“Analysis of factors influencing innovation of Hungarian small and medium-sized enterprises”

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ANALYSIS OF FACTORS INFLUENCING INNOVATION OF HUNGARIAN SMALL AND MEDIUM-SIZED ENTERPRISES

Abstract

Innovation is vital in the modern economic environment, as it aims to improve the operational efficiency, competitiveness, and sustainability of enterprises. The study aimed to examine the innovation activity of Hungarian small and medium-sized enterprises and the most important factors influencing their innovation. The paper employed a questionnaire survey in the spring of 2024. During the survey, a total of 253 companies were interviewed about their innovation factors. Based on the results, the innovation activity of the Hungarian SME sector shows a developing tendency. A positive attitude toward innovation is increasingly present among SMEs. More than half of the respondents (53%) believe that innovation plays a key role in maintaining competitiveness. However, in practice, almost two-thirds (58%) of managers do not involve their employees in innovation processes, or only partially, suggesting that companies' decision-making processes remain centralized. Statistical analyses showed that neither the companies' size nor age showed a significant correlation with innovation. However, the research results showed a close relationship between innovation and the use of knowledge transfer. This result shows that knowledge management plays a decisive role in the innovation processes of Hungarian small and medium-sized enterprises.

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INTRODUCTION

Innovation research by small and medium-sized enterprises is important because SMEs represent one of the most important pillars of the Hungarian economy, as approximately 99% of all enterprises belong to this category, which accounts for 60-70% of Hungarian economic performance. In addition to their role in economic growth and employment, they also contribute to the flexibility of the economy, as they are able to adapt and renew themselves quickly, even during economic crises. To maintain their competitiveness, it is essential to continuously encourage innovation, adapt to new technological trends, and continuously develop them.

The Hungarian SME sector innovation capabilities and competitiveness of enterprises lag significantly behind those of more developed European countries. Raising their level of innovation is critical not only from an economic but also from a social perspective, as it can promote job creation and increase economic stability. A comprehensive analysis of the various innovation factors is necessary to better understand and address this problem.

1. LITERATURE REVIEW AND HYPOTHESES

Over the past decades, researchers have studied innovation from many angles, yet it cannot be claimed that innovation is easy for everyone to understand. Over the years, researchers have produced a wealth of theories related to innovation.

Innovation, as a factor promoting economic growth and competitiveness, plays an important role in the development of SMEs, especially in dynamically changing regions such as Central and Eastern Europe. In the constantly changing economic environment and the impact of globalization, innovation is not only a possible strategic tool for SMEs but also a fundamental need, which provides an opportunity to maintain competitiveness, strengthen their market positions, and ensure sustainable growth (Zamani, 2022; Ng et al., 2017). In Central and Eastern Europe, it is imperative to understand how innovation activity is shaped and what factors influence the innovation performance of SMEs (Stawasz & Głodek, 2011).

In Hungary, SMEs face several challenges in their innovation activities (Csonka, 2017; Ónodi & Kiss, 2023). The scope and scale of innovation activity in Hungary are determined by the economic environment (Szalmáné Csete, 2024), the research and development (R&D) infrastructure, and the European Union and domestic funding opportunities (Lentner & Kolozsi, 2019). One of the factors is access to finance (Tóth et al., 2022). The financial situation and innovation capacity of small and medium-sized enterprises are closely linked, as the financial stability and resources of companies directly influence their ability to develop (Lewandowska et al., 2021). Smaller enterprises often do not have sufficient capital to support innovation processes (Halpern & Muraközy, 2012) and are often unable to provide the same investor environment as large companies (Kotaskova et al., 2020; Amimakmur et al., 2024). Due to innovation risks and a lack of resources, many SMEs carry out innovation activities on a smaller scale. The company characteristics (e.g., company size or age) and the quality of human resources are also key factors. Several international research studies suggest that there may be positive or negative relationships between company size and innovation capabilities (Bruothová et al., 2014). SMEs are inherently more flexible and able to respond quickly to market changes. However, they face many challenges (high risk, limited resources) in terms of innovation compared to large companies (Forsman & Rantanen, 2011). The innovation activities of large companies are generally more complex and structured; in their case, the innovation capacity is generally higher than in smaller companies (Maron et al., 2019).

Another factor is the age of firms. Laforet (2013) found that older firms in the UK are more successful in adopting product and organizational innovations. The age of organizations influences their ability to innovate, and organizations of different ages are capable of different types of innovation. Younger organizations are generally more flexible and open to new ideas, while older organizations often face obstacles to introducing innovations because they have already established stable structures. However, older organizations may have an advantage through market experience that can help them implement innovations on a larger scale (Parsons, 2015). Young organizations are more likely to create rapid and risky innovations because they do not have stable systems that would prevent them from experimenting. Older organizations typically focus more on improving existing products and services (O'Reilly & Tushman, 2008; Damanpour, 1991).

