DETERMINANTS OF DIGITALIZATION IN TURKISH SMES

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Determinants of Digitalization in Turkish SMEs

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DECLARATION OF ORIGINALITY

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ABSTRACT

Determinants of Digitalization in Turkish SMEs

Significance of digitalization is widely recognized today, and organizations increasingly embrace digitalization due to its contribution to their competitiveness and growth. Especially for small-and-medium-sized firms (SMEs), there are countless benefits including improved relations with stakeholders, responsiveness to the environment, operational efficiency, production quality, and organizational image.

This study focuses on exploring the determinants of digitalization adoption for Turkish SMEs. The factors that were considered include top management support, perceived benefits, perceived challenges, company size, level of institutionalization, investment in digitalization, and existence of an IT department.

The sample for this study consists of 79 SMEs operating in electrical-electronics industry, categorized into three groups based on their employee numbers. Category 1 includes companies between 10-49 employees, category 2 includes those with 50-149 employees, and category 3 consists of SMEs with 150-250 employees. Data were collected through a questionnaire prepared on the basis of an extensive literature review.

Research findings demonstrate that investment of digitalization and existence of an IT department have statistically significant positive impact on the extent of digitalization adoption.

ÖZET

Türkiye’deki KOBİ’lerde Dijitalleşmeyi Etkileyen Faktörler

Günümüzde dijitalleşmenin öneminin anlaşılmasının giderek yaygınlaşmasıyla birlikte, büyüme ve rekabet gücüne sağladığı katkı nedeniyle kuruluşlar dijitalleşmeyi daha fazla benimsemektedir. Özellikle küçük ve orta ölçekli işletmeler (KOBİ) için paydaşlarla ilişkilerin iyileştirilmesi, çevreye duyarlılık, operasyonel verimliliğin ve üretim kalitesinin artması, organizasyon imajınının iyileşmesi gibi sayısız faydaları bulunmaktadır.

Bu çalışma, Türkiye'deki KOBİ'lerde dijitalleşmeyi etkileyen faktörleri keşfetmeye odaklanmaktadır. Üst yönetim desteği, algılanan fayda unsurları, algılanan zorluklar, şirket büyüklüğü, kurumsallaşma düzeyi, dijitalleşmeye yatırım ve bir bilişim teknolojileri (BT) departmanının varlığı gibi faktörler dikkate alınmıştır.

Bu çalışmanın örneklemini elektrik-elektronik sektöründe faaliyet gösteren ve çalışan sayılarına göre üç gruba ayrılan 79 KOBİ oluşturmaktadır. Kategori 1, 10-49 çalışanı olan şirketleri, kategori 2, 50-149 çalışanı olan şirketleri, kategori 3 ise 150-250 çalışanı olan KOBİ'leri kapsamaktadır. Veriler, kapsamlı literatür taramasına dayanarak hazırlanan bir anket aracılığıyla toplanmıştır.

Araştırma bulguları, dijitalleşmeye yapılan yatırımın ve bir BT departmanının varlığının, dijitalleşmenin benimsenme düzeyi üzerinde istatistiksel olarak anlamlı olumlu etkilere sahip olduğunu göstermektedir.

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CHAPTER 1

INTRODUCTION

Small and medium-sized enterprises (SMEs) are defined as businesses the staff headcount and annual revenues of which fall below certain limits (KOSGEB, 2023; European Commission, 2019). On a global basis, SMEs represent about 90% of all firms and account for more than 50% of employment (World Bank, 2022). In Türkiye, 99.7% of the businesses are categorized as SMEs and they provide 71% of all employment opportunities (TURKSTAT, 2022). SMEs play a crucial role in fostering economic growth and innovation These organizations contribute to job creation, economic development, and social progress for both developed and developing countries.

