Digital Transformation Maturity of the large enterprises and SMEs in the Kyrgyz Republic

Master Thesis

Degree course: Master of Digital Transformation and Global Entrepreneurship

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Abstract

This thesis explores the digital transformation maturity of large enterprises and SMEs in the Kyrgyz Republic. While digital transformation has permeated every industry and field, there is absence of research regarding digital maturity of companies in the Kyrgyz Republic which is a significant research gap in academic field, and in practical field. The aim of this thesis to gauge maturity degree, identify and compare influencing factors in the case of large enterprises and SMEs. Using the Interaction-based DMM for SMEs model of Williams et al. (2024) which includes quantitative surveys and qualitative interviews. The findings reveal that large enterprises have more digital maturity, SMEs struggle due to limited resource and technical expertise. To achieve higher degree, the thesis recommends focus on strategic planning and organizational culture.

1. Introduction

This introduction section provides background and context to introduce comprehensive information about the master thesis topic. The research problem part focuses on determining the problems of the study. Furthermore, the objective of the study and research questions help establish the goal of the topic, and the significance of the study highlights the importance of the topic for large enterprises and SMEs in the Kyrgyz Republic. Finally, the structure of the thesis part serves as a roadmap for the master thesis.

1.1 Background and context

The importance of digital transformation is irrefutable, it has penetrated every industry and sector of society (Zaoui & Souissi, 2020; Andersson & Rosenqvist, 2018). To address the needs of customers effectively, increase the productivity of the workforce (Asad Amraji et al., 2020; Telegescu, 2018), enhance operational and financial efficiency (Guo & Xu, 2021), and stay innovative and competitive in the global world, it is crucial to adapt to the processes of digital transformation (Mathew, 2021; Brodny & Tutak, 2023). For instance, the emergence of new internet of things (IoT) technologies impacted telecommunication service providers, and they were required to digitize to serve customers (Valdez-de-Leon, 2016).

Digital transformation is the utilization of technology to significantly improve the efficiency or reach of businesses (Westermann et al., 2014). However, it does not contain only utilizing IT instruments but also other important elements (Tratkowska, 2019). For instance, technology, structure of organization, skills, and culture are regarded as essential aspects of digital transformation (Schallmo & Williams, 2021). In addition, strategy and business processes are also considered important elements (Elkadi & El Tazi, 2023).

Businesses face challenges in achieving digital maturity, despite the growing role and popularity of the digital transformation topic in the business landscape and in the academic field. (Weritz et al., 2020). Implementation of digital transformation in SMEs differs from large enterprises due to a variety of micro- and socioeconomic, inside and outside factors (Bin & Hui, 2021). For instance, small and medium-sized enterprises (SMEs) have limited resource opportunities such as funding,

a skilled workforce, and time, additionally, there are organizational and technical barriers (Kljajić Borštnar & Pucihar, 2021; Brink & Packmohr, 2023). In the case of large enterprises, there is the financial condition, organizational culture, workforce skills and expertise, technology, strategic approach, the difficulty of monitoring, outcomes of various sectors of business and insufficient cooperation between departments (Almasbekkyzy et al., 2021; Johannesson et al., 2023).

It is possible to enhance and optimize current processes after understanding the digital maturity degree of the organization (Ilin et al., 2019). Therefore, it is important to find appropriate paths and instruments (Wittine et al., 2021). The digital maturity model serves as a comprehensive roadmap to increase digital maturity (Haryanti et al., 2023). There are also dimensions for assessing digital maturity, which are organizations, offerings, infrastructure, workforce, culture, leadership, and operation (Skalli et al., 2023; Naskali et al., 2018). For instance, about 60% of the digital maturity of SMEs in Brazil is evaluated as a primary degree, and research findings enable MSEs to discuss and modify strategies guiding best practices in markets with comparable characteristics and challenges (da Costa et al., 2022).

SMEs play a pivotal role in economies, they are real competitors for big companies (Savlovschi & Robu, 2011). Hasanova (2019) analyzed the influence of SMEs on the development of the economy of the Kyrgyz Republic. The author found that SMEs are an indispensable sector of the economy because they solve social problems, generate new employment opportunities, and create income. For instance, according to the National Statistical Committee of the Kyrgyz Republic (NSCKR) (n.d.), SMEs produced a total of 40.5% of GDP in 2023 and 38.8% of GDP in 2022. In addition, approximately 106.3 thousand people were working for SMEs in 2023 (HSCKR, n.d.). The inability to integrate medium and high technologies in manufacturing processes leads SMEs in the Kyrgyz Republic to reflect on long-term sustainability, competitiveness, and effectiveness (Karymshakov, 2020).

The digital transformation was researched in the case of SMEs and large enterprises in Spain, and the result shows that investment in IT, research and development activities, and innovativeness of products are important factors for both types of companies (Torrent-Sellens et al., 2022). There is a link that shows that the higher the digital maturity, the more flourishing projects are (Dooley et al., 2001). Therefore, it is noteworthy to find out about the degree and factors of digital maturity in the large enterprises and SMEs of the Kyrgyz Republic.

Here are four statements now that were mentioned previously: "digital transformation," "digital maturity, "maturity models," "large enterprises and SMEs," and "Kyrgyz Republic." Our master thesis will provide the real level of digital transformation maturity of the large enterprises and

SMEs in the Kyrgyz Republic. We hope that there will be valuable research and real recommendations for small, medium, and large enterprises that help them achieve high digital maturity.

1.2 Research Problem

There is a notable lack of academic papers or available information in open-source databases regarding the digital transformation maturity of large enterprises and SMEs in the Kyrgyz Republic, which creates a significant research gap. However, there is some information regarding the digitalization situation in the Kyrgyz Republic in open sources. According to the World Bank (2016), the Digital Adoption Index (DAI) for the Kyrgyz Republic was 0.49, with DAI scores of 0.60 for business, 0.34 for people, and 0.53 for government on a scale between 0 and 1. Kyrgyzstan has made significant progress on digitalization in the areas of information technology, digital government, telecommunications, and financial technology (UNDP, 2021; UNDP, 2023). Moreover, there exists the "Digital Kyrgyzstan 2019–2023" concept at the government level, which serves as a roadmap for digital transformation (Digital Development Ministry, n.d.).

There are few academic papers regarding digitalization in the Kyrgyz Republic. For instance, Ismanaliev et al. (2019) researched digitalization in Kyrgyz society. Digitalization is considered a main factor in economic development because it influences efficiency. Kulueva et al. (2023) analyzed the issues and strategies of the digitalization of the education sector in the Kyrgyz Republic and found that digitalization plays a significant role in improving educational services and socio-economic development. Akzholova and Osmonova (2019) analyzed the integration of digital technologies in the agriculture field and recommended engaging audiences effectively through the development websites. Enikeeva (2019) studied the concept of "Digital Kyrgyzstan 2019-2023," especially in the agriculture, tourism, and creative economy sectors.

Overall, an absence of studies specifically addressing the digital maturity of companies in the Kyrgyz Republic was identified. This problem must be solved because the assessment of digital maturity is a crucial process for companies that helps them attain a higher level of effectiveness (Pedrini & Frederico, 2018). Moreover, maturity models are important for IT managers since they provide the opportunity to evaluate the present situation and determine enhancement strategies (Becker et al., 2009). Organizations with a high level of digital maturity are likely to have agility, tolerance for risk, a collaborative culture, and the ability to continuously learn (Rader, 2019). The research findings of the master thesis will fill a research gap by providing valuable information for large enterprises and SMEs in the Kyrgyz Republic.

1.3 Objectives of the Study

The process of digitalizing businesses can be characterized by digital maturity and estimated using maturity models (Neunaber & Meister, 2023). A higher maturity degree leads to cost efficiency and a competitive advantage in the market (Grebe et al., 2018). For instance, Pinto et al. (2023) analyzed the rate of digital maturity and found that 82% of retail companies in Brasilia have moderate to advanced degrees of digital maturity, and organizations at lower levels need to increase investment in dimensions of strategy and operation. In the context of Tecoman, Colima municipality, Mexico, Preciado Álvarez and Ojeda Pérez (2023) found that the digital maturity degree of medium-sized companies does not depend on the educational degree of the individual in charge or gender.

All the aforementioned research confirms that it is possible to assess the level of digital transformation maturity of organizations and analyze digital transformation maturity factors. Moreover, there is a research problem, which was mentioned in the previous section. Therefore, the objects of the master thesis are to determine the maturity degree and analyze digital maturity factors, which are presented below:

- *Research the current digital transformation maturity degree of large enterprises and SMEs in the Kyrgyz Republic.*
- *Research the current digital transformation maturity factors of large enterprises and SMEs in the Kyrgyz Republic.*
- *Compare digital maturity factors between large enterprises and SMEs in the Kyrgyz Republic.*

1.4 Research questions

This part is a continuation of the research problem and objects of the introduction part. Research questions are essential elements of research and assist in guiding the design and methodologies of research (Bryman, 2007).

Researchers found the digital maturity of SME in Greece, it shows that more than 60% of respondents found companies are mature, and 14% of the respondents believed very low degree or not at all (Kargas et al., 2023). According to the results and other studies, it is achievable to determine the degree of digital maturity and other factors.

This master thesis aims to find answers to the following questions:

1. *What is the present level of digital transformation maturity of large enterprises and SMEs in the Kyrgyz Republic?*
   This question aims to assess the current digital maturity and present position of enterprises.
2. *What factors influence the digital transformation maturity of large enterprises and SMEs in the Kyrgyz Republic?*
   This question aims to identify pivotal factors that affect digital maturity.

By answering these questions, the master thesis will close a research gap and provide insights for high- and medium-level employees to better understand their current positions and formulate plans to improve the digital maturity of organizations.

1.5 Significance of the Study

The results of the digital maturity degree can be valuable not only for the academic field but also for businesses. In the academic context, it will help to close the research gap. In the business context, there are various benefits from digital transformation for SMEs (Ulas, 2019). Moreover, digital maturity is essential for decision-makers, they make a good choice based on the level of digital transformation (Asad Amraji et al., 2020).

Thordsen and Bick (2023) found that there is a positive correlation between digital maturity and the performance of a company. These researchers and Asad Amraji et al. (2020) highlight the real importance of assessing digital transformation maturity for companies.

Based on the master thesis findings, the large enterprises and SMEs of the Kyrgyz Republic will receive information about digital transformation maturity degree and about factors that influence position. Moreover, they will receive real individual recommendations to enhance their current digital transformation position.

1.6 Structure of the Thesis

The master thesis consists of six main parts, which are located systematically and logically.

The introduction demonstrates the background, research problems, objectives, and questions, as well as the significance of the study.

Theoretical background is the second part of the thesis, which contains theoretical aspects of digital transformation, digital transformation maturity, and models for assessing digital transformation maturity.

The literature review analyzed existing literature regarding digital transformation in large enterprises and SME, digital transformation maturity in large enterprises and SME, and digital transformation maturity in different cases.

One of the important parts is **research methodology**, which contains research design, data collection methods, sampling strategy, data analysis techniques, and ethical considerations.

Research findings contain the results of quantitative and qualitative methodologies, which are essential parts of the master thesis.

Other vital parts are **discussion, limitations,** and conclusions.

In summary, this master thesis aims to research the digital transformation maturity of large enterprises and SMEs by utilizing the Williams et al. (2023) digital maturity model and conducting interviews and questionnaire with enterprises in the Kyrgyz Republic.

2. Theoretical Background

The theoretical background part encompasses theoretical aspects of digital transformation, digital transformation maturity, and digital transformation maturity models. The digital transformation part contains information from definition to drivers, impacts, and results of these processes. The second part focuses on a broad analysis of digital transformation maturity roles, including real-life examples. The last part is about models and their applicability in real-life cases.

2.1 Digital Transformation

The effects of digital transformation impact not only individual organizations but also whole sectors and marketplaces (Gurbaxani & Dunkle, 2019). For instance, the digital transformation is in the banking, education, government, and manufacturing industries (Verina & Titko, 2019). Moreover, digital transformation is an interdisciplinary field of research that encompasses IT, enterprise, tactical and functional management, marketing, and management science, among others (Plekhanov et al., 2022).

There are various definitions of digital transformation (Bondar et al., 2017). Therefore, further a self-organized table is constructed, where various definitions of different authors are presented.

№	Reference	Definition
1	(Ciruskabiri & Varnaseri, 2023)	Digital transformation means a change in strategy and operation structure, utilizing innovation technologies to attain operational efficiency, enhance the user experience, and foster customer loyalty by developing goods and services.
2	(Westermann et al., 2014)	Digital transformation is the utilizing of technology to improve efficiency significantly or reach of businesses.

3	(Pihir et al., 2018)	Digital transformation is a growing concept, where strategy focused and customer-centered organizations modify the infrastructure and structure of organizations by using modern information and communication technologies (ICT).
4	(Tang, 2021)	Digital transformation is a form of business transformation led by cutting edge technologies.
5	(Ebert & Duarte, 2018)	Digital transformation means embracing emerging technologies to enhance efficiency, deliver value, and improve community well-being.

Table 1 : Definitions of Digital Transformation

According to Table 1, there are several common elements among different authors, which are "digital transformation," "innovative technologies," and "business process," which means that despite various words of description, the core idea is almost the same.

The main objective is to achieve better business operations and processes that foster a digital-centric business environment, completely change the operating environment, and provide value to customers (Gebayew et al., 2018; Kokolek et al., 2019). It involves innovative technologies that improve productivity, generate value, and contribute to societal well-being (Ebert & Duarte, 2018). Additionally, business processes, decision-making, and engagement with partners and end users are simplified due to digital transformation (Gigova et al., 2019).

To implement digital transformation, businesses require methodology, instruments, and processes (Wolff et al., 2019), therefore, elements of digital transformation were identified in the self-organized table 2. There are different authors and different elements of digital transformation.

№	Reference	Elements of Digital Transformation
1	(Schallmo & Williams, 2021)	Technology, organization, skills, and culture
2	(Verina & Titko, 2019)	Processes, business models, customers, technologies, employess, data, and leaders
3	(Behrens et al., 2023)	"Mindsets, communication, strategy, technology, and people"

4	(Morze & Strutynska, 2021)	" Processes , people, data, and technologies"
5	(Mapingire et al., 2022)	Customer experience, products and services, employee work style, and business processes

Table 2: Elements of Digital Transformation

Table 2 contains different elements of digital transformation, It is possible to find some common elements, which are "technology," "processes," and "people.".

External and internal, micro and macro factors can be considered reasons for companies to implement digital transformation (Osmundsen et al., 2018; Bin & Hui, 2021). Changing consumer behaviors and digital models of the new entrants lead companies to concentrate on digital transformation (Haffke et al., 2017). Moreover, the dynamically evolving market environment, requires digital transformation for organizations to maintain competitiveness (Levkovskyi et al., 2020). In the case of public organizations in the Netherlands, introducing ICT was a key external factor as a requirement of the digital transformation (Tangi et al., 2020). Li et al., (2024) found a positive correlation between digital transformation and financial aspects. For instance, according to the World Economic Forum (2020), there is a financial potential to create $100 trillion in value through digital transformation across industries in the upcoming decade.

As internal factors, Luo and Yu (2022) considered strategy, organizational ability, and leadership. For instance, there is a positive link between digital transformation and operational efficiency (Yu et al., 2022). SMEs are encouraged to adapt digital transformation for innovative business models because of the renewal of business strategies and cultural internal factors (Van Tonder et al., 2023). Moreover, digital leadership and process engineering are key internal factors in implementing digital transformation (Peter et al., 2020).

Further at the self-organized table 3, drivers of digital transformation were analyzed, which motivated companies to transfer companies.

№	Reference	Drivers of digital transformation
1	(Levkovskyi et al., 2020)	Advancement of business strategies, business operations, user experience, and facilitating technologies.