In Hungary, SMEs often do not have sufficient access to the latest scientific results and technological developments, which can put them at a disadvantage in competition (Simon & Reicher, 2024). Furthermore, the innovation culture in Hungary may also differ from that of Western European countries. SMEs often lack the knowledge or experience to manage innovation, as innovation processes are often complex and require a high level of expertise. The human factor plays a significant role in the innovation processes of SMEs, as innovation involves not only technological developments but also the creativity, knowledge, skills, and cooperation of human resources (Hossain et al., 2024).

Leaders play a crucial role in innovation as they guide and shape the environments that enable new ideas and solutions to emerge (Steidle, 2018). Leadership is key to a company's ability to seize the opportunities presented by innovation and find solutions to market challenges (Soken & Barnes, 2014). There is a close connection between leader-

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ship and innovation, as leaders who are creative and risk-takers are more open to innovation (Naushad, 2022; Wiroonrath et al., 2024). Leaders must create an environment that fosters creativity, openness, and the free flow of ideas. Leaders must actively encourage new ideas, even if they are risky or unusual. This requires creating an atmosphere of trust and openness where employees feel free to speak their innovative minds, try new solutions, and are not afraid to make mistakes (Kastner, 2021).

Innovation in SMEs is closely linked to the flow of knowledge and information. SMEs often do not have the resources of large companies, but they may be able to obtain knowledge and information from external sources, such as their partners, universities, or other research institutions. It is important for SMEs to effectively manage and apply existing knowledge, as this can help them implement innovation efforts more quickly (Philipson, 2020). According to Ibidunni et al. (2020), knowledge transfer, i.e., the transfer and sharing of knowledge, plays a key role in innovation processes, as it allows companies, organizations, and individuals to leverage external and internal knowledge sources, thereby implementing faster and more efficient innovation cycles. Knowledge transfer can bring new knowledge, experiences, and technological solutions into organizations, which contribute to the development of new ideas, products, services, or business models. To increase the efficiency of knowledge transfer, enterprises need to use appropriate tools and support a culture of knowledge sharing to achieve their innovation goals faster and more effectively.

The innovation capabilities of small and medium-sized enterprises depend on a number of factors that directly affect their competitiveness in the market. The financial state of enterprises plays a key role, as innovation often requires large investments, and limited resources can make it more difficult for SMEs to introduce new technologies or products. The size of the enterprise is also decisive, as smaller companies are more flexible and can react faster to market needs, but due to their lack of resources, they often cannot implement larger innovation projects. Business experience and the age of the company also affect the success of innovation activities, as older companies are often more closely connected to their customers and better understand their needs. The role of managers fundamentally determines the design and implementation of innovation strategies, as they control the corporate culture and encourage the flow of ideas. In addition, knowledge transfer also plays a key role, as companies often acquire the necessary innovation knowledge from external sources, such as through industry contacts.

Following the literature review, the study aims to explore the factors that influence the innovation of Hungarian small and medium-sized enterprises. Research on the innovation level of Hungarian SMEs is necessary to understand the current situation of companies and how they can be supported in their future development. The hypotheses to be tested in the study are as follows:

H1: *There is a relationship between company size and innovation in Hungarian small and medium-sized enterprises.*

H2: *There is a relationship between age and innovation in Hungarian small and medium-sized enterprises.*

H3: *There is a relationship between application of knowledge transfer and innovation in Hungarian small and medium-sized enterprises.*

2. METHODOLOGY

The research method was a questionnaire survey. The survey took place in Hungary in the spring of 2024. A total of 253 companies were reached through the Hungarian Chamber of Commerce. During the sampling, it was a requirement to address small and medium-sized enterprises. The questionnaires were sent to the respondents electronically. The survey was anonymous. The questionnaire mainly included Likert scale questions. The first part of the questionnaire asked about the company's general data, while the second part contained questions related to the company's innovation. The questionnaire had a total of 27 questions. The hypotheses were evaluated using the SPSS statistical program.

Table 1 shows that limited liability companies (LLCs) dominated the survey, accounting for 63% of the participating firms. In addition to LLCs, the study

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also includes limited partnerships (10%), joint-stock companies (5%), and one general partnership (3%). Joint-stock companies tend to be more advantageous for larger enterprises, which could explain their low representation in this analysis. Furthermore, general partnerships are also not a particularly popular legal form. Alongside these, sole proprietorships also appeared among the respondents (17%). This is because this form involves far fewer legal and administrative procedures than other company structures and does not require capital for the establishment, as is the case with LLCs.