The importance of digitalization has grown for SMEs, especially as they strive to stay competitive in today's digital business landscape. Digitalization entails technology integration across variety of business divisions, including the integration of technology into operations, communications, and strategies (Ghobakhloo & Ching, 2019). However, the process of adopting digitalization can be challenging for SMEs, due to various barriers such as high costs, inadequate infrastructure, lack of top management support, and shortage of technological expertise. The purpose of this thesis is to explore the factors influencing Turkish SMEs on their path to digitalization, with a specific focus on those operating in electrical and electronics industry.

In order to achieve this objective, past literature was reviewed and seven factors that are likely to influence digitalization adoption in the context of SMEs

were identified. These factors are top management support, perceived benefits, perceived challenges, company size, level of institutionalization, investment in digitalization, and existence of an IT department. Hypotheses regarding these factors were then statistically tested.

The study consists of six chapters. The following chapter provides the theoretical background of this study and focuses on the mentioned factors that impact on digitalization. Additionally, hypotheses are presented in this chapter. The third chapter introduces the setting of the research. This chapter offers insights into SMEs worldwide, provides an overview of the SMEs in Türkiye, and explores features of electrical and electronics industry from which sample of the study is drawn. Chapter four focuses on research design. The chapter begins with information on sample selection criteria and the data collection instrument. Then, variables of the study are introduced, operationalized, and checked for internal validity and normality. Finally, statistical methods used in the study are summarized. Chapter five presents descriptive findings and comparisons across three company size categories. The chapter includes correlation analyses, hypothesis testing, regression analysis, and non-parametric tests such as Kruskal-Wallis and Mann-Whitney. Non-parametric tests were conducted to explore the dynamics of variables and company size. In the concluding chapter, chapter six, findings of the study are summarized and determinants of digitalization in Turkish SMEs are discussed.

CHAPTER 2

LITERATURE REVIEW

In this study, a broad literature review was conducted in order to establish a comprehensive theoretical background for each variable of the study. These variables include extent of digitalization (dependent variable), top management support, perceived benefits, perceived challenges, company size, level of institutionalization, investment in digitalization, and the existence of an IT department. Following a literature review of each variable, a hypothesis was developed regarding its impact on adoption of digitalization.

2.1 Extent of digitalization

Although the concepts of digitization, digitalization, and digital transformation seem to be similar and are used interchangeably, they have distinct meanings. According to the OECD (2019), digitization is transformation of analogue data and procedures into a format that can be read and processed by a computer. On the other hand, digitalization is the use of digital technologies and data within organizations, industries, or countries. Finally, digital transformation is a more inclusive term which is generally defined as the economic and social effects of digitalization (OECD, 2019). The European Commission, on the other hand, defines digital transformation as both the integration of digital technologies by companies, that is their digitalization, and the impact of new technologies on society (Negreiro and Madiega, 2019). In summary, it is possible to differentiate among digitization of information,

digitalization of processes and roles within business operations, and digital transformation of business strategies (Bloomberg, 2018).

Saleh and Manjunath (2021) stated that the term digitalization was first introduced to the literature in 1971 in a humanities article where its effects on society were investigated. At that time, the term was used to mean generating income by using data and technology. The definition of digitalization, however, varies depending on the focus of the study analyzing it. Some of the studies define it as networking consistency while others as fundamental transformation in business, and yet others as digital evolution or business reinvention. Additionally, digitalization was also defined as developments to business models, operations, and processes by value-added digitization initiatives (Saleh & Manjunath, 2021).

Digitalization has become a valuable opportunity for businesses since the beginning of the twenty-first century (Taggart & Loonam, 2023). It fosters innovative capabilities, expedites optimizations of value-creation activities, and generates new market opportunities. Digitalization applications are spreading and have become a necessary aspect of businesses today. It has a positive impact on the business world as it provides opportunities to enhance development, accelerate innovation, and create more employment opportunities (Tham & Atan, 2021). Nevertheless, not every company that integrates digitalization into their businesses can experience the expected advantages. While utilizing and sustaining digitalization, companies can face various challenges (Taggart & Loonam, 2023). The need for digitalization is strengthened by the demands and, economic, technological, social, and regulatory challenges of the current era, which companies must respond to remain competitive (Tham & Atan, 2021).