2	(Gulati & Reaiche, 2020)	Interpersonal skills, emotional intelligence, leadership, and motivational factors. (Soft skills)
3	(Tsiavos & Kitsios, 2021)	Technology, organizational culture, leadership, and workforce
4	(Zahra et al., 2024)	Economical, ecological, social, and structural
5	(Daniel et al., 2023)	Economic advantages, regulations of government and climate conditions.
6	(Mihu et al., 2023)	Digital technologies, organizational and structural modifications, and the altering role of humans

Table 3: Drivers of digital transformation.

Overall, the aforementioned and presented authors at the table show that there are totally different drivers or factors that are pushing companies into digital transformation.

Companies that aim for success in their digital transformation path must have plans for transformation, they should know what motivated the initiation of the journey (Morakanyane et al., 2020). Technology and people play a significant role in the digital transformation process (Nadkarni & Prügl, 2021). However, adopting multiple technologies alone is insufficient for digital transformation (Schwertner, 2017). Thus, critical factors influencing digital transformation are strategic focus, customer-focused approach, ICT and procedural infrastructure, enhancing talent, capabilities, and talent, a culture of innovation, and organizational dedication (Pihir et al., 2018; Feliciano-Cestero et al., 2023).

Organizations and sectors face challenges in undergoing digital transformation (Andersson & Rosenqvist, 2018). The challenges can be strategic, organizational, cultural, and planning and implementing, which require the commitment and engagement of top management (Henriette et al., 2016; Sandkuhl et al., 2020). Moreover, it is essential to engage in a collection of strategic activities categorized into three primary dimensions, which are culture and skills, infrastructure and technologies, and ecosystems (Brunetti et al., 2020).

There are several obstacles to implementing digital transformation, including insufficient knowledge, a deficit in digital expertise, inadequate digital leadership, resistance to change, a rigid culture, ambiguous vision and goals, and a deficit of alignment and collaboration (Bouarar et al., 2022). Despite the different challenges and obstacles, Table 4 presents the impacts of digital

transformation. It is a self-organized table that demonstrates various researcher analyses of the results.

№	Reference	Results of the digital transformation
1	(Leão & da Silva, 2021)	Competitive advantage: (innovations, structural performance, reduction in expenditure) Global value chain: (specialization, geographic reach, structure of management, and refinement)
2	(Tolboom, 2016)	Proposition of value, segmentation of customers, engagement of customers, utilizing resources
3	(Alshammari, 2023)	Organizational structure, business models, IT systems, and the advanced adaptability and innovation of business.
4	(Lozić & Čiković, 2021).	Efficiency of business and processes of a business corporation.
5	(Truong, 2022).	Environmental sustainability (management and handling of waste, preventing and controlling pollution, eco-friendly resource management)
6	(Pousttchi et al., 2019)	Models of generating value, value delivery, and customer relationships.

Table 4: Results of the Digital Transformation

Table 4 demonstrates that digital transformation effects businesses totally differently, from "financial" and "operational" benefits to "sustainable" rewards. In the context of the energy sector, effectiveness, sustainability, and adaptability are the main impacts of digital transformation. (Nazari & Musilek, 2023).

Companies fail in their digital transformation efforts because of an absence of understanding or improper management processes (El-Garem & Adel, 2022). To find pivotal success factors of the digital transformation, Senarathna and Wickramarachchi (2024) used four dimensions: customer focus, culture of organization, technical infrastructure, and leadership. In the case of manufacturing companies, the collaborative efforts between consumers, suppliers, and companies and other industry peers are the main success factors in implementing digital transformation

(Vogelsang et al., 2018). In the context of SMEs, Zhang et al. (2022) found that important success criteria are technical, organizational, and environmental aspects.

Social sciences do not have exact rules (Mandavilli, 2023) It proves our theoretical background part of digital transformation, where uncommon definitions, elements, drivers, and results of the processes.

2.2 Maturity Models in General

While doing research regarding digital maturity models, it is essential to define a maturity model precisely (Williams et al., 2019). The digital maturity model was developed based on the traditional maturity model and included digital transformation processes (Minh & Thanh, 2022). It is a popular instrument to measure business processes or certain organizational characteristics, and it provides a more structured and methodical approach in order to conduct business (Proença & Borbinha, 2018). Additionally, it helps to measure the advantages and disadvantages of a system or process in the different fields and create improvement scripts (Reis et al., 2017).

A variety of models have been developed by professionals and scholars for various domains to assess proficiency (De Bruin et al., 2005). In the context of the software engineering field, the majority of the maturity models have been created based on CMM, ISO/IEC 15504, and CMMI-DEV (García-Mireles et al., 2012). The Capability Maturity Model (CMM) and the Capability Maturity Model Integration are the most prominent models in research and academic fields (Poeppelbuss et al., 2011; Albliwi et al., 2014). Khoshgoftar and Osman (2009) compared several maturity models, and the OPM3 was found to be better compared to others.

It is essential to evaluate the processes of organizations by using an appropriate model (Khoshgoftar & Osman, 2009). In the case of SMEs, maturity models are used as a useful instrument to record current situations, create direction and vision, and evaluate different organizations abilities (Virkkala et al., 2020). Titov et al. (2016) investigated the role of CMM implementation on quality-related problems and found favorable effects on both timing and expense performance, and quality management. Vakaslahti (1997) analyzed human potential on the performance of a company by using the People CMM. Ramos et al. (2020) discovered readiness to implement Industry 4.0 technologies in the case of 9 companies from Brazil, the results of the maturity model help to be better state in the future.

Overall, the maturity model is a vital tool for evaluating organizational processes and improving the performances of the company. Moreover, it was widely used in various sectors, from

information systems to project management. The maturity model is the base of the digital maturity model (Minh & Thanh, 2022).

2.3 Digital Transformation Maturity

The phrase digital maturity illustrates the present state of digital transformation in organizations (Chanias & Hess, 2016). In other words, gradually integrating procedures, people, and other resources into digital processes is the process of achieving digital maturity (Aslanova & Kulichkina, 2020). It was identified that there is a positive link between high digital maturity and net income, revenue growth (Kuznetsova & Rusavskaya, 2021). Therefore, enterprises undergo digital transformation across every area of their operations, aiming to improve their level of digital maturity (Aslanova & Kulichkina, 2020). Moreover, the higher degree allows companies to enhance the effectiveness of costs, speed to market, strategic advantage, and share of the market (Grebe et al., 2018).

A higher digital maturity depends on the development of a certain set of digital capabilities, which must be enhanced to properly manage the transition process (Rossmann, 2018). Digital maturity may contain various capability dimensions such as technology, people, culture, governance, business and operational model, leadership, market, sustainability, product, service, and partnership (Rossmann, 2018; Ustaoğlu, 2019; Salume et al., 2021; Kupilas et al., 2023). These researchers confirm that there are no fixed dimensions of digital maturity.

Evaluation of dimension capabilities serves to gauge the readiness of companies to include digital technologies (Johnston, 2017). In order to measure the digital maturity level of enterprises, a suite of methods of multi-criterion decision-making were used, including TOPSIS, VIKOR, and MOORA methods (Brodny & Tutak, 2021). In the context of the Three Seas Initiative, member countries used the CRITIC-Grey relational analysis method, and to determine the resemblance of digital transformation implementation among member countries, the Kohenen artificial neural networks were applied (Brodny & Tutak, 2023).

The degree of digital maturity of over 50% of micro and small enterprises in Brazil was low due primarily to deficiencies in technology, human resources, and government elements (da Costa et

al., 2022). In the case of higher education in Bosnia and Herzegovina, the degree of digital maturity rate is in the middle between 1 and 5 (Mabić & Praničević, 2021). These findings assist organizations in developing competencies to construct digital transformation effectively (Hortovanyi et al., 2023).

The degree of digital maturity is higher when senior management spreads digital vision and imparts it through the company, providing courses and digital skills for staff (Salviotti et al., 2019). Moreover, strategic management is an important element in attaining a high degree because it has been proven scientifically (Abdullah, 2024). A strategy is made to increase degree based on estimating the processes of business (Kurniya & Andriani, 2023).

2.4 Digital maturity models

The initial step in the digital transformation is to gauge the current position and gap of processes in organizations (Merdin et al., 2022). To evaluate the demands of organizations on digitalization (Senna et al., 2023), direct companies toward effective implementation of digital transformation (Hellweg et al., 2021), and help companies strategize and maneuver their digital transformation (Alsufyani & Gill, 2021). The digital maturity model serves as a valuable instrument (Hellweg et al., 2021). It ascertains the ground level of a company's digital maturity (Williams et al., 2019). Moreover, it identifies missing elements of the digital transformation process (Gollhardt et al., 2020). In addition, it allows organizations to manage digital transformation processes effectively (Minh & Thanh, 2022).

The findings of Alsufyani and Gill (2021) indicated that, from an enterprise design perspective, there is still a challenge in fully comprehending digital maturity by using digital maturity models. There is no ideal digital maturity model because it includes strengths and weaknesses (Barry et al., 2023). However, determining the digital maturity degree and offering a guide for digital maturity enhancement serves as a benchmark for choosing one of the digital maturity models (Gökalp & Martinez, 2021).

The dimensions of the digital maturity model give an opportunity to gauge digital maturity and to understand effective tools for implementing digital transformation (Berghaus & Back, 2016; Ustaoğlu, 2019). There are different dimensions used in the case of SME digital maturity, which

are workforce, technology, leadership, culture, procedure, offerings, consumers, relationships, and external factors (Williams et al., 2019; Re et al., 2023; Öztürk et al., 2023; Sukrat & Leeraphong, 2024; van Tonder et al., 2024).

There are various digital maturity models developed, but the topic is always changing, and maturity models do not meet business requirements (Babo et al., 2023). For instance, there are the McKinsey Digital Quotient and MIT Digital Business Center digital maturity models (Ochoa, 2016). The most cited paper in the database was in the context of the manufacturing sector. It was a model with nine dimensions and 62 items, and it was validated by using this model in several use cases (Schumacher et al., 2016).

Further, three digital maturity models are discussed in detail.
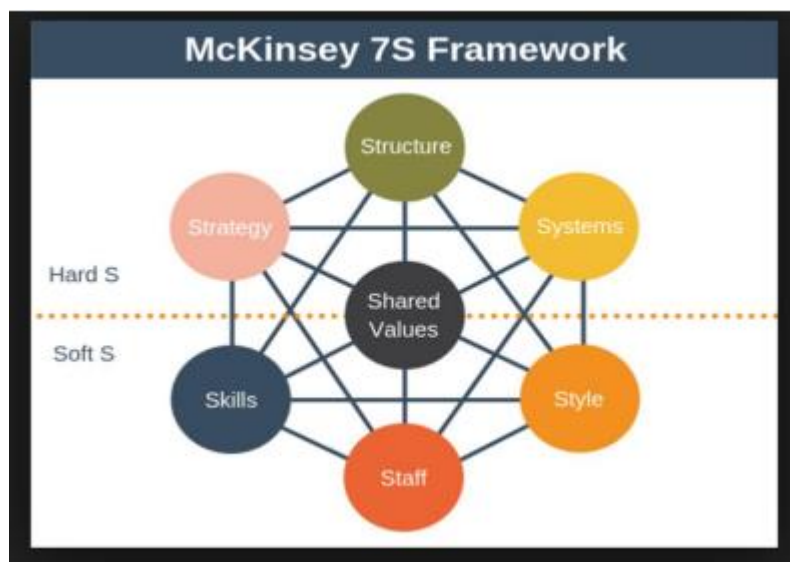
Figure 1: McKinsey 7S Framework

Source: Demir, E., & Kocaoglu, B. (2019). The use of McKinsey's 7S framework as a strategic planning and economic assestment tool in the process of digital transformation. PressAcademia Procedia, 9(1), 115

Figure 1 illustrates the McKinsey 7S Framework, which demonstrates strong interconnection between various elements of an organization, and changing one element impacts other elements. It consists of soft and hard parts, and one central element is "shared values" (Demir & Kocaoglu, 2019). The McKinsey 7S Framework was used to measure the readiness of organizations implementing e-learning platforms; it helped to weigh weaknesses and strengths in order to avoid project failure (Alshaher, 2013). This model served as a prism to embrace digital transformation for the organization (Loonam et al., 2018). Demir and Kocaoglu (2019) assessed rate of importance of all seven elements for organization, and it is identified that the most critical element is strategy and the least critical element is staff.
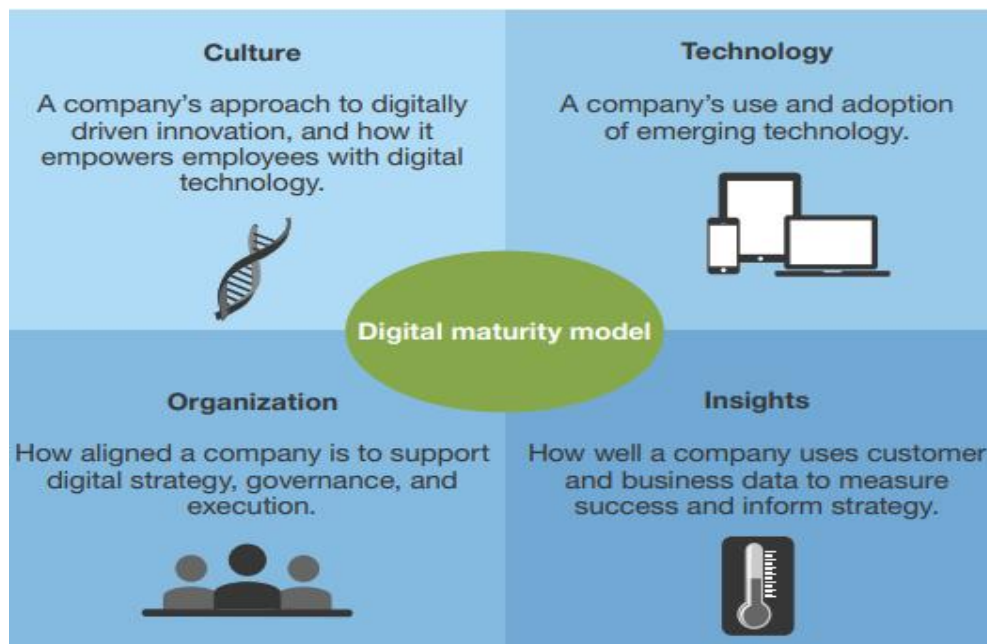
Figure 2: Four Dimensions Determine Digital Maturity

Source: Gill, M., & VanBoskirk, S. (2016). The digital maturity model 4.0. Benchmarks: digital transformation playbook. 3 p.

Figure 2 shows Forrester's Digital Business Maturity Model 4.0 that assesses basic aspects of a company's digital transformation, containing four dimensions: culture, technology, organization, and insights, which span strategy implementation, operational and digital marketing efficiency, and the impact of digital implementation on sales and service interactions. There are four levels: skeptics, adopters, collaborators, and differentiators (Gill & VanBoskirk, 2016). There are several papers in which digital maturity models are used to determine the level of maturity, for instance, the master thesis discovered the digital maturity degree of the retail companies in Sweden, Forrester's Digital Business Maturity Model 4.0 was utilized, and the majority of the companies achieved the collaborator category of degree based on the four dimensions of the model (Tavakoli & Mohammadi, 2017).