The next survey question focused on the sectoral operations of the companies. As shown, 35% of respondents operate in the industrial sector, 45% in the service sector, and 8% in the agricultural sector. Additionally, 9% of respondents indicated involvement in other sectors that do not fall within these three categories. Following this, the age of the companies was inquired about, as the age of a company can influence various factors, allowing one to establish correlations with other data. To facilitate the analysis, the companies were categorized into age groups to better illustrate the data and subject them to statistical tests in the future. Each age group is well-represented. The next question focused on company size. Based on the data, it was observed that 57% of the companies participating in the study are microenterprises. In addition, small enterprises represent 27%, and medium-sized businesses comprise 15%.

Table 1. General data from surveyed companies

Variable		N	%
Legal form of the company	Limited liability company	161	63.64
	Limited partnership	26	10.28
	General partnership	8	3.16
	Joint-stock company	13	5.14
	Sole proprietorship	45	17.79
Sector of the company	Industry	91	35.97
	Service	116	45.85
	Agriculture	22	8.70
	Other	24	9.49
Age of the company	Less than 10 years old	44	17.39
	Between 10 and 20 years	92	36.36
	Between 20 and 30 years	78	30.83
	Over 30 years	39	15.42
Size of the company	Microenterprise	145	57.31
	Small enterprise	69	27.27
	Medium enterprise	39	15.42
Total		253	100.0

3. RESULTS

The results show that nearly two-thirds (65%) of the companies implemented innovations. The next question focused on the presence of research and development (R&D) activities. Nearly half of the participating companies engage in R&D activities. This is a relatively high number, indicating that members of the SME sector are beginning to adopt technical solutions that are already well-established in larger enterprises. The next two questions of the questionnaire asked whether the company generally participates in tenders and whether it typically conducts market research. The two questions are shown in a summary chart. Of the companies questioned, 18% conducted market research, and 39% participated in tenders. Competitiveness is greatly impacted by these two elements. They are crucial for innovation policy, as a significant part of the economic support that has been and will be designed to support innovation is available through tenders. This involves many administrative tasks that can burden or even scare companies.

The next issue addressed the existence of knowledge transfer within companies. Thus, 51.78% of the responding companies use some form of knowledge transfer, which is beneficial for their ability to innovate. However, almost half of the companies (48.22%) do not use such methods, which may hamper their development, especially in a fast-changing market environment. The results of the survey show that most innovation ideas came from managers. This can be interesting as the majority of companies do not carry out market research and R&D activities. This leads to the assumption that the majority of innovation ideas in most companies come from managers since they do not have a good understanding of the innovations in the market and can only draw on the resources that management perceives.

After assessing what is necessary to start an innovation, the questionnaire then looked at the type of innovations implemented. The figure shows that the factor of creating an existing product or service (37.27%) is the outstanding leader. It can be likewise said that the creation of a new product or service (25.45%), the introduction of new

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Table 2. Model summary

Cases	Sum of Squares	df	Mean Square	F	p
Size of the company	0.108	2	0.054	0.237	0.789
Residuals	56.975	250	0.228		

Note: Type III Sum of Squares.

marketing methods (22.73%), the improvement of company operations (19.09%), and even the introduction of new production processes (14.55%) are additionally high. However, 22.72% of companies have not carried out any innovation in the past period. After typifying the innovations that have taken place, the financing of innovation in the management of the company was looked at. Here, the majority of organizations financed innovation activities from their own resources. This is a fascinating statistic. However, this is possible given that companies are afraid to borrow or to bring in external resources. Therefore, they dare to innovate on a scale that most of them can still cover with their assets.

The questionnaire then splits in two after these questions, as the next question asks whether the responding companies plan to innovate in the future. In addition to the innovations made, it is also important to look at the companies that have not innovated recently. The related question asked what company managers consider to be the biggest barriers to innovation. Here, high costs and insufficient assets were identified as the biggest barriers, but not far behind was the riskiness of innovation.

One of the last questions asks whether they plan to engage in innovation, and if so, what kind of innovation activity they plan to engage in. A high proportion of companies that plan to innovate in the future want to improve the way the company operates and bring new marketing methods into the company. The latter can be explained by the increasing choice of communication platforms available to companies, which means that they need to keep up with them. In addition to these factors, the improvement of existing products or services and the creation of new products or services also rank high.

The first hypothesis assumes that the level of innovation in an organization is correlated with its size. The statistical method used to test the hypotheses was an analysis of variance (Table 2). The significance threshold for ANOVA analysis was set at $p = 0.789$, and the resulting F-value was 0.237. There is no discernible difference between the size of the enterprise and the adoption of innovative activities, as indicated by the significance level (p-value), which is higher than the accepted margin of error of 0.05. Therefore, the study rejected H_1.

