



**Doctoral School of
Business and
Management**

SUMMARY OF THESIS

Viktor Nagy- Borsy

**Diffusion and application of Cloud Computing -
Technology management challenges in the domestic SME sector**

for his Ph.D. thesis

Supervisor:

Dr. Nikolett Deutsch, Ph.D

habile university associate professor

Budapest, 2024

Department of Innovation and Business Incubation

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Table of Contents

1.	Theoretical framework	1
1.1	Introduction	1
1.2	Small and medium-sized enterprises in focus	4
1.3	Structure of the thesis and theoretical results	6
2.	Research methodology	9
2.1	Presentation of research questions.....	9
2.2	Applied methodologies	10
3.	Summary of results.....	13
3.1	The results of the research	13
3.2	Summary.....	21
4.	Important bibliography.....	23
5.	Own publications.....	27

List of figures

1. Figure: Topics and key concepts involved in my theoretical research.....	6
2. Figure: Areas of my empirical research	10
3. Figure: The use of Cloud computing in the domestic SME sector and among large companies.....	14

List of tables

1. Table: Results of the theoretical chapters and their application.....	7
2. Table: Research map	11
3. Table: The most important factors determining the use of Cloud computing.....	17

1. Theoretical framework

1.1 Introduction

The impact of technological development and digitalization on companies is an extremely diverse and colorful topic, the examination of the challenges and opportunities arising from technological changes and their possible effects appears in almost all theoretical and practical research involving social, economic and business fields. Just as in economic theoretical research and trends, of course also in the business environment, the central theme is responding to changes caused by digitization, the importance of the appreciation of technology. integration in order to transform and support their business activities and processes. According to Pelser (2014), today's companies, in addition to operating efficiently in their current market, must also innovate and plan for "future markets". The role of digitization in the economy is now indisputable, rapid and continuous technological development prompts significant innovation and research and development activity. According to Nemeslaki & Sasvári (2015), the development of technology has created a "digital world" based on information and innovation, which poses significant challenges to the business sphere, while technological systems and capabilities are intertwined and built on each other. According to Evans (2000), the new forces that appeared in the business environment as a result of technological innovations changed the nature of competition and fundamentally modified and reduced the traditional boundaries of industries and companies. The increasing innovation activity of companies and the rapid technological development in almost all industries have eliminated the stability of the economic environment, the usual methods and sources of the companies' profitability and profitability, thus the professional principles linked to the concept of strategy management have changed, and the *raison d'être* of using paradigms has been questioned (Grant, 1991; Gregory, 1995; Gaynor, 1996; Davenport et al., 2006). The development and use of organizational-technological knowledge possessed by companies forces competing companies to focus on methods to improve the efficiency of the technology available to them, so corporate strategies increasingly focus on the integration and development of technology within the organization as a source of sustainable competitive advantage (Drejer, 1997; Antoniou & Ansoff, 2004; Nagy-Borsy, 2018). Technological issues are therefore increasingly important for companies, and the importance of theoretical and practical research on them has increased. For companies and enterprises, the maintenance, development, planning and management of their available technology has now become a key, strategic issue.

However, the effects of new technologies on companies are often quite unpredictable, the appearance of technological innovations and the descriptive and explanatory trends change rapidly (Pataki, 2005; Szakály, 2008; Shane, 2009). The rapid pace of technology development - in addition to its countless advantages - has created uncertainty for companies in competitive markets, changed the nature of competition and the sources of competitive advantage, thereby transforming thinking about competitiveness. Technological novelties and state-of-the-art developments appear at an extremely fast pace, and it follows that companies

must adapt to changes in market trends in such a way that the widespread, available technologies are often considered outdated. However, strategically important technologies are not the same as state-of-the-art technology, the point of view of strategic management argues for a deeper integration of technology in order to create the most accurate and efficient fit with strategic goals. For companies, the key strategic question is not how the change in technology and digitalization transforms it and what effect it has on their processes and activities, but how they can transform their processes and activities through the deeper integration of technological innovations and digitalization, in what way they can "digitalize".

Changes and paradigm shifts can be seen both in theoretical research and in business thinking. The spread of info-communication technologies, their widespread use, and the effects of digitalization in both society and the economy indicate a shift towards a service-oriented economy. The appearance of technological innovations and solutions collectively known as cloud-based technology fits into this trend. The spread of cloud-based technology has democratized the market for services based on information and communication technology (ICT), since solutions based on cloud-based technology are, with a slight exaggeration, available to everyone and easy to use by everyone (Mell & Grace, 2011). From the point of view of the digitalization of companies, among the available technologies, cloud-based technology currently plays a particularly important role, which, according to Nemeslaki & Sasvári (2015), stands out from other digital technologies: it can be interpreted both as a service technology and as another digital technology (for example, the aforementioned It is an inseparable component of Big Data, AI or Smart City-Smart Home technologies).

The scientific examination of cloud-based technology started at the same time as digitization came to the fore, the topic is domestic (for example Bögél, 2009; Nagymáté, 2010; Racskó, 2012; Nemeslaki & Sasvári, 2015; Füzes, 2018) and international (for example Wang & Laszewski, 2008; Scale, 2009; Kavis, 2015) emphasize the innovative nature of cloud-based technology, and the authors agree that cloud-based technology , creates business models and functionality for enterprises and companies, which affect the entire organizational operation – and thus competitiveness and the sources of competitive advantage. According to Racskó (2012), the spread of cloud-based technology was supported by a number of trends and processes, including the continuous reduction of data storage costs, the intensive growth of data processing capacity, the intense competition experienced in the field of IT developments, the spread and standardization of user-friendly solutions, and computer software spread and its growing role in IT systems.

The transformations in the business environment and the development of literature research, the change in their focus, direction, and development are not independent processes, on the contrary: the subject and "theme" of the discipline of economics is the examination of the economic-social environment (macro level) and the actors (micro level) , the research and interpretation of changes, trends, transformations, as well as the exploration of cause and effect relationships, the analysis of alternatives and possibilities. Similarly, it can be established that the publication of the scientific investigation of the economic-social

environment, research in this direction and subject, and their results can be directly or indirectly utilized in the economic-business environment, given that the information, connections, interpretations or descriptive analyzes discovered can influence and support the decisions and behavior of participants, thereby affecting social processes, the operation of the economy, as well as the competitiveness and profitability of companies. The exploration of the use of a technology, the circumstances of its application, the examination of a technological trend, and the scientific research of these factors can therefore be justified both on the basis of scientific arguments and aspects and on the basis of business logic and the "interest" of companies. In addition to the unique analysis of technology, the maturity of information technologies, the maturity of IT management, and the acceptance of technology, it is essential that the role played by technology in maintaining a competitive advantage is studied with integrative methodologies that also apply a strategic focus.