2.2 Digitalization in SMEs

Small and medium-sized enterprises (SMEs) should embrace digitalization and leverage digital tools to automate production processes while facilitating communication between various organizational divisions. This, in turn, will decrease the dependence on human-labor and human-based errors, reduce production costs, and increase product quality (Cihan, 2019).

Although sustainable digitalization is essential, it also creates difficulties. While facing the challenges of digitalization, SMEs' main strategy should be adopting and integrating digitalization to keep up with early adopters and gain a competitive advantage over their rivals (Saleh & Manjunath, 2021). On the other hand, when comparing the SMEs with their larger competitors, the process of adoption can be different due to SMEs' constraints in financial and/or human capitals. Although their flexibility enables SMEs to make decisions more rapidly than their larger counterparts, they may lack market information and not have the necessary resources to utilize strategic methods like financial analysis, forecasting, and project management. Therefore, to avoid falling behind, SMEs must adjust their business operations and prepare their processes for digitalization adoption (Ghobakhloo & Ching, 2019).

2.3 Top management support

A company's top management team (TMT) is its senior managers who are responsible for making strategic decisions (Li et al., 2023). TMTs as key decision-makers and leaders have a strong impact on strategies of the companies and thus organizations' performances (Wrede et al., 2020). The path of firm development is

influenced by the combined experience, cognitive background, and values of the TMT (Li & Shao, 2023).

As top managers hold an important position in the innovation initiatives of organizations, they also have a remarkable impact on successful adoption of digitalization. (Lutfi et al., 2022; Li et al., 2023). According to Tham and Atan (2021) a TMT should participate in decisions related to digital transformation, even when the firm has technically qualified employees. They can raise awareness about digitalization, introduce it as a strategic priority, and encourage relevant initiatives to ensure its utilization within SMEs (Lutfi et al., 2022). Taggart and Loonam (2023) stated that previous studies on digital transformation point out to TMT support as one of the key push factors for successful implementations. Conversely, lack of TMT support was demonstrated as a factor that tends to lead to failure in implementation of digitalization. According to Taggart and Loonam (2023), top management possesses responsibilities which consist of managerial tasks to support digitalization adoption activities.

Top management's functions and facilitating activities in the context of digital transformation can be divided into three key actions as shown in Figure 1. The first one is comprehending digitalization, which refers to TMT's acquisition of a personal understanding of digitalization. The second one is establishing a formal context for digitalization by shaping the company's business processes and organizational structure. The third one is leading the process of change by communicating employees the significance of digitalization and convincing them to willingly participate in digitalization adoption. This activity is informal. These three categories express the impacts of TMT decisions that are made for digitalization, and

how these decisions influence the implementation process across the entire organization. (Wrede et al., 2020).