The first pan-organisation digital maturity model

The DMM evaluates digital capability across 5 clearly defined business dimensions to create a holistic view of digital maturity across the organisation

Customer	Strategy	Technology	Operations	Organisation & Culture
Providing an experience where customers view the organization as their digital partner using their preferred channels of interaction to control their connected future on and offline	Focuses on how the business transforms or operates to increase its competitive advantage through digital initiatives; it is embedded within the overall business strategy	Underpins the success of digital strategy by helping to create, process, store, secure and exchange data to meet the needs of customers at low cost and low overheads	Executing and evolving processes and tasks by utilizing digital technologies to drive strategic management and enhance business efficiency and effectiveness	Defining and developing an organizational culture with governance and talent processes to support progress along the digital maturity curve, and the flexibly to achieve growth and innovation objectives

Figure 3: The first pan-organization digital maturity model

Source: Deloitte *https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Technology-Media-Telecommunications/deloitte-digital-maturity-model.pdf*

Figure 3 illustrates the first pan-organizational digital maturity model developed by Deloitte with the TM partnership. It is the first industry-standard, pan-organizational comparative analysis and progress assessment evaluation tool for digital maturity and offers opportunities for companies to determine digital transformation positions, formulate objectives and strategies, and execute effective investments on digital transformation projects. There are five dimensions, which are customer, strategy, technology, operations, culture, and organization (Deloitte, 2018). Moreover, the research on digital maturity in the case of the Kompas Gramedia Indonesian company demonstrates that performing digital maturity degree on strategy dimension, customer, operation, technology, and organization dimension's degree is emerging, Deloitte and TM model are used for evaluation (Ervinta et al., 2021).

In summary, companies are able to measure their current digital capabilities and steer their transformation journey with a digital transformation maturity model. As aforementioned, all models can be used in different cases. Businesses enhance their digital capabilities by using the results of their models.

3.Literature Review

This section will present an analysis of existing literature from a variety of sources. There are three main parts, which are the first regarding digital transformation in large enterprises and SMEs, the second regarding digital transformation maturity in large enterprises and SMEs, and the third regarding digital transformation maturity in different sectors. The aim of this part is to consider digital transformation and digital transformation maturity not only in large enterprises and SMEs but also in different sectors. This allows for a broader, deeper review of the topics, which have different structures and functions.

3.1 Digital Transformation in Large Enterprises and SMEs

In the world of the digital economy, enterprises are reshaped by digital transformation processes as a result of the combination of digital technologies and business processes (Liu et al., 2011). In the context of SMEs, processes offer relative advantages, enhance organizational capacities and processes, and alter operations (Ulas, 2019; Kyurova, 2022; Skare et al., 2023) Furthermore, the digital transformation assists with maintaining competitiveness in the marketplace (Kraus et al., 2021). In the case of large enterprises, the deployment of digital transformation pacts is undertaken with the objective of achieving cost reduction, efficiency enhancement, traceability management, quality of products, capabilities of innovation, enhancement of their organizational framework, value creation, and encouragement of innovative management approaches (Peter et al., 2020; Yang et al., 2021; Dong, 2023).

There are technological, organizational, employee, environmental, and strategic factors that impact the digital transformation of SMEs (Teng et al., 2022; Zhang et al., 2023). Historically, the advancement of technologies led to increased efficiency in production processes (Corejova & Chinoracky, 2021). For instance, the digital transformation of companies is facilitated by Industry 4.0 technologies, which are AI, big data, IoT, and cloud technologies (Zheng et al., 2021; Chatterjee et al., 2024). These technologies exert a beneficial influence on company outcomes by

declining average and technology-related costs, as well as enhancing the performance of computing and international connectivity (Jadertrierveiler et al., 2019; Mubarak et al., 2019).

The implementation of digital transformation in SMEs and large enterprises yields a multitude diverse advantages (Tarutė et al., 2018). In the case of Chinese SMEs, Teng et al. (2022) found a positive influence of digital transformation, including increased efficiency for the company. For instance, the organizational performance of the company was influenced by the utilization of an online platform, the B2B system, and cloud computing technologies (Chen et al., 2016). In the context of German SMEs, the deployment of digital transformation has been found to lead to enhanced revenue, greater customer and employee satisfaction, and improvements in performance and efficiency (Pfister & Lehmann, 2023).

Nevertheless, digital transformation presents not only transformative potential but also fundamental challenges for established companies that have not yet fully embraced the digital era (Sebastian et al., 2020). Sumrit (2021) identified obstacles to the deployment of digital transformation in Thai SMEs, which are the absence of a digital culture, insufficient support and commitment, and the absence of risk-taking initiatives. In French, SMEs encounter hurdles such as technological, organizational, workforce, and client challenges (Peillon & Dubruc, 2019). In the context of a large company such as "General Electric," inefficient development and management were found to be challenges for the company in the process of digital transformation (Budagov & Sukhova, 2020). Consequently, it was observed that the pace of processes was slower in SMEs due to limited resources and capacities; therefore, it is important to research factors in order to effectively allocate resources (Zhang et al., 2022).

Tarutė et al. (2018) identified external and internal factors by which SMEs are impacted when implementing digital transformation, including internal fit of capabilities, resources, and the alignment of business models, as well as external regulations of the government and industry-specific factors (Tarutė et al., 2018). Furthermore, companies are motivated to pursue digital transformation due to competitive pressure and new market entrants in the marketplace (Schaller et al., 2022).

The digital transformation drivers can be classified into three main categories: client, information technology, and organizational growth (Mihu et al., 2023). Furthermore, several drivers influence organizations to adopt digital technologies, which are information technology systems, digital solutions, corporate governance, accessible skills, funding, and unexpectedly ecological influence (Omrani et al., 2022).

A strong correlation was found between digital transformation and firm efficiency in the case of Indian SME (Malodia et al., 2023). Overall, digital transformation impacts businesses' business models, operations, and customer experiences (Gebayew et al., 2018). Further, self-organized table 1 consists of three rows, which are author, topic, and results. The main criteria were to choose topics regarding the effects of digital transformation on companies; therefore, the results part contains researchers findings about the impact of digital transformation. It was analyzed abstractly, finding and resulting parts of literature.

№	Reference	Topic	Results
1	(Tolboom, 2016)	"The impact of digital transformation"	Value prepositions of organizations
2	(Llopis-Albert et al., 2021)	"Impact of digital transformation on the automative industry"	Greater profits Productivity Competitiveness
3	(Do et al., 2022)	"The Impact of Digital Transformation on Performance: Evidence from Vietnamese Commercial Banks"	positive performance
4	(Chen et al., 2016)	"Effect of digital transformation on organizational performance of SMEs, Evidence from the Taiwanese textile industry's web portal"	Positive organizational performance

5	(Skare et al., 2023)	"Digital transformation and European small and medium enterprises (SMEs): A comparative study using digital economy and society index data"	Enhance market position and engagement
6	(Sumrit, 2021)	"What are the obstacles hindering digital transformation for small and medium enterprise freight logistics service provider? An interpretive structural modelling approach"	Achieve a competitive advantage Lowering expenses Enhancing customer experience Innovation Efficiency
7	(Nazari & Musilek, 2023)	"Impact of digital transformation on the energy sector: a review"	Sustainability Efficiency Resiliency
8	(Teng et al., 2022)	"Impact of digital transformation of small and medium sized listed companies on performance: based on a cost-benefit analysis framework"	Operational efficiency Innovative efficiency Financial effectiveness

Table 5: Impact of Digital Transformation

Table 5 demonstrates the impact of digital transformation on companies. There are totally different authors, fields of organizations, countries, and degrees of effect of outcomes, but the results are fast the same positive impact. The implementation of digital transformation in organizations can have totally different effects. There are different positive outcomes of digital transformation, from operation efficiency to financial benefits. Based on these results, it is possible to conclude that digital transformation can lead to positive company achievements.

The majority of digital transformation initiatives either fail or fail to attain the planned goals due to a number of factors, including the selected strategy or approach (Omrani et al., 2022) or inadequate strategic planning in line with the needs of the organization (Gouveia & São Mamede, 2022). Additionally, there is a shortage of talent sources, a lack of scalability planning, and internal reluctance to align (Mielli & Bulanda, 2019). Inappropriately utilizing elements associated with technology, innovation, management, and information systems leads to failed digital transformation projects within organizational contexts (Oludapo et al., 2024). The multiplicity of systems and applications that are in operation within a business environment is the reason for the failure of digital transformation (Kozak-Holland et al., 2020). Consequently, Li (2020) identified three emerging methodologies for successfully realizing digital transformation at global digital companies, which are exploring innovation through experimentation, gradually revolutionizing digitalization, and developing a range of transient benefits.

The role of digital transformation on business performance was assessed using quantitative methodology, multiple regression analysis, and SPSS software (Mubarak et al., 2019). Another approach is the qualitative method, which involved the participation of only 7 SMEs on the Alibaba online marketplace (Li et al., 2018). Malodia et al. (2023) employed a mixed-methods approach to evaluate the impact of digital transformation on SMEs in India, combining quantitative data collection with qualitative interviews with businesses (Malodia et al., 2023).

A structured model was used to research the role of digital transformation on SMEs, with a survey and SPSS and SPSSAU instruments (Teng et al., 2022). The author approached it in an it in an alternative way, using Eisenhardt's methodology, which focuses on analyzing existing case studies regarding the digital transformation of organizations (Corejova & Chinoracky, 2021). To investigate the strategic field of digital transformation for SMEs and large enterprises in Sweden, an online survey was conducted, and insights were identified based on the method (Peter et al., 2020). In the context of the digital transformation of SMEs in Indonesia, data analysis was conducted based on structural equation modelling (SEM) with the SmartPLS 3.2.9 software (Wiyono & Kirana, 2021).

In conclusion, digital transformation transforms large enterprises and SMEs significantly by enhancing positive features (Liu et al., 2011; Kraus, 2021). Particularly, innovative technologies improve outcomes (Chatterjee, 2024; Mubarak, 2019; Jadertrierveiler, 2019). However, in the process of digital transformation, there are challenges (Zhang et al., 2022). Despite these challenges, positive impacts have been observed (Malodia, 2023; Pfister, 2023).

3.2 Digital Maturity in Large Enterprises and SMEs

The digital maturity model evaluates the propensity and extent to which SMEs are willing to undergo digital transformation (Blatz et al., 2018; Yezhebay et al., 2021). The object of estimation is to facilitate the attainment of in-depth knowledge of the fundamental elements that are necessary for effective implementation of the transformation (Silva et al., 2022). Furthermore, measuring the level of digital maturity enables businesses to be more competitive in the digital age (Thordsen et al., 2020). Furthermore, the degree of maturity provides understanding of a roadmap for expansion of business and realistic advancement phases of transformation, as well as preparedness for future adjustments (Naskali et al., 2018; Remane et al., 2017).

Both private and public institutions encounter hurdles due to the swift expansion of digital transformation (Nerima & Ralyté, 2021). Nevertheless, the slower rate of adoption of digital technologies is a common problem in the world, and prior to establishing a digital strategy, it is essential to measure a company's current digital maturity and condition (Fernando et al., 2024). A plethora of instruments and evaluation tools for assessing digital maturity have been developed (Kljajić Borštnar & Pucihar, 2021). The results of the assessment assist businesses in becoming more mature digital companies (Kane et al., 2017). Therefore, it is essential to identify appropriate methods and instruments (Wittine et al., 2021). The result of the assessment demonstrates the role of dimension in the digital transformation of SMEs (Ramantoko et al., 2018). Omol et al. (2023) discovered that the technology dimension plays a significant role compared to other dimensions for implementing digital transformation in SMEs in developing countries.

The digital maturity framework serves as guidance to develop the digital transformation level of organizations, based on this framework, it is possible to emphasize only the necessary dimensions (Hägg & Sandhu, 2017). Further, it is self-constructed table 2, which consists of author, topic, and dimension elements, to identify dimensions of framework. It was analyzed in the abstract and methodology parts of papers where it demonstrates information about domains.

№		Topic	Dimensions

1		"Do or Die: How large organizations can reach a higher level of digital maturity" (Hägg & Sandhu, 2017)	Processes Leadership Culture Strategy Analytics IT
2		"Multi-Attribute Assessment of Digital Maturity" (Kljajić Borštnar & Pucihar, 2021)	Technology Informatics Digital business model Strategy Human resources Organizational culture Management
3		"Digital Maturity Action Fields for SMEs in developing countries" (Omol et al., 2023)	Technology Product Strategy People Organizations Operations

4		"Mapping business transformation in digital landscape: A perspective Maturity Model for Small Enterprises" (Naskali et al., 2018)	Business Technology Social
5		"Defining the Roadmap towards Industry: The 6Ps Maturity Model for Manufacturing SMEs" (Spaltini et al, 2022)	Products Process Platform People Partnership Performance
6		"Measuring Digital Capability Maturity: Case of Small and Medium Kampong Digital companies in Bandung" (Ramantoko et al, 2018)	Organization, store presence, support, knowledge management and decision making, marketing and sales, customer relationship, internal communication, ecosystem management, and digital revenue
7		"Analyzing the state of digitalization in SMEs - A survey based on an SME-specific maturity model" (Wittine et al., 2021)	Production IT and data (processes)-Organization Leadership, management, and culture Employees Business model and network

Table 6: Digital maturity and dimensions

Table 6 demonstrates the work of six authors, who were selected randomly. The important row is dimensions, and six authors chose six totally different dimensions, which is a very interesting thing. For instance, there are dimensions from product and human resources to technology and partnership. Every dimension gives only one outcome, therefore, every dimension plays a significant role in the degree of digital maturity.

The implementation of innovative strategies is a key factor in driving business growth (Červinka, 2022). In the Basque region of Spain, the digital maturity level of SME was evaluated using the DIGROW Framework with the completion of 550 questionnaires (North et al., 2019). A total of 16 surveys were gathered from the HR department of SMEs in Germany for the purpose of measuring digital maturity (Thomas, 2021). A mixed-methods approach was employed in Imbabura, Ecuador, the first is the qualitative gauge of the process of adaptation, and the second is the quantitative determination of maturity degree (Reascos et al., 2022).

A maturity framework model for hotels at the micro and small enterprises level was constructed by conducting quantitative and qualitative analysis, and it was considered strategic planning, structure, digital innovation and proficiency, and unified business operation (Ka et al., 2023). Another approach to measuring the digital maturity of SMEs is a self-evaluation framework that means there is no need for external support to evaluate the maturity of the company (Viloria-Núñez et al., 2022).

The digital transformation of business consists of three dimensions: commerce, innovation, and society in the past, present, and future (Naskali et al., 2018). In the context of SMEs in the Czech Republic, the impact of digital maturity on companies was investigated through an online survey of 73 participants and analyzed via the R program (Červinka, 2022). A multi-criteria model was developed to assess the digital maturity of SMEs (Borštnar & Pucihar, 2022) (TOPSIS, MOORA, VIKOR) Multi-Criteria Decision-Making methods are used to assess the maturity of digital (Brodny & Tutak, 2021).

The effectiveness of digital transformation is contingent on the digital maturity of organizations (Sándor & Gubán, 2021). The findings indicate that, in the Basque region of Spain, the smaller the company, the lower the digital maturity level of the SMEs. (North et al., 2019). HR departments of SMEs in Germany still encounter challenges in deploying digital transformation (Thomas, 2021). The operational workflows and client interactions of SMEs in Imbabura, Ecuador, are the most difficult dimensions (Reascos et al., 2022).

In the context of SMEs in Indonesia, there is evidence of low-level digitalization in workflows, planning, innovation, and alignment dimensions; only human resources are most appropriate for the digitalization (Rafiah et al., 2022). The digital maturity capability index for Kampong Digital Suci Rahayu and Binong's yielded scores of 2.62,3 and 2.36 respectively, with a maximum possible score of 4.0 (Ramantoko et al., 2018). The result of the research conducted in SMEs in the Czech Republic indicated a positive correlation between the higher innovation degree and the higher level of digital maturity (Červinka, 2022). In the case of Italian SMEs, it was found that top management attitudes play a significant role in the digital transformation (Ariazzi, 2020).

It is inevitable that limitations exist always, they occur because of sample size and the inability to control the circumstances in which the data is gathered (Červinka, 2022). A number of limitations are present in the case of German SMEs, the first is the qualitative analysis of the context-specific nature and uniqueness of SMEs in the German economy, the third is the assumed return example, and lastly, cases and calculations are presented post-implementation (Pfister & Lehmann, 2023). The limited IT knowledge of respondents and prior literature are counted as limitations for researching the digital maturity of large enterprises (Hägg & Sandhu, 2017).