It follows from the above that a complex, synthesizing examination of these topics is possible with a scientific approach that includes both technological aspects and business aspects. The theory of technology management, and its expanded theory with a strategic focus, is strategic technomangement, integrative fields of science that manage the above-mentioned subfields together in an interdisciplinary approach. The technology management focus enables me to examine the technological issues of companies from a business, or specifically from a business, management point of view. Technology management interprets the technology-related activities of companies at three levels, at the macro level the impact of government policy on companies, at the organizational level the role played by technology in maintaining a competitive advantage, and at the micro level it focuses on the individual contribution to the technology management of companies. The theoretical basis of the research is provided by strategic technomangement, a discipline that includes and interprets trends dealing with technology and technology management, as well as strategic management and innovation management (Burgelman, 2001; Bidgoli, 2010; Cetindamar, 2017). The rise of strategic techno-management is supported by the technological development of the past decades, the spread of info-communication technologies, and the emergence and intensification of social, economic and industry changes that have already occurred or can be forecast due to them (Deutsch et al, 2019). The focus of strategic technomangement research is on the integration of existing and new technologies into corporate strategy as precisely as possible and more efficient integration. Strategic technomangement places the companies' technology management in a strategic context, manages business and technological aspects together, takes into account the company's external and internal environment, capabilities (push mechanisms) and requirements (pull mechanisms) affecting technology management functions.

Services based on cloud-based technology have now become one of the most important technological innovations of economic and social digitalization, which have a significant impact not only on business life, but also on our "everyday life". Cloud-based technology, which poses a strategic challenge for companies and fits into the ever-increasing digitization trend, is therefore a significant technological innovation, which forms or can form part of the technology management activities, tasks and developments of enterprises and

companies, thus it is organically connected to the theoretical topics outlined above, and can be investigated within their framework. The purpose of the research is a multi-level (macro, organizational, individual) investigation of the application of a technology with a strategic focus (that is, taking into account the sources of the companies' competitive advantage), hence the disciplines of technical sciences, innovation management or strategic management alone do not provide a sufficient framework for this. I had to apply a theoretical approach and foundation that unites these scientific disciplines and enables the research of how the application of a specific technology can contribute to the technology management activities of organizations and companies. My research questions serve this purpose: the exploration of macro, meso (company) and micro level factors that determine the application of cloud-based technology and the interpretation of the related results. My research topic is therefore the strategic focus of cloud-based technology, and its subject is domestic small and medium-sized enterprises.

1.2 Small and medium-sized enterprises in focus

As stated in the title of my thesis, my research deals with the use of cloud-based technology and related challenges among domestic small and medium-sized enterprises. The international (for example Acs, 1992; Acs & Preston, 1997; Thurik & Wennekers, 2004; Hitchens et al., 2005; Ciao et al., 2006; Rice et al., 2015) and the domestic literature (for example, Kállay et al., 2008; Némethné, 2010; Papanek, 2010; Serbian, 2010; Kállay, 2012; Serbian, 2014; Mester & Tóth, 2015, Baksi, 2016; Hågen & Holló, 2017) actively deals with the social and economic importance of small and medium-sized enterprises, their role in the national economy, the characteristics of the companies in the sector, as well as the challenges affecting SMEs, the key to their development and competitiveness or the obstacles and barriers. There is also a rich literature on research concerning various aspects of the application of Cloud computing, including analytical research examining the application of Cloud computing among small and medium-sized enterprises (e.g. Sultan, 2011; Abdollahzadegan et al., 2013; Alshamaila et al., 2013; Szabó et al., 2013; Ross et al., 2015; Assante, 2016; Hussin et al., 2018; Dinca et al., 2019, Khayer et al., 2019; Abdullah et al., 2020; Hassan, 2020, Fakieh et al., 2022, Gao, 2022).

For both multinational companies and small and medium-sized enterprises, IT has a special role in managing the company's activities and processes, the use of IT and information communication tools increases productivity, reduces costs and improves the effectiveness of companies (Gubán & Sándor, 2021). Szabó et al. (2013), Kavis (2014), Ross et al. (2015), Fakieh et al. (2022) and Joshi et al. (2023), the use of Cloud computing fits well with the specialty of the SME sector, due to the fact that dynamically scalable IT resources are available to companies as virtualized services and this service-oriented architecture with scalable infrastructure reduces the disadvantages resulting from economies of scale. Szabó et al. (2013), the use of Cloud computing in the SME sector is clearly beneficial because a selected IT product or service can be used quickly without a lengthy implementation process and the development of the necessary infrastructure. In relation to the exploration of the advantages arising from the use of Cloud computing by companies in the SME sector, the

relevant research clearly supports the relationship between gaining a competitive advantage and the use of Cloud computing (Fakieh et al., 2022; Hari et al., 2022; Shrivastava al., 2022) There is agreement among the relevant sources regarding the realizable benefits of Cloud computing for small and medium-sized enterprises, the authors (Alshamaila et al., 2013; Assante, 2016; Rooge et al., 2019; Abdullah et al., 2020; Lisowska et al., 2020; Chandak et al., 2021; Alqahtani et al., 2022; Fakiehet et al., 2022; Gao, 2022; Shrivastava al., 2022), the main advantages of using Cloud computing for small and medium-sized enterprises are the following:

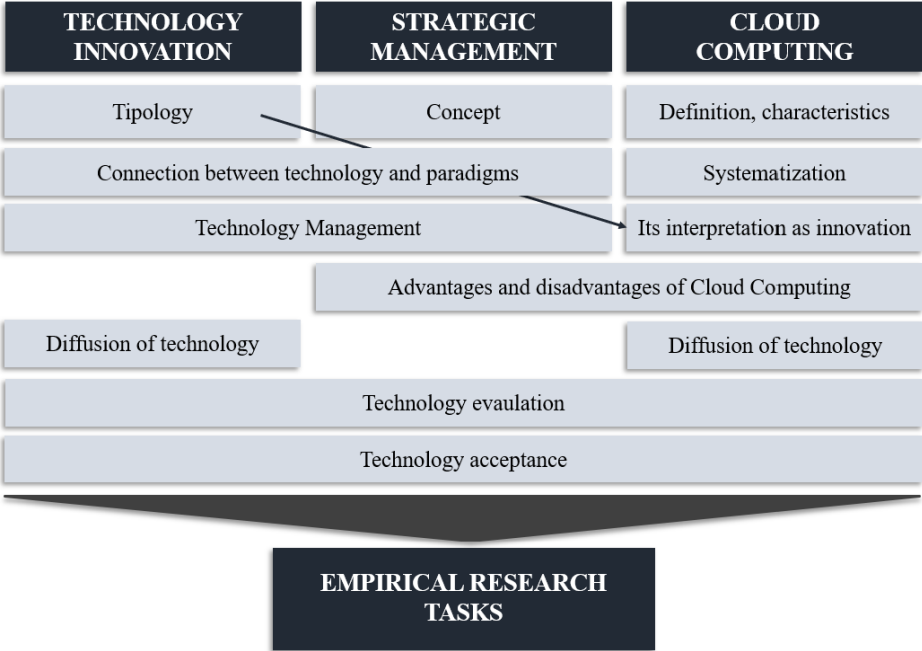
- IT infrastructure investments are typically large-budget investments and developments that require lengthy planning. By using Cloud computing, the costs and planning tasks associated with IT investments can be avoided, and the constraints associated with the established infrastructure can be reduced. Companies have access to Cloud computing as highly customizable services, which fits well with the heterogeneity and variability of the players in the SME sector.
- Small and medium-sized companies are characterized by variability in the use of IT systems, they usually do not require continuous (0-24 hour) access to the systems, and they need resources of variable capacity and type during their activities. The scalability of the services enables the downsizing of underutilized IT resources, as well as the elimination of the use of IT resources that are not profitable in terms of their utilization.
- Cloud computing is accessible and can be accessed by suitable computer devices with Internet access, thus smaller, more mobile, dynamically developing organizations can use the necessary technologies without interruptions in accessing services.