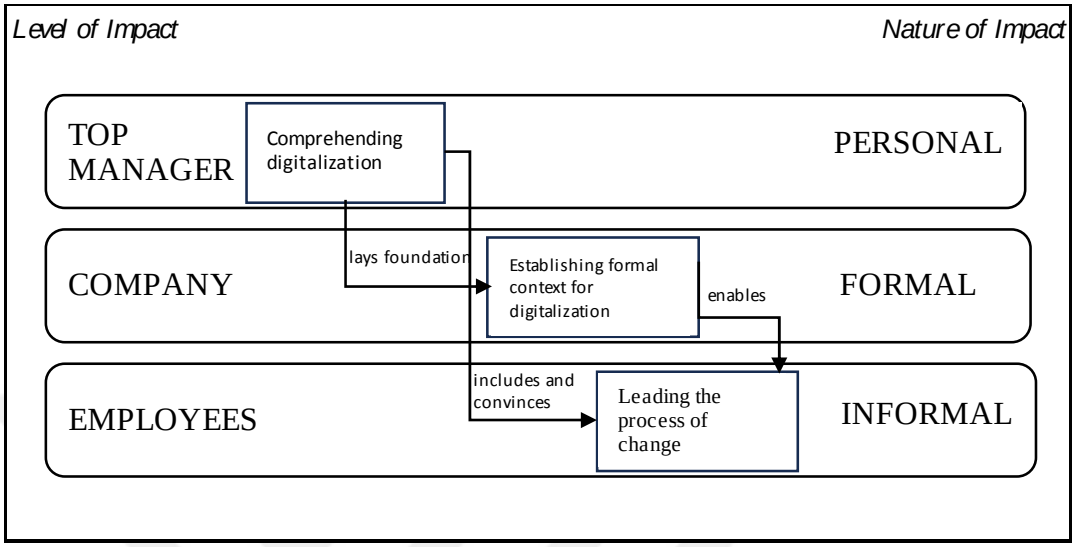

Figure 1. A model of top management approach to promote the process of digitalization

According to Ghobakhloo and Ching (2019), the first step of digitalization adoption in SMEs is top management team's embracement of the benefits of digitalization. This will lead TMT to allocate financial, technological, and managerial resources essential for the integration. Ghobakhloo and Ching (2019) suggest that the higher the extent to which top management tends to understand the benefits of digitalization vis-à-vis its risks and costs, the higher the level of adoption in SMEs. In order to have a successful digitalization adoption process, TMT should be using tailored solutions instead of previously used, traditional ones. Therefore, TMTs, first of all, need to evaluate their companies' status comprehensively (Wrede et al., 2020). In order to achieve effective integration and acceptance of digitalization, TMTs should not only be committed to digitalization themselves but also, promote it, foster connections among employees to facilitate innovation adoption, and develop a

supportive ecosystem encouraging subordinates to embrace digitalization and its related changes. The source of these motivations should be through their values, vision, and communication (Lutfi et al., 2022). Their commitment to digitalization initiatives must be expressed and recognized. Top managers should be actively involved in adoption of digitalization to reflect their commitment to the process. They should motivate subordinates and ensure the enthusiastic participation of employees. After the integration and technological changes, TMT should track employees' reactions. This monitoring is essential for making improvements and developing strategies to obtain, implement and sustain changes if necessary (Tham & Atan, 2021). Chatzoglou and Chatzoudes (2016) also mention two crucial characteristics that top management should have to be able to make successful digitalization adoption. The first one is top managers' information technology knowledge, and the second one is their behavior towards innovation.

As top management support is considered to be one of the key facilitators for new technology integrations, successful implementation and sustainability of digitalization can be achieved with their support. Thus, the following hypothesis is suggested:

H1: Top management support is expected to have a positive impact on the extent of digitalization.

2.4 Perceived benefits

The decision to adopt an innovation in SMEs is shaped by the innovation's ability to provide advantages above and beyond those provided by the technologies currently in use (Lutfi et al., 2022). In early stages of digitalization adoption, perceived value

is evaluated on the basis of its economic benefits, its ability to meet the needs of potential adopters and the extent to which it aligns with organizational culture. Consequently, perception of high potential value increases the willingness for digitalization adoption (Ghobakhloo & Ching, 2019).

Digitalization provides various benefits that create value for companies (Saleh & Manjunath, 2021). It not only improves production quality, flexibility, and productivity (Masood & Sonntag, 2020) but also has a positive impact on organization's overall efficiency and effectiveness (Stentoft et al., 2019). It facilitates communication with customers and suppliers (Chatzoglou & Chatzoudes, 2016), and thus enables the SME to understand the needs of its partners (Ghobakhloo & Ching, 2019), and improve its ability to comprehend their internal processes and business environments (Tham & Atan, 2021). Improved communication also decreases response time to environmental changes (Ghobakhloo & Ching, 2019), and increases a firm's competitiveness over its rivals (Cihan, 2019). Other opportunities that digitalization entails for SMEs are improved international trade potential, growth, and innovation. Digitalization supports SMEs to fulfill the national and/or international requirements (Ghobakhloo & Ching, 2019).