In conclusion, the assessment of digital transformation is essential for both large enterprises and SMEs, it serves as a guide for further development (Yezhebay, 2021; Kljajić Borštnar, 2021). There were different dimensions to evaluate maturity. Effective digital transformation means a higher degree of digital maturity, which leads to higher organizational performance (Sándor, 2021; Červinka, 2022).

3.3 Digital Transformation and Maturity in Different Fields

Digital transformation is a key development trend and is impacting significantly on various industries by eliminating barriers among individuals, enterprises, and technology (Schwertner et al., 2017; Tutak & Brodny, 2022). The integration of digital technologies leads organizations to find solutions and opportunities, from complexity to chance, for sustaining competitiveness and facilitating profitable expansion (De Carolis et al., 2017). Furthermore, it enables the offering of novel products and services and doing business efficiently (Schwertner et al., 2017). In order to evaluate the situation of digital transformation, it needs a specific maturity model (Sari et al.,

2023). It is used for the purpose of analyzing the current state of digital performance and the readiness of organizations (Kuusisto et al., 2021).

Further, it reviews the literature on digital transformation and digital maturity in different sectors, which are manufacturing, healthcare, retail, financial services, education, and the public sector.

3.3.1 Manufacturing

At the present time, one of the most critical subjects for the manufacturing sector is digital transformation (Jones et al., 2021). The impact on manufacturing companies is multifaceted, including promoting sustainable development and growth of the economy, strength, competitiveness, and productivity (Sui et al., 2024). The success factors of implementing digital transformation depend on three important dimensions, which are technological, organizational, and environmental factors (Vogelsang et al., 2018).

Nevertheless, the digital transformation of the manufacturing sector is not just adopting new technology, investing in hardware, and upgrading current systems, the vital process here is the digital transformation strategy (Albukhitan, 2020). However, the implementation of projects presents a number of challenges, including organizational, environmental, technical, skills shortage, intersection of digital technologies, and servitization (Vogelsang et al., 2019; Paschou et al., 2020). Therefore, to successfully deploy digital transformation in manufacturing companies, two strategies are suggested: The Sustaining Digital Transformation Model focuses on process enhancement, and the disruptive digital transformation model focuses on fundamental transformation in the system of a company (Rossini et al., 2021).

The digital maturity of manufacturing companies is a crucial thing for the development of companies and the economy entirely in the digital age (Šikýř et al., 2022). It was tested the digital maturity of manufacturing companies in Taiwan, and most of the 80 companies results show that they are immature or partially mature (Lin et al., 2020).

3.3.2 Healthcare

As with other fields, the healthcare system has substantial advantages in implementing digital transformation (Haggerty, 2017). And currently, it is not just a relationship between doctor and patient as a traditional, there is a multifaceted network involving human and inhuman entities, including the database and information system of a hospital, digital records and electronic cars of health, assisting websites, apps, and technologies (Belliger & Krieger, 2018). Digital

transformation impacts the healthcare system from quality and availability to cost-efficiency and encouraging self-management of health (Berzins, 2024).

Particularly, AI assists in diagnosing and offers opportunities for data analysis, AR enhances performance and reduces the cost of surgery, cloud computing for working with data, blockchain makes patient history more safe; and IoT as software and hardware assist in treating patients in different circumstances (Singh et al., 2021). There are also obstacles in the healthcare system of India, which are insufficient medical and technological facilities, data protection and privacy safeguards, and the absence of health examinations (Inampudi et al., 2024). Despite the barriers, targeted strategies are crucial to resolving these obstacles (Yingngam et al., 2024).

Maturity models are used to assess the present state of development of different sectors and the healthcare field as well, which provides direction for organizing and development (Burmann & Meister, 2021). Evaluation of digital maturity in healthcare is necessary to attain optimal digital health results, and a strategic approach is important (Duncan et al., 2022). Maturity model outcomes offer opportunities to adapt to the digital transformation and level up the digital maturity degree of hospitals (Erdal et al., 2022). There are some obstacles to healthcare digital maturity in Russia, which are legal and regulatory structures, limited investment in healthcare and innovation, and their effect on development and integration in medicine (Grigorieva et al., 2024). To determine the level of digital maturity in hospitals, it was used the methodologies BWM with high priorities and CODAS and MABAC with lower priorities (Nebati & Toprak, 2022).

3.3.3 Retail

All industries have been facing digital transformation, and the retail sector is not exempt. (Ferreira et al., 2020). The development of new technologies impacts retail and consumer relationships, it leads to the transformation of retail companies from a traditional into a digital approach with digital products and services (Meyer et al., 2018). Satisfaction of clients is one of the reasons for the digital transformation in the retail industry (Dutta & Sandhane, 2022). The main object of digital transformation in retail is to facilitate seamless purchasing processes for the client while achieving the highest possible profit (Krymov et al., 2019).

Contemporary circumstances and emerging obstacles are hastening processes of digital transformation (Proskurnina et al., 2021). E-commerce, mobile shopping, and smart technologies threaten traditional retailers and motivate them to adapt innovative technologies. Despite new

approaches to enduring dominance, new players are taking power in the marketplace (Reinartz et al., 2019).

In the real case, it was researched the role of big data or data-driven digital transformation on grocery retailers and ascertained a positive impact in predicting and mitigating the risk of failure (Papanagnou et al., 2022). Framework containing innovation, structural and external, provided analyzing enablers and barriers in digital transformation, the result shows that cloud technologies and data analytics are frontier technologies in the retail industry in South Africa (van Dyk & Van Belle, 2020).

In the case of electricity retailers in Spain, the secret shopper method was used to gather data, and the result of the analysis shows the difference between big retailers and others in the situation of channels (Chaparro-Peláez et al., 2020). To estimate the digital maturity of retailers in Brazil, there are five dimensions, which are plan, sector, procedure, environment, and innovation. The driver dimension of digital transformation in the sector was culture, with a high degree of maturity, and the lower degree of maturity was plan and procedure (Pinto et al., 2023). Another researcher from Brazil analyzed digital maturity with different dimensions of people and leadership, they gathered 260 questionnaires and utilized Partial Least Squares (PLS) (Salume et al., 2021). In the case of Ukrainian retailers, the assessment of digital maturity shows the highest level of significance for sales and communication channels with the website and social media. respectively (Proskurnina et al., 2021). The digital level of ten large retailers in Sweden was in the adopters and collaborators categories (Tavakoli & Mohammadi 2017).

3.3.4 Financial service

Digital transformation affects the financial services industry profoundly (Thottoli et al., 2023). Based on the innovation of technology and the mindset of entrepreneurs to revolutionize the structures of industry and businesses, this is called FinTech in the financial service industry, which has the capability to transform this field (Karagiannaki et al., 2017). Banks focus on being customer-centric because of the necessity of transforming, and digital transformation is a key to this issue (Ditshego, 2018).

The advancement of information and communication technologies (ICT) and robotics substantially enhances the potential of companies in the financial industry (Mavlutova & Volkova, 2019). For

instance, in the upcoming decade, the market for European Fintech will be AI, DLT, smart contracts, and the computing of quantum, particularly back, middle, and front bank offices, which will be greatly changed (Butler, 2020). Another benefit of digital technology in the financial industry is that it enhances information exchange and lowers the costs of transactions between different financial services (Feyen et al., 2021).

Moreover, the impact of digital transformation on financial institutes was researched based on a systematic literature review, quantitative analysis, and qualitative analysis in the case of EU and Baltic countries, and it was found to have effects on sustainable development and a positive effect of digital payment on access to financial services and streamlined operations (Mavlutova et al., 2022). And there are challenges encountered by financial institutes, which are regulatory obstacles, cybersecurity risks, and technological gaps (Jejeniwa et al., 2024), but also data privacy and consumer acceptance (Sudarmanto et al., 2024). Despite the hurdles, the rapid growth in public trust in digital finance has improved efficiency, compelling banks to acquire new knowledge and skills to remain competitive in the market (Baskerville et al., 2020).

The degree of digital maturity of a financial company is determined based on quantitative and qualitative information about the services and products of financial institutions (Magomaeva et al, 2020). To assess maturity, the core of digital transformation is digital leadership, trends, skills , strategies, and technologies (Ditshego, 2018). And degree is essential to enhancing the competitive standing of a company; a high degree of digital maturity depends on implementing digital transformation successfully (Kaufmann, 2022). In the context of Indonesia, factors that influence the digital maturity of financial institutes were researched using a structural equation model with Lisrel 8.80 software as a method, and it reveals that digital transformation governance is an important element in achieving a higher degree of digital maturity (Hie, 2019).

3.3.5 Education

Companies digitize their products, services, and business models due to the widespread adoption of computer and network applications, and the education field is no exception (Rodríguez-Abitia, 2021). The structure and content of education were influenced by digitalization (Tulchinsky, 2017). The advancement of technology impacts the transforming system of education (Mukul & Büyüközkan, 2023). Digital technology does not serve as just an instrument; it is a key to opportunities such as pursuing education at any suitable time and ongoing learning (Bilyalova et al., 2020).

The strategy for sustainable management of education serves as a roadmap for digital transformation in the higher education sector globally (Mohamed Hashim et al., 2022). Due to the COVID-19 pandemic, the acceleration of digital transformation processes in education has even raised the question of a fully online university (Rospigliosi, 2020). E-learning allows great prominent access to education for previously no-access populations, resuming adult learners, part-time employees, and remote study opportunities for students (Cahyani et al., 2023). The pace of technological advancement is higher than that of educational programs, therefore, it is necessary to get knowledge from external sources frequently (Tulchinsky, 2017). In Society 5.0, the role of digital transformation in education was examined by students from 120 universities, and the outcome demonstrated a positive effect (Ydyrysbayev et al., 2022).

To evaluate the degree of proficiency and assist in guiding digital transformation in education, a maturity model is needed (Wu et al., 2023) to facilitate the impactful deployment of digital transformation (Kupres et al., 2022). It was researched the digital maturity of the university by using the Deloitte and TM forum models; the higher degree of maturity was technology and lower culture and organization (Hoang et al., 2023). As a different approach, it was developed as a maturity model for higher education organizations, DMMHEI, which consists of two components: impacting factors and evaluation instruments (Đurek et al., 2019). In Croatian schools, it was determined that the digital maturity level was determined based on the integration of information and communication technologies (Balaban et al., 2018).

3.3.6 Public Sector

Digitization is the most prominant and hopeful topic of the past decade, businesses invest and endeavor a lot to digitize procedures, goods, and services (Kokkinakos et al., 2016). And many governments prioritize digitizing public services as an imperative need currently (Alvarenga et al., 2020). And at the core of the initiatives are internal and external users (Mergel et al., 2018). It impacts businesses, boosts citizen engagement, and stimulates economic growth by enhancing the operation of government through digitization (Alvarenga et al., 2020), moreover, citizens are key stakeholders in the processes of digital transformation (Kitsios et al., 2021).

To change classic government to modern government, bid data is considered a capability instrument that provides quick access to open and responsible trouble-free public institutions (Sarker et al., 2018). And there are challenges identified, which are restricted budget funding,

shortage of skilled personnel, inadequate norms and frameworks, technological regulations, and benchmarks (Belyakova, 2021).

It researched the present situation of the e-government in the case of Uzbekistan, conducted quantitative and qualitative data, examined legacy and policy documents and websites of public agencies, and revealed minimal community involvement in the early stages of transactional services, despite the significant e-government ratings of international organizations (Kuldosheva, 2021). It was analyzed by conducting an online survey on the role of cloud computing in the public sector of Saudi Arabia, and outcomes show that the primary obstacles are security, privacy, and governance deficits, as well as an absence of knowledge for some institutes (Al-Ruith et al., 2018). In the context of the Moroccan public sector, the Technology-Organization-Environment Framework assessed the adoption of digital technologies based on secondary data, and the results show that indexes of human capital and online services were lower than the world average (Nachit et al., 2021).

There is a positive impact of blockchain technology on the trust of public institutions (Treiblmaier & Sillaber, 2020). In the digitalization process, one of the essential strides is the evaluation of digital maturity (Nerima & Ralyté, 2021). Because it determines the future development of digital transformation in public organizations (Kafel et al., 2021).

The digital maturity of the public sector was researched in the case of the Sweden based Citizen Centricity, Leadership, Digital Toolbox, Security, and Sustainability domains (Cramner, 2021). Maturity of e-governance in Denmark was ascertained by email response speed and qualities of government institutes, and one-third of central public organizations did not respond, and about 80% gave either no response or incomplete ones (Andersen et al., 2011).

In summary, digital transformation and digital maturity topics touch every industry and each field, facing challenges and opportunities. Despite these challenges, digital maturity evaluation and strategy planning are essential elements for improving digital transformation and achieving sector-specific goals in every different field. (Burmann, 2021; Nerima, 2021).

4. Research Methodology

This part provides the whole procedure for conducting the research part of the master thesis; therefore, it includes research design, population and sampling, data collection methods, data analysis techniques with quantitative and qualitative data, and ethical considerations. Further, it explains the whole procedure of the master thesis research in detail.

4.1 Research Design

It is well known that research aims to give response and discover new knowledge (Marczyk et al., 2010). There are two phases of research strategy, which include quantitative investigation and qualitative exploration parts (Creswell, 2014). According to the study, the majority of studies offer that mixed methods are the best for tackling research inquiries (Malina et al., 2011). The combination of two methods is highly effective (Holton & Burnett, 2005). Further at Table 7, the methodology of papers was analyzed, and the table includes reference, topic, and methodology parts.

№	Reference	Method
1	"The impact of digital transformation" (Tolboom, 2016)	Quantitative
2	"Do or Die: How large organizations can reach a higher level of digital maturity" (Hägg &Sandhu, 2017)	Qualitative and workshops
3	"Multi-Attribute Assessment of Digital Maturity" (Kljajić Borštnar, Pucihar 2021)	Validation of experts Real-life cases

4	"Mapping business transformation in the digital landscape: A perspective maturity model for small enterprises" (Naskali et al., 2018)	qualitative
5	"Measuring Digital Capability Maturity: Case of Small and Medium Kampong Digital Companies in Bandung" (Ramantoko et al., 2018)	quantitative
6	"Analyzing the state of digitalisation in SMEs - A survey based on an SME-specific maturity model" (Wittine et al., 2021)	quantitative
7	"Digital transformation and European small and medium enterprises (SMEs): A comparative study using digital economy and society index data" (Skare et al., 2023)	quantitative

Table 7: Methodologies of Research

Table 7 shows that there are different approaches to research, one paper is mixed methodology, one is only quantitative, and the other is qualitative, which are applicable to research digital maturity in different cases.