Based on the data of the KSH (2017) and the OECD (2023), domestic small and medium-sized enterprises have the necessary infrastructure conditions for the application of Cloud computing, and there are no barriers to the use or spread of the technology that specifically affect device use, device requirements, or network access. The examination of Cloud computing is a relevant, current research topic, and it speaks for the relevance of small and medium-sized enterprises that the enterprises of the sector are extremely important players in the domestic national economy in terms of their number of employees and their sectoral extent. The importance of the SME sector is also strengthened by the fact that all major professional workshops in the domestic scientific and academic life deal with the sector's competitiveness, specialties, and role in the domestic economy. Based on the relevant literature sources, the characteristics of Cloud computing are extremely well suited to the specialties of small and medium-sized enterprises. The examination of Cloud computing in the domestic SME sector is therefore a well-connected topic. However, small and medium-sized enterprises are not primarily the topic of my research, but rather the subject of it. My research primarily covers the strategic examination of a specific technology, carried out among domestic small and medium-sized enterprises. The aim of my thesis is to examine whether the factors that support the importance of cloud-based technology revealed by previous research, the definable characteristics and advantages affecting the application of the technology, i.e. the suitability of cloud-based technology to the SME sector, can be confirmed among domestic small and medium-sized enterprises.

1.3 Structure of the thesis and theoretical results

Figure 1 shows the main disciplines involved in the theoretical research, as well as the related theoretical topics and subfields. I started processing the theoretical literature with the interpretation and conceptual typology of the disciplines of technology, innovation, technological innovation and strategic management, the first chapter of my theoretical framework deals with the description of the concept of technological innovation. The topic of the second theoretical subsection of the thesis is technology management, while the third theoretical subsection examines the relationship between technology and strategy, in relation to the discipline of strategic technomanagement. The identification of the intersections of innovation, technology and strategic management areas was crucial for the research, and these concepts were later interpreted in relation to cloud-based technology as well. The last three chapters of my theoretical framework deal with the examination of technology at different environmental levels, at the macro level I describe the diffusion of technology, at the organizational level I present the models of technology evaluation, and at the individual level I present approaches to technology acceptance. A separate theoretical chapter is the presentation of cloud-based technology, which includes the definition of the technology, description of its characteristics, and the systematization of cloud-based technology. By processing the relevant literature, the advantages associated with the application of the technology can be determined, and the relationships and interpretations between the theoretical chapters and cloud-based technology can be explored.

1. Figure: Topics and key concepts involved in my theoretical research



Source: own compilation

The different areas in Figure 1 are connected by the concept of strategic technomanagement, this discipline was created from the integration of the above areas: innovation, technology and strategic management. Each area has its own conceptual framework and specific functions, which build on each other to form strategic techno-

management. This approach allows companies to remain competitive in a rapidly changing technological environment and to effectively exploit the potential of innovation. The goal of strategic technomangement research is to ensure that companies are in harmony with technological development and innovations in line with the company's long-term strategic goals, taking into account external environmental effects. The strategic technomangement discipline provides the basis for theoretical and practical research, the subfield's conceptual system and approaches pervade all steps of the research.

The main question of research concerning strategic techno-management is how the technologies used by enterprises can be fitted into a strategic context, and what strategic challenges enterprises face regarding their technology management activities. Taking into account the characteristics of small and medium-sized enterprises, the interpretation and importance of technology management functions is given a different emphasis than in the case of large enterprises. At the same time, as explained in the previous subsection, the characteristics of Cloud computing and the business and technological design of the services based on it are well suited to the characteristics of small and medium-sized enterprises. The use of services based on Cloud computing can strongly reduce the disadvantages arising from the size of businesses, due to the fact that this type of service is accessible to anyone, taking into account the technological requirements, and can be used offering a high degree of personalization. The transition to cloud-based technological solutions and the partial outsourcing of the company's activities can therefore also be interpreted as a strategic issue for businesses. The spread of service-oriented platforms replacing the product-oriented approach is in itself a strategic techno-management issue, however, the spread of services based on Cloud computing can bring about a paradigm shift for small and medium-sized enterprises, therefore the investigation of this is a relevant research topic.

The results of my theoretical research are presented in 1. is contained in the third column of the Table. Based on the definition of the concepts of technology and innovation and the presentation of the typologies noted in the literature, it became possible to characterize Cloud computing and interpret it as innovation. The correlations between the paradigms of strategic management and the management of technological issues have highlighted that the management of technology has become a strategic issue for companies. The application of Cloud computing will not be a source of competitive advantage for companies, the technology is at most sufficient to achieve competitive parity. The framework of strategic technomangement combines these approaches and gives a strategic focus to technology management and the innovation activities of companies. It follows from the application of the strategic management approach that the empirical examination of Cloud computing must take into account both external and internal environmental elements, company capabilities (pull mechanisms) and business-economic requirements (push mechanisms). The models used during my empirical research must therefore fit the elements of the strategic technomangement framework.

1. Table: Results of the theoretical chapters and their application

Key concepts, topics	Conceptual framework	Application of results
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Key concepts, topics	Conceptual framework	Application of results
the relevance of small and medium-sized business sector	The domestic small and medium-sized business sector is a relevant subject for theoretical and practical research in terms of both its importance to the national economy and its business characteristics. The characteristics of Cloud computing are extremely well suited to the specialties of the SME sector.	Empirical research: What kind of digital maturity and technology use characterizes the enterprises of the domestic SME sector in terms of Cloud computing?
technology	Technology is the knowledge that can be used to expand a person's abilities and possibilities.	Cloud computing is a mature network technology, as it is a component of services, and therefore a core technology.
innovation	An innovation is a new or significantly improved product or service, process, marketing method or organizational method in business practice.	Cloud computing can be interpreted as technological innovation, service innovation, radical innovation and disruptive innovation.
technology management	Technology management is the assessment, management and development of the available technological base and capabilities of companies. Its functions are identification and selection, acquisition, exploitation, protection and learning.	Empirical research: What characterizes the technology management functions of enterprises in terms of the application of Cloud computing?
strategic management paradigms	The paradigms of strategic management have dealt with the issue of technology in different ways. Parallel to the development of paradigms, the strategically focused evaluation and management of the technological base at their disposal have become more and more important for companies. The development of the technology management discipline was based on the perception of the direct relationship between technological resources and capabilities and the acquisition and retention of competitive advantage.	The management of technological issues, the evaluation, design and development of the technological portfolio have become a strategic issue for companies. The use of Cloud computing guarantees competitive parity for companies.
strategic technomanagement	Strategic technomanagement places the technology management of companies in a strategic context. The approach of strategic technomanagement handles both business and technological aspects, takes into account the company's external and internal environment, capabilities (push mechanisms) and requirements (pull mechanisms) affecting technology management functions.	When empirically examining Cloud computing, both external and internal environmental elements, company capabilities, and business requirements must be taken into account.
technology diffusion	Diffusion of technology means modeling the future spread of a specific innovation or technology. The spread of technology is influenced by the willingness of users to innovate, the characteristics of the technology and environmental effects. The macro-level examination and prediction of the diffusion of a technology can be carried out using mathematical models.	Empirical research: What characterizes the future spread of Cloud computing in the domestic SME sector?
technology evaluation	The models dealing with the evaluation of technology deal with companies' technological ability, technological maturity, innovation success factors, and quality criteria for the application of technology. Approaches focusing on the evaluation of technological capabilities are suitable for examining a specific technology.	Empirical research: What characterizes the technology management capabilities of enterprises regarding the application of Cloud computing?
technology acceptance	Models dealing with technology acceptance deal with business, technological, behavioral and external environmental aspects in different ways, but typically together. Behavioral models, which are typically psychologically charged, are suitable for mapping attitudes related to technology acceptance.	Empirical research: What characterizes the acceptance of Cloud computing in the domestic SME sector?