There are several motivators for SMEs to embrace digitalization. These motivators, driven by the benefits that digitalization can provide, include cost reductions (Stentoft et al., 2019) improved financial performance, rapid access to the required information, improved knowledge transmission (Ghobakhloo & Ching, 2019), and improved organizational image (Chau & Hui, 2001). Moreover, the lack of resources in SMEs to develop higher value-added products that enhance the company's competitiveness serves as a motivator for digitalization (Mustafa & Yaakub, 2018) as digitalization provides the benefit of enabling SMEs to develop

higher value-added products. Another motivating factor involves information security concerns (Tham & Atan, 2021). Digitalization serves as a solution to information security by offering the benefit of improved information protection.

On the basis of various benefits that digitalization may provide, it is expected that perception of more benefits will increase the extent of digitalization. Thus, the following hypothesis is developed:

H2: Perceived benefits are expected to have a positive impact on the extent of digitalization.

2.5 Perceived challenges of digitalization for SMEs

Digitalization is a challenging process as it continues to develop and requires continuous financial commitment (Saleh & Manjunath, 2021). Masood and Sonntag (2020) suggest that since two of the key challenges of digitalization adoption for SMEs are integration costs and time to learn about how to implement, SMEs often perceive them as barriers to digitalization. Financially constrained SMEs tend to find it hard to make the necessary investment for digitalization. However, emergence of cost-effective technologies more recently has been mitigating this challenge (Thrassou et al., 2020). Dedicating sufficient time for a digitalization implementation is difficult due to the dual obstacles of time constraints and human resource limitations. Committing a full-time employee to stay informed about new developments is often difficult to manage for SMEs **(**Masood & Sonntag, 2020). While larger enterprises can allocate the necessary time and financial resources for digitalization, SMEs can be left behind. Yet, in order to remain competitive and benefit from growth opportunities, SMEs should embrace digitalization which can

enable them to respond effectively to ongoing economic, technological, regulatory, and social challenges (Tham & Atan, 2021).

Resistance to change is another perceived challenge of digitalization adoption. The uncertainty regarding the consequences of transition to digitalization may create logical and illogical concerns among employees who are likely to be influenced by it (Saleh & Manjunath, 2021). In order to achieve successful transformation, managements and decision-makers should forecast and address potential resistance and implement strategies to neutralize this resistance (Tham & Atan, 2021).

According to Ghobakhloo and Ching (2019), cost of digitalization training, and assuring compatibility with preferred work practices are also perceived challenges among SMEs to adopt digitalization. They define compatibility as the alignment with the existing technological infrastructure, culture, values, and preferred work practices of SMEs.

Other common perceived challenges of adoption among SMEs can be listed as lack of infrastructure, information/education, qualified employees, and R&D (Cihan, 2019), concerns over data privacy or security (Senarathna et al., 2018), difficulty of learning to use new digital technologies for employees, and maintaining new digital technologies (Lutfi et al., 2022).

In conclusion, considering the various challenges of adoption of digitalization mentioned above, the following hypothesis is developed:

H3: Perceived challenges are expected to have a negative impact on the extent of digitalization.

2.6 Company size

Depth and breadth of a company's technological and financial capacity is influenced by its size. The high level of investment required for digitalization implementations renders smaller firms with limited internal resources and higher risk avoidance disadvantaged vis-à-vis the larger firms (Buer et al., 2021; Jung and Gómez-Bengoechea, 2022; Holl & Rama, 2023). Therefore, firm size has an impact on not only the tendency to adopt digitalization but also the business models and approaches used for digitalization (Chatzoglou and Chatzoudes, 2016; Buer et al., 2021; Saleh and Manjunath, 2021; Holl & Rama, 2023).