This master thesis utilizes digital model, interview, and questionnaire resources developed by (Williams et al., 2024) to research the digital transformation maturity of large enterprises and SMEs in the Kyrgyz Republic. Therefore, it will use mixed methods to measure maturity.
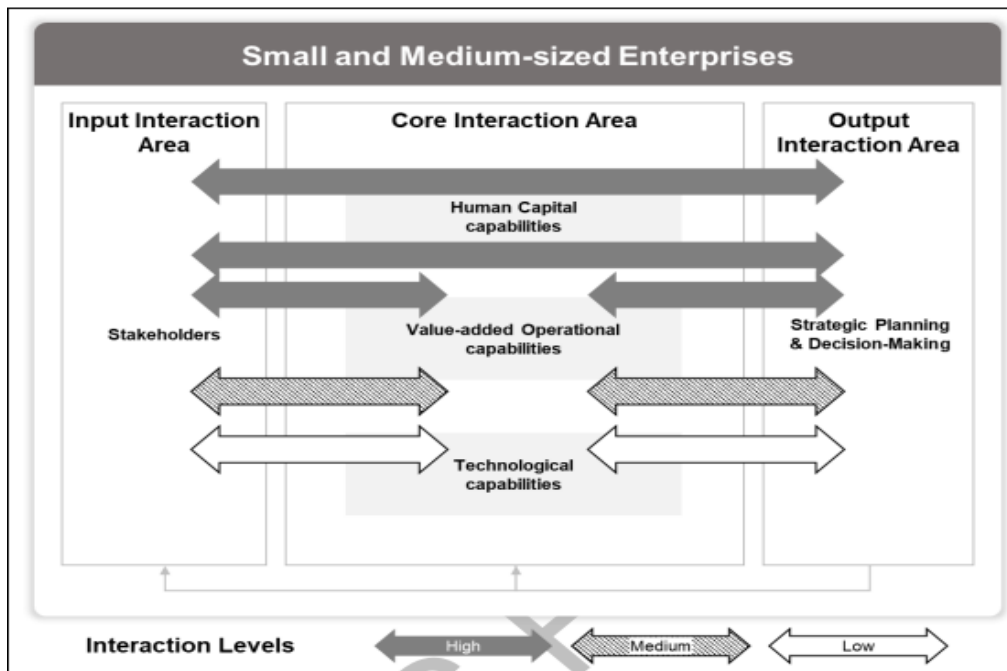
Figure 4: Interaction-based DMM for SMEs

Source: Williams, C., Krumay, B., Schallmo, D., & Scornavacca, E. (2024). Digital Maturity Model for SMEs: Validation Through a Mixed-Method Approach. *Pacific Asia Journal of the Association for Information Systems*, *16*(1), 2.

Figure 4 demonstrates the interaction-based DMM for SMEs (Williams et al., 2024)., and there are three vital areas that identify the digital maturity model of SMEs:

- The first is input that shows interaction of the SME with external actors, such as individuals and companies that offer digital expertise,
- The second area is core, which emphasizes the primary dimensions and competencies of SME.
- The last area is output, which researches the link between crucial inputs and capabilities and their impact on fundamental outputs

This model has been validated through real-life cases and focuses on core digital capabilities that assist enterprises in making operational and strategic decisions (Williams et al., 2024). Moreover, it is consistent with key aspects of the digital maturity model as defined by other researchers, which are present status quo measurement (Merdin et al., 2022), organizational demands for digitalization (Senna et al., 2023), manage effective implementation (Hellweg et al., 2021), and strategize and direct (Alsufyani & Gill, 2021).

The dimensions of the digital maturity model of Deloitte with the TM partnership (Deloitte, 2018), Forrester's Digital Business Maturity Model 4.0 (Gill & VanBoskirk, 2016), the McKinsey 7S

Framework (Demir & Kocaoglu, 2019), and Table 2 "Digital maturity and dimensions" on the literature review are not similiar but they were applied at the same and various cases or sectors. The model of Williams et al. (2023) the interaction-based DMM for SMEs, was used to measure SMEs cases, and this master thesis will be used in the cases of both SMEs and large enterprises.

4.2 Population and sampling

According to Bin and Hui (2021), there are different processes of deployment of digital transformation in SMEs and large enterprises. Therefore, the focus of the master thesis is large enterprises and, at the same time, small and medium enterprises. In order to measure the digital maturity of the organizations, but also compare SMEs and large enterprises processes of digital transformation. Therefore, as a population, all large enterprises and SMEs in the Kyrgyz Republic took part in the research, independent of the size and direction of the organizations.

The total number of participants was more than 30 in the first quantitative phase. Random sampling was used to determine 16 companies based on totally different production, size, and direction. It was conducted only with 16 companies.

4.3 Data collection method

The data gathered from the beginning of May to the 15th of June took a total of about 1.5 months, and it is primary data. As a distribution path, Facebook was chosen because it is one of the most popular social networks in the Kyrgyz Republic. The online questionnaire was collected using a Google survey, and interviews were conducted online as well, due to the long distance between Germany and Kyrgyzstan. It was used via Zoom and WhatsApp as software and recorded all results. After recording, the results were transcribed and translated from Kyrgyz and Russian to English.

4.4 Data analysis techniques

There is all the detailed information about quantitative and qualitative approaches.

4.4.1 Quantitative

Quantitative methods are approaches based on numerical data and measureable factors to find, anticipate, and regulate phenomena (Helmold et al., 2019). It provides in-depth and detailed insights regarding a group or sample (Holton & Burnett, 2005). For the quantitative part of the survey, there are a total of 16 surveys, which include different parts, from the demographic features of participants to specific digital maturity questions.

To measure digital maturity, four subscales which are *com_abi*, *enter_gap*, *s_abi*, and *o_abi* (Williams et al., 2024).

The common digital capabilities of SMEs (*com_abi)* item focuses to gauge vital for SMEs. Respondents were required to evaluate digital capabilities by choosing the right word to complete the statement.

Example for *com_abi*

When our organization develops its strategy, it _____ considers future digital innovations.

There are five options which are a)can't b) should c) needs to d) wants to or e)can, and responces were coded between 1 and 5. To ensure consistent score with other quantitative results, they were divided by 6.

The digital gap analysis of SMEs (*enter_gap*), this item evaluates digital drivers for the moment and future to identify disrepancies.

This (*enter_gap*) includes two parts, which are organization and culture. In the case of organizations, there are seven options. 1) strongly disagree, 2) disagree, 3) somewhat disagree, 4) undecided, 5) somewhat agree, 6) agree, and 7) strongly agree, and the scale is between 1 and 7, respectively. Culture has five variances, which are: 1) not at all; 2) once in a while; 3) sometimes; 4) fairly often, and 5) frequently, if not always. Here is five scales from 1 to 5.

The digital strategic capabilities (*s_abi*) and the digital operational capabilities (*o_abi)* assess the strategic and operational aspects of SMEs capabilities. In the case of *s_abi,* respondents were chosen between 0 and 100, to provide a consistent score with other quantitative results, they were divided by 1300 because the maximum *s_abi* equals 1300. And *o_abi,* respondents chosen between 0 and 100 to provide a consistent score with other quantitative results, were divided by 300 because the maximum *s_abi* equals 300 (Williams et al., 2024).

Subscales	Questions
com_abi	- Can't=lack the ability - Should=Need to (in my view) - Need to=Need to (organization's view) - Want to=A desire evident - Can=Possesses the ability

enter_gap	- My company focuses on encouraging and developing the adoption of digital business and engagement. - What differences does your company need to develop and attain?
s_abi	The degree of responsibility, importance, and capability of digital transformation in a company must be estimated before discussing the digital transformation of the company.
o_abi	- Please evaluate the degree of responsibility for the digital processes. - Please evaluate the importance of digital processes. - My organization has the capabilities to develop and implement an exceptional digital strategy.

Table 8: Subscales

A questionnaire was developed based on four parts, which are demographic, the capabilities of digital technologies, present and upcoming digital opportunities, and the general and upcoming importance of digital technologies (Williams et al., 2024).

We conducted an online questionnaire, we used Google Survey as a platform, It takes about 30 minutes to complete the survey, and we could gather more than 30 respondents who represent large enterprises and SMEs in the Kyrgyz Republic. There is α greater than.75, .75 demonstrates strong reliability and provides minor modifications to the questionnaire (Williams et al., 2024).

4.4.2 Qualitative

To evaluate social phenomena, the qualitative method serves as a comprehensive path (Marshall & Rossman, 2014). It is worth conducting this method because it provides a deep explanation of complex occurrences, surveillance of unique and unanticipated events, emphasizing experiences as individuals with different backgrounds and roles, highlighting the voices of those infrequently heard, developing theories and generating hypotheses, and advancing direct description (Sofaer et al., 1999). Qualitative methods play a significant role in the social sciences field, and there are three paths to conducting research: interviews, focus groups, and observation (Given, 2008).

It was noted the importance of the semi-structured interview to identify the level of digital maturity as HDM, MDM, and LDM in the case of SMEs (Williams et al., 2024). But also, quantitative methods were used to measure the digital maturity of businesses (Hägg & Sandhu, 2017; Naskaliet al., 2018).

The interview consists of three levels, which are strategic, operational, and technological. The questions are about present comprehension at three levels, experiences and a view of the future (Williams et al., 2024). It was conducted through interviews, and there are different scales of

management who represent the large enterprises and SME in the Kyrgyz Republic. Only one interview was conducted in English, two in Russian, and others in Kyrgyz.

Interview results were coded by two coders, and the results of coding determined LDM, MDM, and HDM. The software used was MAXQDA Version 2020.4.1, and it analyzed more than 1000 codes.

Maturity levels	Maturity level	Clusters
SME	High	D3, D4, D11,
	Medium	D5, D6, D7,
	Low	D1, D12, D16, D8,
LE	High	D2, D4, D10
	Medium	D15, D14, D13,
Table 9: List of HDM, MDM, and LDM SME and LE		

Table X demonstrates the maturity levels of the participating enterprises. Among SME, there are high, medium, and low digital maturity levels (N = 10). In the case of large enterprises, there are only high and medium level enterprises, it was not identified as a company with a low digital maturity level (N = 6).

4.5 Ethical considerations

Participants were informed in advance about the procedure of the survey and interview. From our side, we guarantee the confidentiality of all the gathered data. It was not the real name of the companies; they were coded, for instance, as 16 companies, and they were numbered from 1 to 16. Most companies do not want to share information about them.

5. Research findings

This section will present the results of the quantitative and qualitative analyses. The first paragraph serves an informative function, and it includes descriptive information about the large enterprises and SMEs of the Kyrgyz Republic. The second paragraph presents the results of the online survey, where the outcomes are divided into SMEs and large enterprises by categorizing HDM, MDM, and LDM clusters. The last paragraph presents the results of the interview, which illustrate the codes derived from the interviews. Additionally, there are short interview texts framed by a digital maturity model.

5.1 Overview of the Large Enterprises and SMEs of the Kyrgyz Republic

A total of 16 companies from the Kyrgyz Republic took part in the master thesis research. Appendix B provides information on the cluster, age, gender, education, position, duration, and sector of the companies. The mean age of respondents was 34 years, with a minimum level of education being a bachelor's degree and the highest level being a PhD. The majority of respondents were in senior or executive management or employees with managerial responsibilities. Participating companies represent totally different sectors, from education and insurance companies to manufacturing, information technology, and communication.

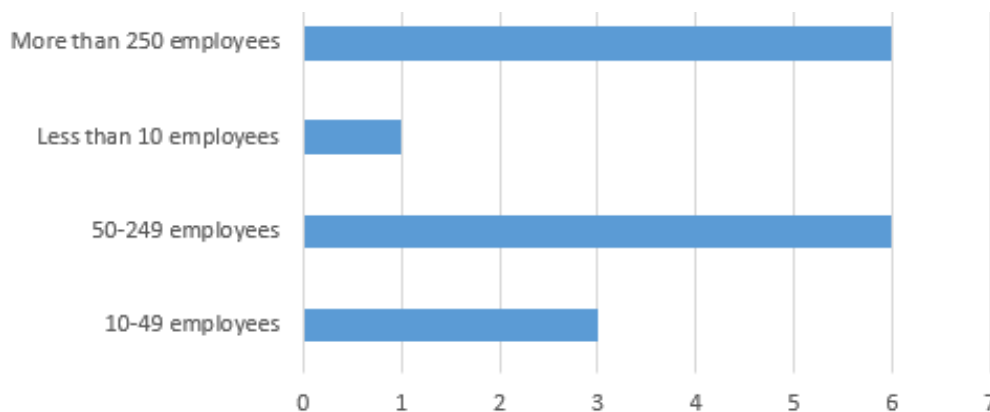**Figure 5**: The number of employees working in organizations.

Figure 5 demonstrates the size of the participating companies based on the number of employees, Of the participating companies, 6 companies have between 50 and 249 employees, and another 6 companies more than 250 employees. 3 companies fall into 10-49 employees category, and the least number of participants is less than 10 employees category.
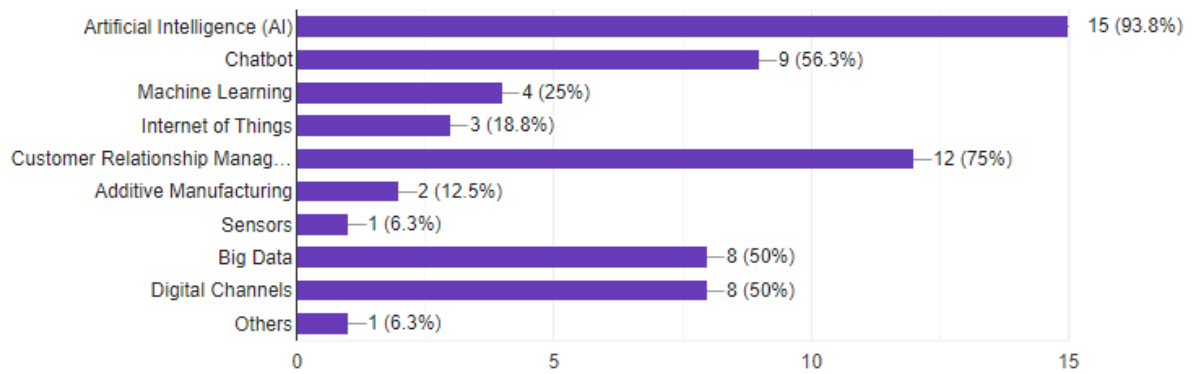
Figure 6: The most important technologies over the next 3-5 years

There is one question on the survey regarding companies most important technologies for upcoming next 5 years. Artificial intelligence, chatbots, and customer relationship management technologies were mostly chosen by organizations, and machine learning, the internet of things, additive manufacturing, and sensor technologies were not a priority for the future.

5.2 Quantitative Findings

The quantitative findings section presents a descriptive analysis of the online survey. There are subscales; *com_abi,* current and future *enter_gap, s_abi* and *o_abi*. And clusters divided to the three categories 1) HDM, 2) MDM and 3) LDM based on the digital maturity model (Williams et al, 2024).   Table   X *com_abi* demonstrates of evaluation of the digital capabilities of the large enterprises and SMEs by categorizing HDM, MDM and LDM clusters. It considers these clusters separately in the case of SME and LE. The gap between score will be on the Appendix B.

The comparison between the HDM SME and MDM SME capability items shows significant differences in their capability ratings. The HDM SME cluster demonstrates higher ratings in strategic, digital initiatives, risk acceptance, cross function, digital knowledge utilisation, resource allocation and facilitation capabilities. However, the MDM SME capability items reveal higher ratings in innovation, effective recruitment and location- based capabilities.

In the case of the MDM SME and LDM SME, the MDM SME capability items show in strategy, innovation, continuous learning, cross-functions, effective recruit, location-based, providing employee resource and facilitating abilities. In contrast the LDM SME capability items demonstrate higher ratings in digital initiatives, accepting risk abilities.

All capability items of HDM SME were higher than LDM SME, the most highly rated capability items were strategy, digital initiatives, accepting risk, effective recruiting, providing employee resources and facilitation abilities. It was indicated a significance gap of capability items rating in strategy, innovation, effective recruiting and facilitating abilities.

There are significant differences between HDM LE and MDM LE capability ratings, particularly in strategy, innovation, digital initiatives and providing employee resource abilities. Thus, enhancement of these elements lead shift large enterprises from medium maturity position to high maturity position.

Overall, there are some common capability ratings between HDM LE and HDM SME, at the both of clusters highest-rating were in strategy, accepting risks and providing resource capabilities.

