнення досягти високого рівня задоволеності клієнтів, шляхом задоволення їхніх потреб та підвищення якості послуг. Найсуттєвішою перешкодою для впровадження інновацій виявився брак часу. Дослідження також засвідчило, що близько 75% МСП планують впроваджувати інновації у найближчі роки. Варто зазначити, що малі та середні підприємства проявляли більшу активність у плануванні інновацій, ніж мікропідприємства. Основними напрямами майбутніх інновацій були визначені: вдосконалення існуючих продуктів і послуг, розробка нових продуктів чи послуг, а також впровадження нових технологій або виробничих процесів. За результатами аналізу гіпотез, статистично значущих відмінностей між інноваційною діяльністю мікропідприємств і малих та середніх підприємств не було виявлено.

Ключові слова: МСП, інновації, сектор ІКТ, чинники підтримки інновацій, перешкоди інноваціям.