Source: own compilation

Additional results of my theoretical research can be identified, which are contained in the bold highlighted fields of the third column of Table 1. These do not refer to the characterization of Cloud computing or the approach to research, but point to the missing results of the research. The relevance of the small and medium-sized business sector - as the subject of the research - appears in all empirical studies, however, the mapping and presentation of the current use of Cloud computing is a closely related task. The field of technology management deals with the management of the technological base and capabilities of companies, the technology management functions of companies can be determined based on the authors of the topic. Empirical research is required regarding the application of these functions and Cloud computing. A similar research gap can be seen in terms of technology diffusion, technology evaluation and technology acceptance, these are the areas in which I need to conduct practical research in order to fulfill my research goals.

2. Research methodology

2.1 Presentation of research questions

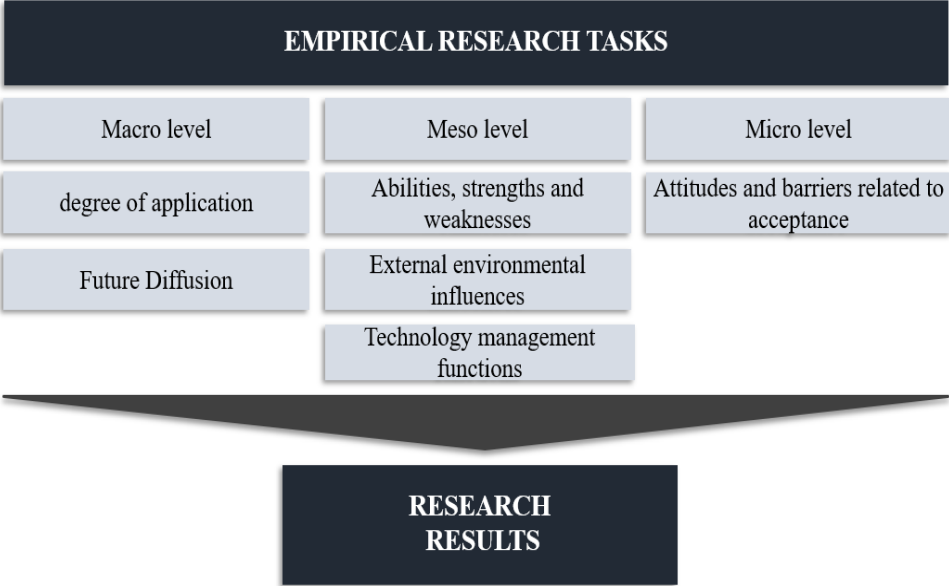
Based on the theoretical framework, several dimensions of the relationship of domestic small and medium-sized enterprises with Cloud computing can be examined. In my empirical research, I strive to explore both macro, meso and micro factors and effects. I formulated my research questions in relation to the different environmental levels and the purpose of the research. From the perspective of the macro environment, my study deals with the spread and diffusion of Cloud computing, as well as the characterization of the digital maturity of the sector concerned (Q1, Q2). The meso-level part of my research focuses on the external and internal factors, driving forces, obstacles associated with the use of Cloud computing by domestic small and medium-sized enterprises, as well as the quality of techno-management functions (Q3, Q4). In the course of the micro-research, I will investigate the attitudes of the actors of the domestic SME sector regarding Cloud computing (Q5). Based on the processing of theoretical literature and the identification of practical research gaps, I formulated the following research questions.

- **Q1.** To what extent do domestic small and medium-sized enterprises use Cloud computing?
- **Q2.** What future spread (diffusion) can be expected regarding Cloud computing in the domestic SME sector?
- **Q3.** How can the internal technology management capabilities and external environmental effects of Cloud computing be characterized among domestic small and medium-sized enterprises?
- **Q4.** What characterizes the individual technology management functions of domestic small and medium-sized enterprises in terms of the application of Cloud computing?
- **Q5.** What are the typical attitudes related to the acceptance and use of Cloud computing among domestic small and medium-sized enterprises?

The purpose of my practical research is to answer the research gaps arising from the framework that can be created on the basis of theoretical studies with practical experiences

and practical methodologies. The data collected and analyzed during the empirical research support the detection of questions concerning the application and use of Cloud computing, and help to reveal the specific problems and challenges that are relevant for domestic small and medium-sized enterprises in relation to Cloud computing. Figure 2 shows the main areas of my empirical research, the research steps and tasks, as a result of which, by answering my research questions, I can provide an account of relevant, sufficiently supported research results in my thesis.

2. Figure: Areas of my empirical research



Source: own compilation

Based on my research questions, I formulated my narrowly interpreted empirical research topic and related tasks, which is the use and spread of Cloud computing, as well as the exploration of external and internal technology management effects and attitudes related to the application among domestic small and medium-sized enterprises. My research was an exploratory research, so my goal is to examine my developed research questions with relevant methodological tools and to analyze and interpret their results with scientific sophistication. The theoretical foundation of my research questions was adequate for the successful completion of the exploratory research, the quality and relevance of my research results depends on the quality of the execution of my research activity.

2.2 Applied methodologies

My empirical research is a mixed-methodology research, due to the fact that the applied quantitative research methodology tools are replaced by a qualitative research approach, moving towards a micro focus. The expected result of my research is the characterization of the spread and diffusion of Cloud computing based on the available data, the examination of external and internal factors determining the application of technologies, the evaluation of the existence and quality of techno-management functions among domestic small and medium-sized enterprises, and the use of Cloud computing exploring attitudes. The

goal of my research is to answer my research questions related to the different levels of the business environment with sufficient justification, and to contribute to the high-quality scientific results of the topic by synthesizing, interpreting and complexly explaining the obtained results.

Based on the focus of my research, it is macro-, meso-, and micro-level research, and its theoretical background is provided by an interdisciplinary, synthesizing scientific field, strategic technomanagement, which includes the subfields of innovation, technology management, and strategic management. Based on the processing of the literature, I examined my research questions with a mixed (quantitative and qualitative) methodological orientation. My empirical research consisted of several stages that were separate from each other, but at the same time partly built on each other, which were adapted to the environmental levels of the research and to the research questions. During the research, the focus of the research and the orientation of the applied methodology both changed, I moved from a macro-level focus to a micro-level focus, while the applied quantitative orientation was replaced by a qualitative approach (Table 2). After the three stages of my empirical research, I summarized and synthesized the results of the research.