Subscale	Items	Clusters				
		HDM		MDM		LDM
		LE	**SME**	**LE**	**SME**	**SME**
com_abi	Strategy abilities	0.81	0.67	0.70	0.6	0.57
	Innovation abilities	0.79	0.58	0.67	0.63	0.63
	Digital initiatives abilities	0.79	0.67	0.67	0.57	0.55
	Accepting risk abilities	0.81	0.67	0.79	0.58	0.6
	Continuous learning abilities	0.67	0.63	0.58	0.63	0.6
	Cross-functions abilities	0.67	0.49	0.63	0.45	0.42
	Effective recruit abilities	0.70	0.67	0.6	0.70	0.5
	Utilizing digital knowledge abilities	0.67	0.61	0.58	0.6	0.52
	Location abilities	0.63	0.47	0.58	0.53	0.43
	Providing employee resources abilities	0.79	0.67	0.70	0.63	0.55
	Facilitating abilities	0.70	0.67	0.70	0.58	0.53

Table 10: Results of com_abi

Table *enter_gap* demonstrates future and current digital drivers for larger enterprises and SMEs, categorized by HDM, MDM and LDM cluster scores. The significant gap exists between current

drivers for the HDM SME and MDM SME, particularly in the area of the evaluation processes, workforce motivation, and promotion opportunities. Notably, MDM SME exhibit a higher requirement for current digital driver related to management and discouraging embracing digital instruments was higher compared to HDM SME.

A trend was observed regarding current digital drivers between HDM SME and LDM SME, with only significant differences being in promotion opportunity, which is scored zero in case of LDM SME. Required by management item of LDM SME was higher than HDM SME. For HDM SME requirement of management is not important driver than LDM SME.

For, HDM LE revealed the highest scored current digital drivers are component of evaluation process and promotion opportunities. In the case of HDM SME additional current digital drivers were anticipated drive from workforce and fostering digital engagement. In contrast, discourage embracing digital instruments and doubtful drivers were scored zero for both of them.

In the case of future digital drivers, HDM SME identified goods and services and IT as most significant future drivers, whereas MDM SME rated strategy and innovations higher. For LDM SME good and services, and administrative direction were most critical future digital drivers.

When comparing future digital drivers between the HDM LE and MDM LE, customer experience and strategy were highest drivers for HDM LE. Other drivers were on the same tendency. Administration, staff and activities future digital drivers were the same rated for both HDM LE and MDM LE.

There is a difference between HDM LE and SME future digital drivers, for instance LE scored strategy highest score and SME chose good and services. MDM LE emphasized client experience, strategy, structure and procedure as most significant future digital drivers. For MDM SME offering, strategy and innovation were high-rated drivers.

Views	Subscales	Items	Cluster score				
			HDM		MDM		LDM
			LE	**SME**	**LE**	**SME**	**SME**
		Discourage embracing digital instruments	0.00	0.00	0.00	0.17	0.17

Curre nt	*enter_gap*	Required by management	0.50	0.33	0.67	0.50	0.50
		Component of the evaluation processes	0.84	0.67	0.50	0.33	0.33
		Appreciation	0.67	0.33	0.50	0.33	0.17
		Monetary rewards	0.67	0.33	0.67	0.33	0.17
		Anticipated drive from workforce	0.67	0.50	0.67	0.17	0.33
		Promotion opportunities	0.84	0.50	0.50	0.17	0.00
		Fostering digital engagement	0.67	0.50	0.33	0.50	0.33
		Doubtful	0.00	0.00	0.00	0.00	0.00
Future	*enter_gap*	Client experience	0.83	0.50	0.67	0.33	0.33
		Offering	0.67	0.67	0.50	0.50	0.50
		Strategy	0.83	0.50	0.67	0.50	0.17
		Administration/directi on	0.50	0.50	0.50	0.33	0.50
		Partnership	0.67	0.50	0.33	0.17	0.17
		Environment	0.50	0.33	0.33	0.33	0.17
		Staff	0.50	0.50	0.50	0.33	0.17
		Structure	0.67	0.50	0.67	0.33	0.33
		Procedure	0.84	0.50	0.67	0.17	0.17
		Activities	0.50	0.33	0.50	0.33	0.17
		IT	0.83	0.67	0.57	0.17	0.17
		Innovations	0.57	0.50	0.57	0.50	0.33

Table 11: Results of enter_gap

Table 11 *s_abi* and *o_abi* illustrate the strategic and operational capabilities of LEs and SMEs. HDM SME scored higher in digital significance and capabilities than MDM SME, but MDM SME digital responsibility scored higher than HDM SME. The three variables of strategic ability scored significantly lower in LDM SME than HDM and MDM SME.

o_abi subscale demonstrates that HDM SME scored highest in digital cooperation and operation variables, lowest in digital culture and professionals variables. MDM SME scored highest digital operation and cooperation, the lowest digital client experience and IT solutions. LDM SME scored highest in digital cooperation and operation variables and lowest in digital plan professionals and deployment. Interestingly, highest in digital cooperation and operation variables were for all of them HDM, MDM and LDM.

For HDM LE scored highest in digital cooperation, culture and abilities of digital transformation, deployment and initiatives management. In the context of MDM LE digital cooperation, goods and services rated significantly.

In comparison, HDM LE outperformed HDM SME in broader range of variables which are digital cooperation, culture, and digital transformation, deployment and initiatives management abilities.

Subscales	Variables	Cluster				Gap
		HDM		**MDM**		**LDM**
		LE	**SME**	**LE**	**SME**	**SME**
s_abi	Digital accountability	0.82	0.67	0.67	0.78	0.64
	Digital significance	0.78	0.83	0.67	0.82	0.65
	Digital abilities	0.69	0.69	0.65	0.67	0.61
o_abi	Digital client encounters	0.27	0.25	0.24	0.20	0.24
	Digital offerings	0.27	0.24	0.27	0.21	0.22
	Digital plan	0.25	0.25	0.23	0.23	0.20
	Digitally mature	0.27	0.24	0.26	0.24	0.21
	Digital operations	0.26	0.26	0.26	0.24	0.26
	Digital cooperation	0.29	0.27	0.27	0.22	0.26
	Digital IT solutions	0.27	0.24	0.23	0.2	0.24
	Digital culture	0.28	0.23	0.25	0.22	0.25
	Digital professionals	024	0.22	0.23	0.22	0.2
	Abilities of digital transformation	0.28	0.25	0.2	0.23	0.22
	Abilities of digital deployment	0.28	0.25	0.24	0.22	0.21
	Abilities of digital initiative management	0.29	0.25	0.24	0.23	0.25

Table 12: Results of s_abi and o_abi

5.3 Qualitative Findings

The qualitative finding part presents an evaluation of the digital transformation maturity of large enterprises (LEs) and SMEs in the case of the Kyrgyz Republic, following the DMM framework for SMEs by Williams (Williams et al., 2024). The analysis is based on five tables covering key subdimensions and HDM, MDM, and LDM clusters for both SMEs and larger enterprises. Every cluster includes code-derived semi-structured interview results, which serve as factors in further evaluation.

The stakeholder table, part of the input interaction area, highlights how SME engages with partners by utilizing CRM, cloud computing, monitoring, and digital instruments. These factors contribute to SMEs advancing to the HDM level. There are no significant differences between HDM SME and MDM SME, it is also mostly about using different technologies, such as UDS, KPI, and 1C technologies, but the general functions are the same.

For LDM SME, the two factors show a lower degree, which are the lack of an internal IT department and regular digital collaboration. Addressing these two factors is important for leveling up maturity.

In the case of HDM LE, there are totally different factors, which are omnichannel capability in the house IT department, cross-departmental collaboration, proactive IT advisory, and cross-departmental IT training. MDM LE shares the same factors as MDM SME, with the main difference being the specific technologies used. It was indicated that there was the same difference of stakeholders between HDM and MDM in both SMEs and large enterprises.

The primary distinction between HDM SME and HDM LE stakeholders lies in the engagement of external and internal partnerships. HDM SME prefers external resources, for instance, outsourcing for digital expertise and the use of CRM and cloud technologies. HDM LE utilizes internal resources such as internal IT staff and cross-departmental collaboration and IT training.

There are no significant differences between MDM SME and MDM LE, both of them work with external partners.

Overall, digital capabilities regarding stakeholders play a significant role in determining the cluster level of HDM, MDM, and LDM SMEs and LE. The different capabilities are illustrated as internal and external factors at the stakeholder table.

Input Interaction Area		
Stakeholders		
SME		
HDM	MDM	LDM
- CRM utilization - Real-time data processing - International Collaboration for Digital Innovation - Outsourcing for Digital Expertise - Use of cloud technologies - Real-time vehicle monitoring	- Use of digital learning platforms - KPI for digital technologies - Logistic control - Use of CRM, 1C - Adoption of the UDS program - Building and utilizing CRM systems	- Lack of an internal IT department - Lack of regular digital collaboration
Large enterprises		
HDM	MDM	
- Omnichannel Capability - Inhause IT Department - Cross-departmental collaboration - Proactive IT Advisory - Cross-departmental IT training	- Use of mobile applications - Reliance on external expertise - Use of digital communication tools - Digital CRM and Social Media Presence - Use of AI for marketing	
Table 13: Results of Stakeholders		

The human capital capabilities table demonstrates factors related to the human potential in SME and LE, there are also categorized HDM, MDM, and LDM clusters. HDM SME shows as the human capability: trend scouting, digital development, driving innovation, and the attitude of management toward digital transformation. They reflect that the company invests in research and development.

In contrast, LDM SME shows a weaker human contribution to the digitalization of SMEs, marked by factors such as manual data access and a lack of staff for early-warning incoherent digital familiarity. These factors are clear indicators of lower digital maturity.

HDM LE indicates high-level potential in human, for instance, involvement in digital products, designated stages of digital transformation, and continuous skill development are significant factors.

There are no major differences between MDM SME and MDM LE. However, HDM SME and HDM LE differ significantly, in the case of HDM LE, it exhibits fully realized human potential and knowledge development, which are employee involvement in digital products, designated digital transformation staff, continuous skill development in digitalization, and capability for digital product prototyping.

Core Interaction Area		
Human capital capabilities		
SME		
HDM	MDM	LDM
- Digital skills as a hiring criterion - IT Staff for Trend Scouting - Positive management attitude - Employee digital skills development - Capability to drive innovation	- Capability for digital testing - Employee involvement in digital tools - Proactive technology scouting - Employee engagement in digital - Proactive digital observation	- Manual Data Access - Lack of Staff for Early Warning - Incosistent digital familiarity
Large enterprises		
HDM		MDM
- Data Analytics Capability - Employee involvement in digital products - Designated digital transformation staff - Continuous skill development in digitalization		- Employee familiarity with digital tools - Analytical capabilities - Training for digital adoption

● Capability for digital product prototyping	

Table 14: Results of human capital capabilities

The second dimension of core interaction is value-added operational capabilities, which are assessed in SME and LE across HDM, MDM, and LDM clusters. SME HDM demonstrates strengths in customer segmentation, adoption of digital technologies, and digitalization of administration processes. The primary differences between SME HDM and SME MDM are the adoption of digital tools and process automation.

On the other hand, LDM SME shows lower maturity compared to HDM and MDM, with limited potential due to a lack of data insight derivation, consumer data, resources, and exploring innovative technologies. These factors influence the maturity degree of companies negatively.

HDM LE excels in the allocation of resources for digitalization, regular improvement, and automation of processes. Compared to the HDM SME, it shows greater potential for providing resources and regularly improving. MDM LE and MDM SME exhibit almost identical factors on the digital transformation journey.

Core Interaction Area		
Value-added operational capabilities		
SME		
HDM	**MDM**	**LDM**
● Customer segmentation using CRM ● Regular meetings for digital projects ● Readiness to adapt digital technologies ● Digitalization of Administrative Processes	● Proactive opportunity scouting ● Adoption of digital tools ● Evaluation of digital processes ● Assessment of Digital Processes ● Full process automation	● Lack of digital business models ● Lack of data insight and derivation ● Lack of consumer data ● Resource Limitation ● Limited Exploration of New Technology ● Lack of early warning systems ● Lack of resources and time
Large enterprises		
HDM	**MDM**	

● Resource allocation for digitalization ● Regular process improvement ● Process automation ● Essential Digital Services	● Shift from non-digital to digital channels ● Ability to customize digital processes ● Data handling ● Importance of innovation scouting ● Embracing digitization ● Evaluation of digital processes

Table 15: Results of Value-Added Operational Capabilities

The last dimension of the core interaction area is technological capabilities. This table demonstrates the technological strengths of SME and LE at the HDM, MDM, and LDM levels. SME HDM and MDM contain similar factors, mostly utilizing various technologies. In contrast, LDM is characterized by negative factors such as a lack of advanced technologies, digital tools, and data analysis instruments.

When comparing HDM SME and HDM LE, there are some similar factors, which are the adoption of the latest technologies, a leadership in digital innovation, and other digital technology capabilities that are closely aligned as well. A similar trend is observed between MDM SME and MDM LE, where technical capabilities are nearly the same.

Core interaction area		
Technological capabilities		
SME		
HDM	**MDM**	**LDM**
● Evaluation of New Technologies ● Adoption of the latest digital technologies ● Leadership in digital innovation ● Full-remote education capabilities	● Timely reaction to market changes ● Real-time data evaluation	● Limited remore work capability ● Lack of advanced technology use ● Lack of data evaluation tools ● Lack of systematic early warning ● Non-Automated Data Analysis ● Lack of measurement tools
Large enterprises		
HDM	**MDM**	
● Adoption of emerging technologies	● Assessment of new technologies ● Effective technology utilization	

● IT infrastructure upgrades ● Rapid testing and modification ● Consumer Data Analysis ● Adoption of the latest digital tool	
Table 16: Results of Technological Capabilities	

The last dimension is strategic planning and decision-making, which belong to the output interaction. The table illustrates the role of strategic planning and decision-making in SME and LE. The most notable difference between HDM, MDM, and LDM is the number of factors involved, the higher the maturity degree, the more diverse the strategic planning and decision-making factors.

HDM SME mainly has strengths in long-term and strategic planning factors such as strategic digital planning, learning from mistakes, and investing in digital technologies. In the case of MDM SME, it emphasizes current planning and decision-making on the digitalization path, for instance, openness to discuss mistakes, flexibility in digital offerings, and implementation of digital plans.

The same trend is observed in HDM LE and MDM LE. HDM LE includes more strategic factors than MDM LE, and it emphasizes current decisions, which include willingness to take risks, use innovative solutions, focus on customer-centric innovation, and regular review of digital initiatives.

Output Interaction Area		
Strategic planning and decision-making		
SME		
HDM	**MDM**	**LDM**
● Market leadership in digital innovation ● Strategic Digital Planning ● Periodic Review of Digital Transformation ● Risk-taking for digital innovation ● Proactive Discussion of Digital Failure ● Personal mission in digital initiatives	● Management's focus on digitalization ● Preference for innovation ● Flexibility in digital offerings ● Openness to discussing mistakes ● Implementation results ● Implementation of a digital plan	● Lack of structured planning ● Lack of digital strategy ● Lack of a distinct digital strategy

● Continuous improvement from mistakes ● Investment in Digital Technologies ● Risk readiness for digital innovation ● Strategic Digital Business	

Large enterprises	
HDM	**MDM**
● Strategic digital planning ● Innovation and risk-taking ● Data-driven decision-making ● Learning from mistakes ● Strategic Mission ● Leadership in Digital Innovation ● Long-term digital transformation planning ● Regular review of digital initiatives ● Mission to innovate digital products ● Risk-taking in digital innovation ● Data-driven strategic decision ● Critical digital goals	● Digital promotion and reporting ● Focus on customer-centric innovation ● willingness to take risks ● Goal of Full Automation ● Decision-making based on data ● Willingness to use innovative solutions ● Positive view of digital impact ● Regular review of digital initiatives ●

Table 17: Results of Strategic Planning and Decision Making

Figure 7: Word frequency

Source: own representation

Figure 7 illustrates most frequent words from the interviews most prominent words are "business", "technologies", "management", "marketing", "company", "digital" and "technologies", but the most infrequent words are not the same.

Stakeholders

  The first dimension is stakeholders; here semi-structured interview results are categorized by high, middle, and low maturity levels.