H_2 assumed that the level of innovation in an organization is correlated with the age of the organization. A Pearson chi-square analysis was performed for this hypothesis test (Table 3). The results of this test performed are $\chi^2 = 1.983$, df = 3, and $p = 0.576$. The p-value is 0.576, which is also much higher than the significance level of 0.05, meaning that there is no meaningful correlation between the age of the company and the adoption of innovation. The data collected show that the age of the company does not affect the frequency of innovation activity. The results show that innovation is not correlated with the age of the company. Therefore, H_2 was also rejected.

Table 3. Results of chi-squared tests for H_2

	Value	df	p
X^2	1.983	3	0.576
N	253		

H_3 assumed that knowledge-sharing enterprises are more likely to innovate than those that do not share their knowledge. The statistical method used was similar to the Pearson chi-square test (Table 4). The test result was $\chi^2 = 28.198$, df = 1, $p < 0.001$. There is a significant correlation between knowledge transfer use and innovation activity, as indicated by the p-value, which is significantly lower than the 0.05 significance level. Therefore, H_3 was accepted.

Table 4. Results of chi-squared tests for H_3

	Value	df	p
X^2	28.198	1	< .001
N	253		

4. DISCUSSION

Innovation is a key factor for Hungarian SMEs to achieve sustainable growth and competitiveness. The relationship between size and innovation can represent key strategies for companies. The innovation potential of SMEs, therefore, often depends on the size of the company, as larger companies have more financial resources, more extensive R&D activities, and more professional innovation structures. At the same time, the innovation advantages of smaller companies include lower bureaucracy and more flexible decision-making processes. The statistical analyses of this study show that there is no significant relationship between company size and innovation. However, in the international literature (Rogers, 2004; Plehn-Dujowich, 2009; Kelley & Helper, 1999), a correlation can be shown between the size of the organization and innovation.

The second hypothesis, according to which a relationship can be found between company age and innovation, was not accepted either. Similar findings can be found in the literature, according to which the age of the business does not determine a company's ability to innovate. Some research suggests that young companies are particularly capable of quickly adapting to new ideas, while others find that older companies have the stability and resources that allow them to sustain innovations over the long term (Bouncken et al., 2021; Medase, 2020). However, according to the research results, the use of knowledge transfer was significantly associated with innovation, which emphasizes the importance of knowledge management methods. This is confirmed by the international literature (Lee, 2016; Ode & Ayavoo, 2020; Öberg & Alexander, 2019), according to which a correlation can be found between knowledge management and innovation. The success of innovation depends significantly on the functioning of knowledge management systems and their ability to facilitate the rapid flow and integration of knowledge into organizational processes. Knowledge management and innovation are closely intertwined, as the effective management, sharing, and application of knowledge fundamentally contribute to the development of new ideas. A large proportion of the companies surveyed (51.77%) use some form of knowledge transfer, which is a positive sign of progress in developing innovation capabilities. Innovation is, therefore, not only about technological developments but also about applying appropriate leadership, financial, and knowledge management approaches.

CONCLUSION

The aim of this paper was to explore and analyze the innovation factors of Hungarian small and medium-sized enterprises, paying particular attention to the financial situation, size, age, and the importance of knowledge transfer of the enterprises.

The majority of surveyed Hungarian companies are engaged in innovation and recognize the importance of innovation. High costs and insufficient assets are the main barriers to innovation, identified by most respondents as the biggest challenges. Hence, the expansion of favorable financing opportunities, particularly soft loan schemes and grants, is essential for realizing future innovation initiatives.

According to the research results, the innovation performance of the Hungarian SMEs studied is not influenced by the age or size of the enterprise but rather by the efficiency of the flow and sharing of knowledge. Innovation success is not always related to the size or age of the enterprise but rather to the extent to which the enterprise is able to exploit the available resources and apply the latest scientific and technological developments.

The study recommended that policymakers and banks increase the availability of soft loans to members of the SME sector. In order to enable greater innovation by SME actors, policy actors need to increase the availability of affordable credit. In addition, managers should involve their employees as much as possible in corporate innovation decisions and processes and take advantage of the opportunities offered by knowledge transfer more often.

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Further scientific studies may research wider geographical and industry samples to obtain a comprehensive picture of the innovation situation of SMEs in Hungary.

AUTHOR CONTRIBUTIONS

Conceptualization: Peter Karácsony, Alexander Tsoy, Janos Meszaros, Kuralay Nurgaliyeva.
Data curation: Janos Meszaros.
Formal analysis: Peter Karácsony, Alexander Tsoy, Kuralay Nurgaliyeva.
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Investigation: Peter Karácsony, Alexander Tsoy, Janos Meszaros, Kuralay Nurgaliyeva.
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Visualization: Janos Meszaros.
Writing – original draft: Peter Karácsony, Alexander Tsoy, Janos Meszaros, Kuralay Nurgaliyeva.
Writing – review & editing: Peter Karácsony.

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