2. Table: Research map

Focus	Affected topic	Research question	Applied methodology	Orientation
MACRO LEVEL	SME sector	Q1. To what extent do domestic small and medium-sized enterprises use Cloud computing?	descriptive statistics	quantitative
	spread of technology	Q2. What future spread (diffusion) can be expected regarding Cloud computing in the domestic SME sector?	diffusion modeling (Bass, 1969)	
MESO LEVEL	technology evaluation	Q3. How can the internal technology management capabilities and external environmental effects of Cloud computing be characterized among domestic small and medium-sized enterprises?	questionnaire expert survey (Hobday, 2002)	quantitative
	technology management	Q4. What characterizes the individual technology management functions of domestic small and medium-sized enterprises in terms of the application of Cloud computing?	descriptive statistics statistics revealing patterns network analysis	
MICRO LEVEL	technology acceptance	Q5. What are the typical attitudes related to the acceptance and use of Cloud computing among domestic small and medium-sized enterprises?	semi-structured interviews (Bandura, 1986)	qualitative

Source: own compilation

The aim of the macro-level research is to characterize the current spread of Cloud computing among domestic small and medium-sized enterprises based on representative data, and to be able to provide a methodologically supported forecast for the future spread and diffusion of the technology. The source of the data for the empirical analysis was the databases of the Central Statistical Office (KSH, 2023) and Eurostat (2023). During the

macro-level research, I used descriptive statistics and diffusion modeling. The use of cloud-based services by domestic small and medium-sized enterprises could be quantified based on the descriptive statistics, and the values of the domestic sector could be compared with the European Union average and the values of the same indicators of the EU member states. Based on the systematized and revealed data, the digital maturity of companies in the domestic SME sector can be characterized in terms of the use of Cloud computing. The description and interpretation of Bass 's (1969) diffusion model, which is relevant based on the relevant literature, gave me the opportunity to characterize the spread of Cloud computing innovation among domestic small and medium-sized enterprises. Based on Rogers' (1962) diffuser categories, I was able to draw conclusions from the results of the diffusion models regarding domestic SMEs and their groups and regarding the spread of Cloud computing.

The meso-level research, I prepared a unique questionnaire survey, as well as statistics revealing patterns from the resulting data. The steps of a unique questionnaire survey include the development, validation, modification, testing of the questionnaire, the completion of the survey (directly contacting the people filling out the questionnaire), the processing of the questionnaires, the screening and correction of errors and deficiencies, and the evaluation of the questionnaires. The unique survey was conducted in the form of a questionnaire available online, and its target group was the managers of domestic small and medium-sized enterprises who have significant knowledge and experience in the application of Cloud computing, and are considered experts in terms of both technology and the SME sector. The purpose of the questionnaire survey was not to represent small and medium-sized enterprises, but to collect the opinions of experts with relevant knowledge about the sector. The expert survey was supported by the fact that some of the domestic small and medium-sized enterprises presumably do not have sufficient knowledge of the topics and concepts covered in the survey to be able to evaluate the statements on merit (this preconception of mine was convincingly confirmed during the validation of the survey), and that at my disposal it was not possible to conduct large-scale, representative research among domestic small and medium-sized enterprises with existing research tools. The questionnaire survey was based on Michael Hobday's (2002) model dealing with the evaluation of technological capability, the model was published by the United Nations Industrial Development Organization (UNIDO) Technology Needs Assessment (TNA) for Developing Countries. The applicability of the model is supported by the fact that, based on the systematic processing of the literature, several subsequent researches dealing with technology evaluation used Hobday's approach, and the model was also applied in practice in several cases (Rusch et al., 2007).

The quantitatively oriented macro- and meso-level research, the qualitative research approach was dominant in the micro-level research. On the one hand, I wanted to supplement the quantitative analysis described above with qualitative research, and on the other hand, the exploration of attitudes related to the acceptance of technology is much more in line with qualitative methodologies. Some of the models presented in connection with the topic are specifically based on the exploration of behavioral characteristics and attitudes, which are typically not or only difficult to examine with quantifiable indicators. In order to explore the attitudes that characterize the acceptance of Cloud computing, Bandura (1986) Social

Cognitive Theory model. During the micro-level research, I conduct semi-structured interviews. On the basis of the interviews, it becomes possible to reveal relevant trends and characteristics regarding the deeper attitudes related to the use of Cloud computing among domestic small and medium-sized enterprises. I conduct the interviews with experts in the field, making sure that the interviewees are selected from different sectors and from different types of workplaces (corporate, academic).

3. Summary of results

3.1 The results of the research

My research questions based on theoretical research can be interpreted on three levels. The subject of my macro-level investigations is the characterization of the use and future spread of cloud-based services by domestic small and medium-sized enterprises, based on representative data for modeling at the national level. The subject of my meso-level investigations is the research of the characteristics of the use of Cloud computing by the companies of the Hungarian SME sector, as well as the supporting and inhibiting factors. The subject of my micro-level investigation is the characterization and presentation of the attitudes and soft factors that can be discovered among domestic small and medium-sized entrepreneurs. I present the theses of my dissertation, i.e. the most important results of my theoretical and practical research, along the lines of my research questions.

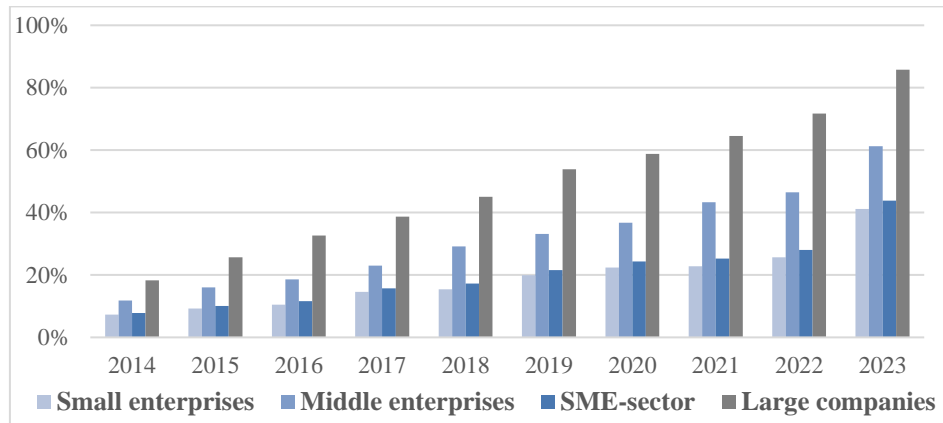
Q1. To what extent do domestic small and medium-sized enterprises use Cloud computing?