The HDM level demonstrates a strong capacity to combine various consumer contact channels, guaranteeing smooth service delivery on both digital and non-digital platforms.

"We have digital and non-digital channels with consumers, for example as a traditional we have enough local offices, and as a digital channel, we have hot lines, chat bots and email options. D2"

The MDM level says also all potentional of the orgnizations, for instance internal resource is able to analyze data regarding customers:

"We analyze all data regarding our customers, we have a data analyst and data science specialists who build different graphs. – D10"

The LDM degree demonstrates that utilizing basic approach on working with costumers, though it is one of the important element for the companies:

"We utilize CRM (Customer Relationship Management) systems to manage customer interactions. We also use common office tools like email and various applications. However, unlike large companies, we do not have extensive IT infrastructure or server systems. Our approach is quite basic; for instance, we sometimes use ChatGPT to generate advertisement text, but that's about it. -D1"

Human capital capabilities

It is a second dimension, that shows the capability of humans in organizations.

The HDM states skills and knowledge are essential, particularly learning regarding digital transformation, which can impact a company significantly.:

"I try to learn new digital technologies that can be appropriate for our business. -D 12"

The MDM middle shows the familiarity of employees with digital tools and transformation; thus, knowledge has a positive correlation.

"Employees know about digital instruments and processes D-11."

The low degree of LDM shows a lack of capability in digital transformation, with the statement that human capability:

"We have optimized our operations, which included digitization. For instance, in our database management, where previously three people were employed, now only one person is sufficient due to their proficiency with 1C.-D14."

Value-added operational capabilities

It is the last dimension of the core interaction area, and demonstrates the operational capabilities of the organizations.

The HDM degree shows that deployed digital project and it gives majority of opportunities for the consumers.

"To enhance efficiency, various platforms and programs have been developed to streamline processes and expedite client transactions, minimizing wait times. Our specialized digital banking department provides Internet banking services, allowing clients to conduct operations such as opening accounts without visiting our office. Recently, we have also introduced online lending capabilities to further expand our digital offerings. –D10."

The MDM level demonstrates the capability of making valuable information based on analyzing consumer data:

"We have a CRM system and a UDS system, and we can analyze some findings and insights from the data. -D6"

Technological capabilities

Technological capabilities are the last dimension of core interaction, and it shows utilizing technologies   in   organizations.
The HDM degree shows developing big data and AI in the case of the own company, these technologies show the high technological capabilities of the company.

"We have our own IT staff, they have already started to use and develope Big Data and AI in case of the our company. D2"

The MDM level of technological capability demonstrates the technological potential of the companies, they are developing their own applications and utilizing them in business, this is an indicator of medium maturity.

"We have implemented a specialized application aimed at enhancing consumer trust. This application allows us to track the entire product cycle online, from inception to the delivery of finished products (D15)."

The LDM, or low maturity, lacks or has limited technological potential.

"I don't focus on digitization, but I make efforts to create extensive databases. I aimed to streamline processes by utilizing tools like Google Drive, Excel, and online spreadsheets for easy and immediate access. D12"

Strategic planning and decision-making

Strategic planning and decision-making belong to the output interaction area.

The HDM shows special staff, and there are strategic goals and plans regarding digital transformation.

"We have a special department to answer digital transformation questions, and of course they have strategic plans and goals. -D2"

In the MDM, there are some strategies, but they do not include a digital plan and goals.

"I can identify important consumer features from the data and adjust our marketing strategies accordingly. For instance, if we have more student customers, we can lower our service prices to attract more of them. In short, data helps us make better decisions. -D5"

The LDM degree shows a lack of digital strategy.

"There is no digital-innovative strategy, plan, or goal. -D14"

6. Discussion

This master thesis aimed to identify digital maturity, explore the influencing factors, and compare factors among the large enterprises and SMEs in the Kyrgyz Republic. The study reveals digital maturity levels and significant factors, and it has determined valuable insights and closed the research gap in the context of the Kyrgyz Republic. We analyzed differences between HDM SME, MDM SME, and LDM SME as well as between HDM large enterprises and MDM large enterprises.

The results confirm Bin and Hui (2021) disparity of the digital transformation processes between large enterprises and SMEs. It was identified as a significant gap in analyzing digital capabilities at qualitative analyses. For instance, in the case of stakeholders, the dimension between HDM SME and LE was that HDM SME prefers external resources, and HDM LE utilizes internal resources.

Results confirm Kljajić Borštnar & Pucihar (2021) and Brink & Packmohr (2023) that SMEs are attributed to differences in resource availability. Particularly, LDM SME demonstrated that lack of different digital capabilities leads to a low maturity degree.

Similar to the findings of Williams et al. (2023), the HDM SMEs place emphasis on digital planning and strategy. Additionally, in our results, HDM large enterprises have more focus on digital strategy and digital planning than MDM large enterprises. LDM SME has less digital strategy and planning capabilities, with larger organizations demonstrating higher levels of digital transformation maturity.

Moreover, in the case of stakeholder's similar findings of Williams et al. (2024), in the case of HDM, MDM and LDM SMEs and HDM MDM Larger enterprises emphasized significant role of diversity of stakeholders.

General indicators of the entrepreneurship gaps in current drivers were the same, as in the Williams et al. (2023) results. However, unlike Williams et al. (2023), we found mostly positive entrepreneurship gaps among future drivers between HDM SME, MDM SME, and LDM SME. Moreover, the rate of HDM large enterprises was higher than that of MDM large enterprises.

These research findings have significant implications for enterprises in the Kyrgyz Republic, especially to implement digital transformation projects in organizations, because they will know weak and strong digital capabilities. Furthermore, it was validated as an "interaction-based model DMM for SMEs" in the case of the Kyrgyz Republic, and it was the first time it was used to test for large enterprises.

7.Limitations and Future Research

While the master's thesis provides valuable insights, there are some limitations. The first is sample size, especially among large enterprises. Additionally, even in the case of the Kyrgyz Republic, the participating companies are not subject to the same circumstances, because sectors of participated companies very different, from banking to education sectors.

Another limitation regarding the self-fulfilled surveys is that respondents. For instance, some CEO or manager had limited awareness of or not enough information about digital transformation processes in the organization. Moreover, they can rate digital capabilities very differently.

Future research could attract a great number of large companies and SMEs. Research digital maturity of companies by sectors could give more prices results. Investigating LDM large enterprises is also essential thing for future in the case of the Kyrgyz Republic, because we were unable to attract more large enterprises in our research.

8. Conclusion

This master thesis investigated the digital transformation maturity of large enterprises and SMEs in the Kyrgyz Republic. In the academic field aims to fill a significant research gap, and practical field aims to understand organizations adapting processes on digital transformation in this region. The study found the considerable level differences between large companies and SME. This proves on comparing digital abilities of enterprises on the different dimensions.

The study reveals that there are key factors which influence on digital maturity of organizations, which are strategic planning investment on human and technology capabilities, and organizational culture, by advancing these factors it is possible to achieve higher level.

The results of qualitative analyse show that the more activity regarding digital transformation, the higher degree. The main differences between HDM and MDM in case of larger enterprises were number of digital capabilities especially in the stakeholders, strategic planning and decision-making dimensions.

In the case of technical and human capabilities, HDM SMEs and large enterprises focus on more using advanced technologies and train employees to utilizes latest digital tool and adaption on emerging technologies, which lead companies attain high level of digital maturity.

LDM SMEs need to focus on solving resource issues such funding, skilled workforce and culture of organisation, because these factors can barriers for SMEs. Large enterprises need to focus on digital strategies, which can assist remain competitive in the market, additionally investing on workforce and technologies may be essential for them.

In general, improving digital maturity across all business kinds will be essential to the Kyrgyz Republic's sustained economic growth in the digital era.

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Appendix A

Digital transformation maturity of the large enterprises and SMEs in the Kyrgyz Republic.

Welcome to our study on the Digital transformation maturity of the large enterprises and SMEs in the Kyrgyz Republic!

My supervisor, Prof Dr. Christopher Williams, and I are very excited that you have decided to take part in our study.

The project has two aims :

1) Research current digital transformation maturity in your organization

2) Research current digital transformation processes and leverage technologies

Do you have to take part?

Your participation is entirely voluntary. It is important you understand that you do not have to participate in the project at all and that you can decide to withdraw at any point.

This questionnaire should last between 20-30 minutes. After the questionnaire, we will conduct an interview via video conferencing software of your choice, either by telephone or in person. The interview should last no longer than 60 minutes. The interview will focus on the following areas:

1) General digital initiatives

2) Digital initiatives across different levels of your organization (e.g. strategic areas, operational areas and technologies)

3) Digital success factors

The interview will be recorded to assist in their evaluation. The data from your questionnaire will be used as basis for some of the interview questions. The total amount of time needed to complete the study will be approximately 90 minutes.

How will I analyse data?

After the questionnaire and the interview, the collected data will be analysed using quantitative and qualitative methods. Your questionnaire and data will be analysed quantitatively using statistical analysis. Your interview will be qualitatively analysed by first transcribing the interview and coding the transcription for analysis. The analysis of the data will use Chris Williams' Digital Maturity Model. The results of the study will be reported in a master thesis, which will be held at the library of the Neu-Ulm Universuty of Applied Science in Germany, and is open for viewing. An article may be generated from the study, quality permitting.

Your survey responses will be electronically and securely stored and will contribute to summaries of findings that I may publish or circulate. But your own response will not be identified and will not be shared with any third party, including members of your own institution.

If you have any questions, please feel free to contact me directly.

Enjoy the questionnaire and thank you so much for your participation!

All the best!

Daniiar

There are 36 questions in this survey.

ashirovdaniiar0@gmail.com Switch account

Not shared

Creation of Participant Code

Please create your own individual participant code

I would like to assure you once again at this point that all details are treated confidantially. Your code is only used to allocate the response appropriately and differentiate between other participants. The table below shows you how to create your individual code.

1)First letter of your mother's first name.

2)First letter of your father's first name.

3)Second letter your first name.

4)Second letter of the city you were born.

5)The day you were born

For example

1)Aliia=A

2)Daniiar=D

3)Henry=E

4)Bishkek=I

5)18-July=18

Your individual participant code= **ADEI18**

Please enter individual code participant code here.

Please type in CAPITAL LETTERS

*

Your answer

DEMOGRAPHICS

In the first section, I would like to find out some background information about yourself.

Please enter your age

Your answer

Please enter your gender*

Only choose only one of the following

Female

Male

Non-binary

What is your highest level of completed education?*

Please choose only one of the following:

High School Diploma / A level

Bachelor

Masters

Doctorate/ Ph.D.

Vocational Training

Other

What is your current employment ?*

Please choose only one of the following:

Permanent & full-time employment

Permanent & part-time employment

Temporary & full-time employment

Temporary & part-time employment

Other

Please choose your primary affiliation in your company.*

Please choose only one of the following:

Sales

Purchasing

Supply Chain

Corporate Communication including Marketing

Public Relations

Finance

Consulting

Coaching

Human Resource (HR)

Research and Development(R&D)

Manufacturing

IT

Quality Management

Business Development

Facility Management

Administration

Customer Service/Support

Legal

Other

Please select your current position.*

Please choose only one of the following:

Senior or executive management

Middle management

Employee WITH managerial responsibility

Employee WITHOUT managerial responsibility

How many years have you been working in your current organization?*

Please choose one of the following:

Less than 1 year

1-2 years

3-5 years

6-10 years

11-20 years

More than 20 years

What is the name of your organization?

[   ]

Your answer

How many employees work in your organization?*

Please choose only one of the following:

Less than 10 employees

10-49 employees

50-249 employees

More than 250 employees

What type of organization do you work in?*

Please choose only one of the following:

Business

Non-profit

Governmental

What sector does your organization belong to?*

Please choose only one of the following:

Agriculture, Forestry and Fishing

Mining and Quarrying

Manufacturing

Electricity, Gas, Steam, and Air Conditioning Supply

Water Supply, Sewerage, Waste Management, and Remedition Activities

Construction

Wholesale, Reatil Trade, Repair of Motor Vehicles and Motorcycles

Accomodation and Food Service Activities

Information and Communication

Financial and Insurance Activities

Real Estate Activities

Professional, Scientific and Technical Activities

Arts, Entertainment and Recreation

Other Service Activities

Activities of Housholds as Empoyers, Undifferentiate Goods and Services Producing Activities of Housholds for Own Use

Activities of Extraterritorial Organizations and Bodies

Other

ORGANISATION

Please choose the appropriate response for each item:

Strongly disagree

Disagree

Somewhat disagree

Undecided

Somewhat agree

Agree

Strongly Agree

Managers should make most desicions without consulting subordinates

It is frequently necassary for a manager to use authority and power when dealing with sibordinates

Managers should seldom ask for the opinions of employees

Employees should not disagree with management decisions

Management should not delegate imporant tasks to employees

It is important to have job requirements and instructions spelled out in detail so that employees always know what they are expected to do

Managers Expect workers closely follow instructions and procedures

Rules and regularities are important because they inform workers what they the organization expected of them

Standart operating procedures are helpful to employees on the job

Instructions for operations are important for employees on the job

Meeting are usually run more effectively when they are chaired by a man.

It is more important for men to have a professional career than it is for women to have professional career

Men usually solve problems with logical analysis, women usually solve provlems with intuition

Solving organizational problems usually requires an active,forcible approach, which typical of men

It is preferable to have a man in a high level position rather than a woman

Group welfare is more important than individual rewards.

Group success is more important than individual access

Being accepted by the members of your workgroup is very important

Employees should pursue their goals after considering the welfare of the group.

Managers should make most desicions without consulting subordinates

It is frequently necassary for a manager to use authority and power when dealing with sibordinates

Managers should seldom ask for the opinions of employees

Employees should not disagree with management decisions

Management should not delegate imporant tasks to employees

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Group welfare is more important than individual rewards.

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Being accepted by the members of your workgroup is very important

Employees should pursue their goals after considering the welfare of the group.

CULTURE

Please choose the appropriate response for each item:

Not at all

Once in a while

Sometimes

Fairly often

Frequently, if not always

I make others feel good to be around me.

I express with a few simple words what we could and should do.

I enable others to think about old problems in new ways.

I help others develope themselves.

I tell others what to do if they want to be rewarded for their work.

I am satisified when others meet agreed-upon standarts.

I am content to let others continue working in the same ways always.

Others have complete faith in me.

I provide appealing images about what we can do.

I provide others with new ways of looking at puzzling things.

I let others know how I think they are doing.

I provide recognition/ rewards when others reach their goals.

As long as things are working, I do not try to change anything.

Whatever others want to do is OK with me.

Others are proud to be associate with me.

I help others find meaning in their work.

I get others to rethink ideas that they had never questioned before.

I give personal attention to others, who seem rejected.

I call attention to what other can get for what they accomplish .

I tell others the standards they have to know to carry out their work.

I ask no more of others than what is absolutely essential.

I make others feel good to be around me.

I express with a few simple words what we could and should do.

I enable others to think about old problems in new ways.

I help others develope themselves.

I tell others what to do if they want to be rewarded for their work.

I am satisified when others meet agreed-upon standarts.

I am content to let others continue working in the same ways always.

Others have complete faith in me.

I provide appealing images about what we can do.

I provide others with new ways of looking at puzzling things.

I let others know how I think they are doing.

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I get others to rethink ideas that they had never questioned before.

I give personal attention to others, who seem rejected.

I call attention to what other can get for what they accomplish .

I tell others the standards they have to know to carry out their work.

I ask no more of others than what is absolutely essential.

Please choose the appropriate response for each item:*

Non-participant

Laggard

Mainstream

Fast follower

Leader

Don't know/ not sure

Hould would you characterize your organization's efforts to develope as a digital business?

Hould would you characterize your organization's efforts to develope as a digital business?

Please choose the appropriate response for each item:*

Significanlty decreesing

Decreasing

About the same

Increasing

Significantly decreasing

Don't know/ not sure

Is your organization planning to invest a higher or lower amount in digital business initiatives in the next 12-18 months?