During my macro-level empirical research, I focused on the use of cloud-based services, based on the currently available data, to what extent the domestic SME sector is characterized by its use, and to what extent the spread of the technology is expected in the future. Diffusion of the technology started among domestic enterprises in the early 2010s, since then the research of Cloud computing has become an important topic in the theoretical literature, and its practical application has also become increasingly well-known and important for enterprises. The specialties and characteristics of Cloud computing fit perfectly with the specialties of small and medium-sized enterprises, from this point of view a relevant research question is what characterizes the domestic SME sector in terms of the application of technology. In my empirical research I examined the current prevalence of Cloud computing and the degree of expected diffusion among domestic enterprises and companies.

Representative data on the use of Cloud computing is available for the period between 2014 and 2023. Based on these, the use of technology has increased in each of the different business headcount categories, but their pace shows a very different picture (Figure 3). It can be concluded that a larger company size (in terms of personnel categories) presupposes a higher rate of technology use. In the examined period, the technology spread much more strongly among large companies than among small and medium-sized enterprises, and the difference between the sectors - excluding the data for 2023 - also increased every year. By 2023, 41.2 percent of small businesses, 61.3 percent of medium-sized businesses, and 85.8

percent of large companies will have used Cloud computing. As a result of the fact that in connection with the use of technology, companies do not encounter, or only to a negligible extent, barriers and obstacles related to the use of infrastructural devices, this is a rather serious difference in terms of the staffing categories of the companies.

3. Figure: The use of Cloud computing in the domestic SME sector and among large companies



Source: own compilation

Q2. What future spread (diffusion) can be expected regarding Cloud computing in the domestic SME sector?

I examined the future diffusion of technology using the Bass model. For each staffing category, I received a forecast with a suitable fit. The model, in line with the existing time series data, continued to estimate serious differences in terms of the spread of technology in terms of company size. Looking at Rogers' categories of innovation acceptance, while the market spread has essentially been achieved in the case of large companies (the late majority of companies also apply the technology and the laggards are already starting to use it), in the case of medium-sized companies this is by 2033, in the case of small companies by 2043 can be predicted. It should be noted that the model gave a rather conservative estimate, as the usage rate indicated for 2023 was slightly below the actual usage rate typical for businesses in all categories, so it is conceivable - if the value in 2023 is not just a one-time outlier - that in reality the diffusion will take place somewhat faster than estimated by the model. The model's forecast in this form can therefore be considered a negative scenario.

If the diffusion of Cloud computing is not examined in terms of the categories of employees of enterprises, but according to the average value ranges for innovation and imitation coefficients in the literature, then the diffusion of Cloud computing in Hungary cannot be assessed as slow in any way. In the case of small and medium-sized enterprises, the innovation effect is essentially the same as the average value, while in the case of large enterprises, the willingness to innovate is much higher than the average noted in the literature. At the same time, the imitation effect falls short of the average range for all personnel categories. However, interpretation of the results' point of view, it is more important to look at the innovation and imitation coefficients estimated by the model within a data set, since these values in themselves have a characteristic force in terms of diffusion. In the case of small businesses and the SME sector, the propensity to innovate can be said to be average,

which is exceeded by the propensity to imitate, which develops similarly in the case of medium-sized enterprises and large companies. The innovation propensity of medium-sized enterprises is almost double that of small enterprises, while large enterprises have almost four times as much innovation propensity as small enterprises.

Investigating the diffusion of a technology is not only an interesting field of research from the point of view of the characterization of technology as innovation, but also from a practical point of view. With regard to my research question, the spread of Cloud computing among domestic enterprises and companies in the examined years is spectacular, and the rate of future diffusion can be said to be average according to the model. At the same time, the differences between the individual personnel categories are clear. Looking at the use of technology so far and its predictable application, it is also noticeable that large companies have a greater willingness and acceptance of innovation compared to the SME sector, but the use of technology by medium-sized companies also exceeds that of small companies regarding Cloud computing. Considering the characteristics of Cloud computing, this difference is not justified between small and medium-sized enterprises, large enterprises and the SME sector. Therefore, the differences presented in relation to the staffing categories of domestic enterprises do not stem from the specialties of Cloud computing, but rather from the different willingness of small and medium-sized enterprises and large enterprises to innovate.

Q3. How can the internal technology management capabilities and external environmental effects of Cloud computing be characterized among domestic small and medium-sized enterprises?

The framework of my meso-level research, I examined the ability levels belonging to different environmental levels. By summarizing the experts' answers and applying the methodology of Hobday's (2002) capability level analysis, I came to the conclusion that enterprises are characterized by the level of strategic capability, the SME sector by the level of reactive capability, and the national economy also by the level of reactive capability. That based on the answers received, the level of the national economy is extremely close to the level of strategic capability. The reactive level is the second level of capability levels after the passive level, characterized by the fact that technological readiness is generally of medium or low quality, the willingness to innovate is low, and the country's companies and sectors are characterized by slow follow-up regarding the acceptance of technological innovations. The strategic level refers to a higher degree of technological preparedness, (in this case) companies have advanced technological capabilities that can be a source of competitive advantage, but at the same time they are also characterized by serious shortcomings. The technological preparedness of enterprises corresponding to the level of strategic ability is of a medium-high standard, in their case, the individual technology management areas are characterized by different preparedness.

Looking at the variables related to the different environmental levels, it can be concluded that the experts typically rated the company variables (that is, belonging to the internal environmental level) better than the variables of the external environmental level. On average, I received a worse evaluation of the external environment statements, and the

responses are characterized by a much smaller standard deviation. The evaluation of statements related to the company level shows a greater difference and better evaluations. Regarding the external environmental variables, it is characteristic that the variables related to the SME sector were typically valued more by the respondents than those related to the national economy. Based on this, it can be concluded that the respondents of the survey see the technology management preparedness of the enterprises as slightly better in terms of Cloud computing than the SME sector, and the national economic effects regarding the application of Cloud computing.

The above is supported by the analysis of the agreement rates given to the variables (i.e. the totality of the "rather agree" or "strongly agree" responses). The ranking of the variables based on the agreement ratio gives a more accurate and sensitive picture of the distribution of the variables according to the evaluation. At the company level, an agreement rate of over 80 percent characterizes 4 variables (these are knowledge of Technology from the point of view of business activity, evaluation of Opportunities, the role of Technology in the company and business strategy and the establishment of Effective protection), between 60 and 80 percent agreement characterizes the half of the variables, 14 in total, 8 variables received an agreement rate of between 20 and 60 percent, and 2 variables were rated below 20 percent. An agreement rate below 50 percent essentially expresses disagreement, since in this case there were several answers to the given variable in which the respondent chose the evaluation "rather disagree" or "rather agree". An agreement rate of less than 50 percent characterized 9 variables, these are the use of external organizations in the implementation of the strategy, knowledge of intellectual property rights, the existence of post-project evaluations, the use of external organizations for the evaluation of technology, the use of external organizations in development, the existence of project evaluation systems, encouraging investments, cooperation in development with universities, research institutes and Cooperation in development with government institutions. The external environmental variables (that is, the SME sector and the variables related to the national economy) were evaluated together, an agreement rate of over 60 percent does not characterize any of the variables, an evaluation of over 50 percent (thus expressing real agreement) and came to only three variables (Protection of Intellectual Property knowledge in the SME sector, awareness and quality of government policy priorities, government support for technology protection). An agreement rate between 20 and 50 percent characterizes 6 variables, a value below 20 percent characterizes 3 variables, the knowledge of the protection of Intellectual Property in the SME sector, the familiarity and quality of Government policy priorities and the government support for the protection of Technology. Based on the experts' responses to the external variables, it can be concluded that the impact of the SME sector and the national economy on the technological capabilities and preparedness of Cloud computing is of extremely low quality, and in several cases it can be evaluated as an external environmental (otherwise supportive according to its purpose and content) impact cannot be interpreted at all in terms of this technology.

Based on the evaluations given to the variables and the tests carried out on them, the strong and weak points, as well as the supporting and inhibiting effects from the external environment, which characterize the use of Cloud computing from the point of view of

technology management among small and medium-sized enterprises, can be determined. The organization of the variables, their quality (i.e. positive or negative content) and their connection to the environmental level is contained in Table 3. From the point of view of Cloud computing, strengths and advanced capabilities include positive, supportive elements related to the company level, while weaknesses and areas to be developed-capabilities are contained in the negative, inhibiting factors of the internal environment. The set of positive, supporting elements of the external environment includes the driving forces that can be identified in connection with Cloud computing, the factors that support the readiness of technology management and technological capabilities, while the negative, inhibiting factors of the external environment include the application of technology and the development of technological capabilities related to Cloud computing we can find inhibiting and hindering environmental effects.

At the level of the internal environment, in terms of strengths and advanced capabilities, variables with a strategic focus and selection and procurement appeared. Regarding the external environmental effects, positive, supporting factors can be interpreted relative at best, although the highest expert agreement also appeared regarding procurement and the benefits of Cloud computing, but the level of expert agreement is very unconvincing. In terms of weaknesses and inhibiting factors, variables related to cooperation, the involvement of external actors, the protection of technology, and learning processes can be identified at both environmental levels. Overall, it can be clearly stated that the expert opinions evaluated the statements related to enterprises more positively than the statements concerning the SME sector and the national economy, so in terms of Cloud computing, they see the technological management preparedness of enterprises as relatively better than the relevance of the external environmental influences influencing it. and their positive influence.

3. Table: The most important factors determining the use of Cloud computing

		Quality content of ability and effect	
		Positive, supportive elements	Negative, inhibiting factors
Environmental	Internal	<ul style="list-style-type: none"> ● Evaluation of opportunities ● The role of technology in corporate and business strategy ● Selection of required technology ● Knowledge of priorities in relation to technology ● Acquisition of technology ● Knowledge of technology from a business perspective ● Building effective protection 	<ul style="list-style-type: none"> ● Cooperation in development with universities ● Cooperation in development with government institutions ● Use of external organizations in development ● Encouraging investments ● Existence of project evaluation systems ● Existence of post-project evaluation ● Knowledge of intellectual property protection
	External		

		Quality content of ability and effect	
		Positive, supportive elements	Negative, inhibiting factors
External environment		<ul style="list-style-type: none"> • Advantages of Cloud computing in the SME sector • Technology strategies technoportfolio in the SME sector • Procurement quality in the SME sector 	<ul style="list-style-type: none"> • Awareness and quality of government policy priorities • Identification of opportunities and threats in the SME sector • Government support for identifying opportunities and threats • Government support for collaborations and procurement processes • Review of developments in the SME sector • Measuring the performance of companies at the government level • Government support for technology protection • Knowledge of intellectual property protection in the SME sector

Source: own compilation

The internal-external, supporting-inhibiting factors affecting the use of Cloud computing were explored using descriptive statistical methodologies. On the basis of the relevant analyses, it can be concluded that the respondents of the survey see the technology management preparedness of the enterprises in terms of Cloud computing somewhat better than the SME sector, and the national economic effects regarding the application of Cloud computing. At the level of the internal environment, the abilities with a strategic focus and those related to selection and procurement appeared as strengths, among the weaknesses I identified abilities related to collaborations, involvement of external actors, and learning processes. The supporting effects from the SME sector and the national economy can only be interpreted as relative support, and there was a rather low level of expert agreement in this area. The inhibiting factors related to the external environmental level showed the insufficiency of governmental support, protective and learning technological capabilities. It can be concluded that, regarding Cloud computing, the experts' opinions see the technology management preparedness of the enterprises and the quality of the technological capabilities of the enterprises as relatively better than the relevance and positive influencing power of the external environmental influences that influence it.

Q4. What characterizes the individual technology management functions of domestic small and medium-sized enterprises in terms of the application of Cloud computing?

Regarding the application of Cloud computing, the technology management functions that characterize and determine the application of the technology were also analyzed. My goal was to explore the correlations and connections between the functions, also taking into account the environmental levels. At the company level, the functions can be interpreted as a set of variables, while at the external environmental levels, the individual technology management functions can be identified with the corresponding variable. Below, I describe the most important findings of the tests affecting the functions in relation to the individual environmental levels.

The experts rated the corporate level function as clearly better than the same functions belonging to the external environmental level, of which only ACQUISITION (Technology acquisition, Relationship with suppliers, Investment stimulation, Use of external organizations

in development, Cooperation in development with universities and research institutes, Cooperation in in development with government institutions) is an exception. Among the functions, EXPLOITATION (Organization of technological activities, existence of project processes - investment, development, procurement - use of external organizations in the implementation of the strategy, utilization of special strengths, ability to decide on outsourcing or own development) plays a central role. In the network of functions, IDENTIFICATION (Knowledge of technology from the point of view of business activity, Selection of necessary technologies, Evaluation of opportunities, Assessment of threats, Existence of a vision), SELECTION (Knowledge of procurement sources, Role of technology in company and business strategy, Use of external organizations to evaluate technology, Technological proficiency in strategy formation, knowledge of priorities in relation to technology), EXPLOITATION and PROTECTION (Knowledge of technological risks and hazards, Building effective protection, Knowledge of secure procurement and development, Knowledge of Intellectual Property) are elements that are close to each other and have a strong impact on the other functions. Regarding the ranking of the variables, we reached the same result, it can be stated that the technology management functions that are most important from the application's point of view of Cloud computing and can be evaluated as better from the point of view of preparedness are IDENTIFICATION, EXPLOITATION, SELECTION and PROTECTION. The function of LEARNING (existence of project evaluation systems, existence of post-project evaluations, ability to learn from projects) is located further away from the other functions in terms of their network.

Several strong, close and correlational relationships can be identified between Cloud computing functions. The strength and closeness of the relationships indicate that the development of each function can have a positive effect on the other function, the correlation means that, based on expert opinions, the evaluations given to the functions show a correlation, so it can be concluded that the higher evaluation of one function is the other function resulted in a higher rating. At the corporate level, the strongest and closest relationship can be demonstrated between IDENTIFICATION and SELECTION, EXPLOITATION, PROTECTION, and between SELECTION and EXPLOITATION, PROTECTION. I reached mostly similar results regarding the correlation relationships, including the positive correlation relationship between the SELECT function of the company level and the ACQUISITION (Quality of acquisitions in the SME sector) function of the SME sector, not mentioned above.