Please choose the appropriate response for each item:*

No applicable/ my organization is not implement digital business initiatives

Mostly small experiments

Both small experiments and big company-wide efforts

Mostly big company-wide efforts

Don't know/ not sure

When my organization implements digital business initiatives, they tend to start as:

Please choose the appropriate response for each item:*

Our organization does not pay much attention to digital business

We talk about digital business more than actually doing doing anything about it

Digital initiatives are used in our organization but the business objectives aren't always clear

Digital initiatives are a core part of our organization's business strategy

Digital initiatives support specific business goals, but are not a core part of our business strategy

To the best of your knowledge, how would you best charachterize the primary role of digital business within your organizations:

My organization primarily drives digital business adoption and engagement internally through:*

Please all that apply:

None: My organization doesn't encourage digital adoption and engagement

Mandating from management

Including in performance review

Recognition

Providing financial incentives

Expecting employees to be motivated to embrace digital business opportunities

Providing career advancement opportunities for those who participate

Strong digital business culture (e.g. risk taking, collaboration, continues learning)

Don't know/not sure

Other

Imagine an ideal organization utilizing digital technologies and capabilities to improve processes, engage talent across the organization, and drive new digital technologies.

On a scale of 0 to 5 (0 worst 5 best), how close is your orgaization to that ideal?*

Please choose the appropriate response for each item.

0

1

2

3

4

5

What does your organization need to do differently in order to progress toward this ideal?*

Please choose all that apply:

Customer experience

Prodcut/service

Strategy

Management/Leadership

Collaboration

Culture

People

Organization/Governance

Processes

Operations

IT

Technologies

Other

To the best of your knowledge, which specific technology is the most important to your organization to the next 3-5 years?*

Please choose all that apply

Artificial Intelligence (AI)

Chatbot

Machine Learning

Internet of Things

Customer Relationship Management (CRM) systems

Additive Manufacturing

Sensors

Big Data

Digital Channels

Others

Think about your organization's current and future digital initiatives. In the following, you fill in the blank of statements with one of the following words. Below is list of the word and meaning behind the word.

Can't=Do not have the ability

Should=Need to (my opinion)

Need to=Need to (organization's opinion)

Want to=Evident of desire

Can=Have the ability

Please refer to this table when you select your answer

Please choose the appropriate response for each item

can't

should

needs to

wants to be able to

can

Our organization _____ develop a clear and coherent digital business strategy

When our organization develops its strategy, it _____ considers future digital innovations.

Our organization _____ spend time, energy, resources for digital initiatives.

My organization _____ accept risk of failure as a natural part of experimenting with new initiatives.

My organization _____ value and encourage experiments and testing as a means of continuous organizational learning.

Our organization _____ organize around cross-functional project teams, not necessarily functions and divisions, to implement digital business priorities.

My organization _____ recruit sufficient talent today to support our organization's digital business strategy.

My organization _____ effectively utilizes the digital knowledge, skills, interest, and experience held by our employees.

The geographic location(s) of my organization _____ hinder our ability to acquire sufficient digital talent to accomplish my organization's digital business initiatives.

My organization _____ provide its employees with theresources and/or opportunities to develop skills and opportunities to thrive in a digital business environment.

My organization's management structure and practices (e.g. , reporting relationships and decision-makingprogresses) _____ engage in digital business successfully.

Our organization _____ develop a clear and coherent digital business strategy

When our organization develops its strategy, it ____ considers future digital innovations.

Our organization _____ spend time, energy, resources for digital initiatives.

My organization _____ accept risk of failure as a natural part of experimenting with new initiatives.

My organization _____ value and encourage experiments and testing as a means of continuous organizational learning.

Our organization _____ organize around cross-functional project teams, not necessarily functions and divisions, to implement digital business priorities.

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My organization _____ effectively utilizes the digital knowledge, skills, interest, and experience held by our employees.

The geographic location(s) of my organization _____ hinder our ability to acquire sufficient digital talent to accomplish my organization's digital business initiatives.

My organization _____ provide its employees with theresources and/or opportunities to develop skills and opportunities to thrive in a digital business environment.

My organization's management structure and practices (e.g. , reporting relationships and decision-makingprogresses) _____ engage in digital business successfully.

Please rate your level of of responsible......*

Fill in using a point system between 0 and 100

0-the lowest level of responsibility.

100-the highest level of responsibility.

Please write your answer(s) here:

Please rate your level of responsible for the **digital end-user** experience in your organization?

> [   ]

Your answer

Please rate your level of responsible for the **digital product and/or service** in your organization.

> [   ]

Your answer

Please rate your level of responsible for the **digital strategy** in your organization.

> [   ]

Your answer

Please rate your level of responsible for the **digital maturity** of your organization.

> [   ]

Your answer

Please rate your level of responsible for the **digital processes** in your organization.

> [   ]

Your answer

Please rate your level of responsible for the **digital collaboration** in your organization.

> [   ]

Your answer

Please rate your level of responsible for the **digital IT** in your organization.

> [   ]

Your answer

Please rate your level of responsible for the **digital culture** in your organization.

> [   ]

Please rate your level of responsible for the **digital employees** in your organization.

Please rate your level of responsible for the **transforming digitally** in your organization.

Please rate your level of responsible for implementing **digital technologies** in your organization.

Please rate your level of responsible for managing and leading **digital initiatives** in your organization.

Please rate your level of responsible for the **digital operations** in your organization.

Please rate the importance.....*

Fill in using a point system between 0 and 100

0-the lowest level of importance.

100-the highest level of importance.

Please write your answer(s) here:

Please rate the importance of a **digital end user experience** in your organizations

Your answer

Please rate the importance of a **digital product and/or service** in your organizations

Your answer

Please rate the importance of a **digital strategy** in your organizations

Your answer

Please rate the importance of a **digital mature** in your organizations

Your answer

Please rate the importance of a **digital processes** in your organizations.

Your answer

Please rate the importance of a **digital collaboration** in your organizations.

Your answer

Please rate the importance of a **digital IT** in your organizations.

Your answer

Please rate the importance of a **digital culture** in your organizations.

Your answer

Please rate the importance of a **digital employees** in your organizations.

_____

Your answer

Please rate the importance of a **transforming digitally** in your organizations.

_____

Your answer

Please rate the importance of implementing **digital technologies** in your organizations

_____

Your answer

Please rate the importance of managing and leading **digital initiatives** in your organizations.

_____

Your answer

Please rate the importance of a **digital operations** in your organizations.

_____

Your answer

My organization has the capabilities to.....*

Fill in using point system between 0 and 100

0-the lowest level of capability.

100-the highest level of capabiity.

Please write your answer(s) here:

My organization has capabilities to deliver exceptional **digital customer** experience.

_____

My organization has capabilities to deliver exceptional **digital product and/or service.**

My organization has capabilities to delvelop and implement exceptional **digital strategy**.

My organization has capabilities to become a **digitally mature** organization.

My organization has capabilities to implement exceptional **digital processes**

My organization has capabilities to work effectively with **digital collaboration** initiavtives

My organization has capabilities to implement exceptional **digital IT** initiatives

My organization has capabilities to develop and implement and exceptional **digital culture**.

My organization has capabilities to cultivate and develop exceptional **digital employees**

Your answer

My organization has capabilities to **transform digitally** successfully.

[   ]

Your answer

My organization has capabilities to implement **digital technologies** successfully .

[   ]

Your answer

My organization has capabilities to manage and lead **digital initiatives** successfully.

Appendix B

Table of Contents

1 Interview Schedule

Opening

(Establish Rapport) [shake hands] My name is Daniiar Ashirov and a master degree candidate at HNU.

(Purpose) I would like to ask you some questions about your organization and its digital transformation initiatives.

(Motivation) I hope to use this information to help develop a holistic digital maturity model for SMEs.

(Timeline) The interview should take about 60 minutes.

Warm up
Instructions: We are going to discuss your company's current digital maturity

We asked respondents to "imagine an ideal organization in your industry transformed by digital technologies and capabilities that improve processes, engage talent across the organization, and drive new value-generating business models."

We then asked respondents to rate their company against that ideal on a scale of 1 to 10. Three maturity groups were observed: "early" (1-3), "developing" (4-6), and "maturing" (7-10).

Transition: If we look at the triangle, there are different levels that we will discuss. It is important to first talk about your customers. Maybe you do have the "classic" customers but let's think about the work that you do and who does your organization serve (e.g. end user, employees, state, investors, etc.)

Setting the stage: Who do you serve & what do you offer?

Past digital experiences

What are your past experiences with digital technologies, processes, etc.?

What is your personal relationship with digital technologies, processes, etc.?

What are your company's past experiences with digital technologies?

Customer/Stakeholder Experience

Do you ensure and interact with your customers on all digital AND non-digital channels via a classic, consistent and channel-adequately designed customer experience?

Do you personalize our digital customer communication (e.g. regarding content and frequency) according to user behavior and existing CRM data?

Do you look at the interaction data of your customers and if so, do you derive insights from customers and interaction data that influence our marketing and communication activities?

Will the evaluation of customer data as well as the triggering of relevant actions happen automatically in real-time?

Product and Service

Have you supplemented your products and services with digital offers?

Have you successfully implemented new digital business ideas or business models in recent years?

Do you regularly involve your employees, customers or external experts with ideas for digital products?

Triangle Level 1: Strategy

Strategy

Are you perceived by competitors and experts as a driver of digital innovations?

Do you drive digital innovations systematically and purposefully (e.g. strategic digital plan, goals with options, digital strategy formulation)?

Do you systematically evaluate new technologies and changes in customer behavior to identify digital innovations (e.g. products, business models, trend scouting)?

Do you drive digital business with an overall digital strategy and digital projects? Is it a high priority?

Do you see the digital transformation as a continuous strategic development of our company?

Management & Leadership/Transformation Management

What is the overall mentality of management on the topic of digital initiatives?

Are goals of digital transformation measurably defined and known in the company?

Is the target achievement of all activities related to the digital transformation periodically reviewed?

Do the management and board of directors recognize the importance of digital business and provide appropriate resources?

Is middle management driving the implementation of digital transformation projects?

Does the top management level assume cross-functional responsibility for the digital transformation?

Transition: Strategy and transform are driven by people. We will now discuss collaboration, culture, people and your organization

Corporate Culture

Collaboration

In general, when you work and communicate with your customers/stakeholders do it more face to face or through digital platforms? Before/during corona time

In internal and external projects, do you use digital tools (such as Skype, intranets, platforms like Sharepoint, Jive)?

Do you use the exchange with external experts to develop additional knowledge in the field of digitization?

Have you defined internal experts for digital topics who are available as contacts for employees or external parties?

Do you enable employees to work at home or mobile with full access to data and allow them to work from home?

Do you think how you collaborate will change due to the corona experience?

Culture

Is the development of digital expertise a central component of employee development?

When recruiting new employees, are function-related digital skills an important selection criterion?

Are your employees familiar with digital processes and tools?

Are you and your employees willing to take risks for the existing business by using innovative digital solutions?

Do you support the development of innovative digital solutions, even though you know that this can be a financial risk?

Are mistakes and lessons learned from failed digital projects proactively communicated within the company?

Do you evaluate mistakes made to improve our digital processes and solutions??

People

(use questionnaire results)

Organization & Governance

Are digital projects planned and implemented across departments and functions?

Do you have a systematic "early warning" to identify technologies, trends, processes business models that are relevant?

Are you able to react quickly to changes in technology or market environment?

Do you have enough resources in your normal business operations to simultaneously drive digital innovation?

Do you maintain a partner network in the field of digitization with external service providers, start-ups or research institutions?

Do you rely on standardized, efficient processes when working with external partners?

Do you consider any technology standards or intellectual property/data security concerns?

> Transition: If you look at the triangle again, you see that middle is operations. We will discuss now processes, operations, IT

Triangle Level 2: Operations

Processes

Do you regularly check your core processes for improvement potential through digital technologies?

Do you look at taking advantage of the latest, suitable digital possibilities to improve your routine processes?

Do you both let the evaluation of options for action and strategic decisions be guided by findings from data analysis (e.g. to improve communication)?

Do your internal or external expert actively explore and/or use new areas like Big Data, AI, machine learning?

Operations

(use questionnaire results)

IT

Are you able to adapt your digital offers and/or processes at short notice if our business requires it?

Can you quickly test and modify new digital products and services using prototypes?

Do you regularly update our IT infrastructure to meet changing requirements and relevant?

Does your internal IT department proactively and competently advise the specialist departments on technological innovations?

Transition: If you look at the triangle again, you see that bottom is technologies. We will discuss now technologies

Triangle Level 3: Technologies

Technologies

(use questionnaire results)

Transition: One of the last topics is the success factors. We should consider your past and current digital success factors but also consider what might be a future digital success factor.

Success factors

Digital (critical) success factors

What are the digital (critical) success factors in your job right now?

In what one, two, or three areas would (lack of digital capabilities) hurt you the most?

In what area would you hate to see something go wrong?

Assume you are placed in a dark room with no access to the outside world, except for daily food and water. What would you most want to know about the organization when you came out three months later? What technology advances would you mostly be interested in?

(Regarding digital initiatives), what is your personal mission and role in the organization?

What are your most critical (digital) goals and objectives?

What are your three greatest (digital) problems or obstacles?

Transition: That's it.

Closing

(Summarize) You are digital experience seems very interesting.

(Maintain Rapport) I appreciate the time you took for this interview. Is there anything else

you think would be helpful for me regarding your digital initiatives?

(Action to be taken 1) I should have all the information I need. Would it be alright to call you

at home if I have any more questions?

(Action to be taken 2) Once I have developed the initial digital maturity model, would you be
interested in testing in your organization or one of the departments?

(Conclusion) Thanks again.

Appendix C

№	Cluster	Age	Gender	Education	Position	Duration	Sector
1	LDM	34	Male	Bachelor	Senior or executive management	Less than 1 year	Other
2	HDM	28	Female	Bachelor	Senior or executive management	6-10 years	Other
3	LDM	30	Male	Bachelor	Senior or executive management	3-5 years	Construction
4	HDM	45	Female	Bachelor	Senior or executive management	More than 20 years	Manufacturing
5	HDM	26	Male	Bachelor	Employee with managerial responsibility	Less than 1 year	Real Estate Activities
6	HDM	25	Male	Bachelor	Employee without managerial responsibility	1-2 years	Information and Communication
7	HDM	25	Female	Masters	Employee with managerial responsibility	Less than 1 year	Manufacturing
8	LDM	26	Male	Bachelor	Senior or executive management	1-2 years	Wholesale, Reatil Trade, Repair of Motor Vehicles and Motorcycles

9	LDM	27	Male	Bachelor	Senior or executive management	3-5 years	Wholesale, Reatil Trade, Repair of Motor Vehicles and Motorcycles
10	MDM	26	Male	Masters	Senior or executive management	3-5 years	Manufacturing
11	MDM	34	Male	Bachelor	Senior or executive management	3-5 years	Accomodation and Food Service Activities
12	HDM	36	Female	Masters	Middle management	Less than 1 year	Financial and Insurance Activities
13	MDM	35	Male	Masters	Employee with managerial responsibility	3-5 years	Manufacturing
14	LDM	30	Male	Masters	Middle management	Less than 1 year	Other
15	MDM	32	Male	Masters	Employee with managerial responsibility	3-5 years	Manufacturing
16	MDM	44	Male	Doctorate/ Ph.D.	Employee with managerial responsibility	6-10 years	Financial and Insurance Activities

Affirmation

„I hereby confirm that I have authored this thesis independently and without illicit assistance from third parties and using solely the aids mentioned. The thoughts that were retrieved directly or indirectly from other sources are marked as such. The work was submitted or published so far in same or similar form of no other test authority."

Neu-Ulm   Daniiar   Ashirov

Place, Date   Signature