Looking at the external environmental level, there are no significant differences between the same functions belonging to the SME sector and national economy levels, so the expert evaluations typically evaluated the functions in the same way, regardless of whether they contained a sectoral or national economic impact. An exception to this is the SELECTION function, in which case the Technology strategy, technoportfolio in the SME sector received a significantly better evaluation than the familiarity and quality of Government policy priorities. According to the opinion of the experts, the (supporting) impact of the SME sector is stronger and more characteristic of Cloud computing than the impact of the national economy.

In the SME sector, the functions of SELECTION (Technology strategy, technoportfolio in the SME sector) and LEARNING (Review of developments in the SME sector) play a central role. In terms of function proximity, all functions are at the same distance, close to each other, except for the EXPLOITATION (Advantages of Cloud computing in the SME sector) function, which is not a member of the network. In the SME sector, the IDENTIFICATION (Identification of opportunities and threats in the SME sector), SELECTION and LEARNING functions can exert a strong influence on other elements of the network of functions. In terms of the national economy, all functions play a central role, but in terms of the proximity and strength of the functions, the function of EXPLOITATION (Government support for the exploitation of digital technologies) stands out.

Examining the relationships between the functions belonging to the external environment level, a strong and close relationship can be identified between IDENTIFICATION and LEARNING in the SME sector and between SELECTION and ACQUISITION (Quality of acquisition in the SME sector). EXPLOIT is essentially unrelated to other functions. Looking at the correlational relationships, we can find less significant relationships than at the corporate or national economic level, but we can identify between LEARNING and IDENTIFICATION, SELECTION, PROTECTION (Knowledge of intellectual property protection in the SME sector), and between ACQUISITION and IDENTIFICATION, SELECTION trips together. At the level of the national economy, there is essentially a strong and close connection between all functions, this is also the same as the result of the exploration of correlational relationships. The fact that we can identify such strong connections and synergies among the technology management functions related to the national economic level is not only characterized by the close integration between the variables. The strong correlations can also result from the fact that the experts are less differentiated in their responses and the individual respondents evaluated the functions in the same way, so due to the homogeneity of the answers, the patterns and differences between the functions cannot emerge in any meaningful way.

In order to explore the relationships between functions related to Cloud computing, I used pattern-revealing statistics and network analysis. It can be concluded that the functions related to the company level were evaluated by the experts as different and typically better than the same functions of the external environment. From the point of view of the application of Cloud computing, the most important technology management functions are IDENTIFICATION, EXPLOITATION, SELECTION and PROTECTION. Based on the expert evaluations, the IDENTIFICATION and SELECTION functions received higher evaluations, while the enterprises already have serious deficiencies in the areas of EXPLOITATION and PROTECTION. The closest and strongest connection is between IDENTIFICATION and SELECTION, these functions are able to influence the other functions the most. The function of ACQUISITION and LEARNING needs a lot of development in terms of Cloud computing. It can be concluded that technological capabilities with a strategic focus related to the application of Cloud computing and related to the selection, evaluation and procurement of technology are more developed among small and medium-sized enterprises. The biggest gaps can be identified in the field of collaborations,

technological developments, protection and learning abilities. In the SME sector, the identification of Opportunities and threats is extremely closely related to the review of Developments, and a strong relationship can also be shown between the existence of a Technology strategy and technoportfolio and the quality of Procurement. The advantages of Cloud computing in the SME sector have a special role, i.e. the EXPLOITATION function, which, based on the analyses, cannot influence the other functions. Looking at the level of the national economy, all functions are equally closely related, and a significant correlation can be shown between all functions.

Q5. What are the typical attitudes related to the acceptance and use of Cloud computing among domestic small and medium-sized enterprises?

Attitudes related to the acceptance and application of Cloud computing were examined with semi-structured interviews. Summarizing the comments of the interviewees, the use and application of Cloud computing among domestic small and medium-sized enterprises is mostly driven by industry and business-to-business (supplier, customer, partner) relationships, the existence of computer and IT competencies and capabilities, and the role of experts and consultants, and is supported by the resulting education. The factors most hindering the acceptance and application of technology are the fears and concerns related to data protection and data security, which are extremely typical among businesses, the lack of knowledge and skills related to Cloud computing and IT, as well as the resistance resulting from the age of the decision-makers of the businesses, the aversion to novelty, which characterizes the older generation.

3.2 Theses of the research

The aim of my thesis was to examine whether the factors that support the importance of cloud-based technology, the definable characteristics and advantages of the application of the technology, i.e. the suitability of cloud-based technology for the SME sector, can be confirmed by domestic small and medium-sized enterprises. around. The theses of my doctoral thesis are summarized below.

- Thesis 1: There are significant differences between domestic small and medium-sized enterprises, and between the SME sector and large companies regarding the use of cloud-based technology, this difference is not justified considering the characteristics of the technology or the infrastructural development of the SME sector.

- Thesis 2: The future spread of cloud-based technology in the SME sector will be slower than among large companies, the background of this is the lower willingness of medium-sized enterprises and even more so small enterprises to innovate.

- Thesis 3: In relation to the application of cloud-based technology, the strengths of businesses can be identified in relation to their strategic activities and procurement, their weaknesses affect collaborations, protection of technology and learning processes.

- Thesis 4: With regard to cloud-based technology, the technology management of enterprises is of a higher standard in terms of internal functions and capabilities, while the supporting factors and pulling mechanisms at the macro and industry level are missing or weak.

- Thesis 5: The most important factor in the adoption of cloud-based technology in the domestic SME sector is the age of the decision-makers, the older generation is aloof from technological innovations. This is related to the fact that lower-level IT knowledge and skills hinder the use of cloud-based technology, which can be helped by education and relationships between businesses.

During the theoretical research, I looked for the answer to how the practical application of cloud-based technology can be examined from a strategic point of view, with what theoretical background and framework. My theoretical research also answered the practical gaps in the topic, which formed the basis of the empirical research. The novel results of my doctoral research include

- the interpretation of cloud-based technology as a technological innovation,
- the mapping of the examination approaches of technology at different environmental levels (diffusion, evaluation, acceptance) in the context of strategic technomanagement,
- interpretation of data characterizing the use of cloud-based technology in relation to the domestic SME sector and large companies,
- Adapting Hobday's model for assessing technological capabilities to the topic, using the questionnaire survey,
- and the exploration of attitudes related to the acceptance and use of cloud-based technology.

The new results of the research include

- the application of the Bass model to cloud-based technology,
- determination of technological capability levels for companies, the SME sector and the national economy,
- exploring the readiness of internal, unique technology management functions that characterize the application of cloud-based technology, and the quality of internal technological capabilities in relation to domestic enterprises,
- the mapping of the existence of external (macro and sectoral) technology management factors affecting the use of cloud-based technology, as well as their supporting and inhibiting effects,
- network analysis of technology management functions related to cloud-based technology with regard to enterprises, the SME sector and the national economy.

The aim of my research was a practical examination of the suitability of cloud-based technology for the SME sector. Being an exploratory research, I formulated the research questions in order to fulfill my research goals, and examined the research questions using relevant methodologies. The theses described above, the new and novel results show that my research goal can be considered successful, I gave relevant, scientifically supported answers to the research questions determined based on the processing of the theoretical literature.

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