Despite the advantages and opportunities of digital technologies, and rising attention in recent years, many SMEs are still left behind in embracing digitalization. In addition, smaller SMEs experienced widening gaps in digitalization adoption compared to larger SMEs over the past decade (OECD, 2021). Considering these issues, the following hypothesis is put forward:

H4: Size is expected to have a positive impact on the extent of digitalization.

2.7 Level of institutionalization

Uygun et al. (2013) define institutionalization as processes that involve establishment of a formal framework, adoption and/or improvement of impersonal and objective procedures, avoidance of informal norms, participation in administrative rituals, and dedication to an emphasis on legitimization. Organizations are dynamic and evolve over time together with their environment. Some organizations can successfully handle these changes, others may struggle due to a lack of institutionalization. Institutionalization contributes to organizations by improving their legitimacy in the

eyes of stakeholders. This, in turn, enhances stakeholders' ongoing support of the organization and increases its sustainability prospects (Uygun et al., 2013).

Schildt (2022) suggests that from an institutional perspective, digitalization is something that is triggered by the changes of the beliefs, norms, and habits of managers and investors, and supported by institutionalized practices and technology diffusions.

Based on these considerations, the level of institutionalization is expected to have a positive impact on digitalization adoption and the following hypothesis is stated:

H5: The level of institutionalization is expected to have a positive impact on the extent of digitalization.

2.8 Investment in digitalization

SMEs face resource limitations in general and financial limitations in particular. These constraints force SMEs' TMTs to be strategic about their investments and spendings. Despite the limited resources, SMEs still make investments in digitalization, which can influence their financial performance, and their perception of the extent to which they understand the benefits of digitalization (Sándor & Gubán, 2021).

Firms need to invest in R&D and improve their IT infrastructure (Brodny and Tutak, 2022; Hai, 2021) for a successful digital transformation. Therefore, a significant amount of investment is required for adoption of digitalization (Masood and Sonntag, 2020). Consequently, only SMEs with sufficient financial resources can consider digitalization as a viable project to maintain (Ghobakhloo & Ching, 2019).

In conclusion, the following hypothesis was developed based on the presented insights:

H6: Existence of investment in digitalization is expected to have a positive impact on the extent of digitalization.

2.9 Existence of an IT department

A company's digital transformation strategy and digitalization implementation initiatives rely on capabilities of its IT department (Isaev et al., 2018). Isaev et al. (2018) report from an Ernst & Young study that 87% of a company's digitalization readiness is associated with its IT management practices. Therefore, an IT department is a crucial element in a company for a digital transformation.

An organization's IT department provides advanced technical expertise and support to other departments to utilize newly emerging technologies. This, in turn, contributes to the increased extent of digitalization (Buer et al., 2021; Kutnjak & Furjan, 2020). Support of IT strengthens the competencies and capabilities of employees and increases in economic productivity (Kutnjak & Furjan, 2020).

Technological innovations are required to be proactively followed and integrated to an organization's processes by IT departments. This contributes to company's extent of digitalization, value proposition, and success (Urbach et al., 2019). Therefore, the following hypothesis is developed:

H7: Existence of an IT department is expected to have a positive impact on the extent of digitalization.

CHAPTER 3

CONTEXT

In this chapter, overview of SMEs worldwide, and in Türkiye will be detailed. Additionally, information about both global and Turkish electrical and electronics industry will be presented.

3.1 SMEs worldwide

SMEs play a crucial part in enabling, limiting, and shaping growth and innovation patterns at global, regional, and local economies. In both developed and developing countries, SMEs are perceived as engines of growth, contributing to sustainable economic development in the age of economic globalization (World Economic Forum, 2022). Especially in developing countries, SMEs serve as key actors in overcoming various development challenges such as poverty, inequality, unemployment (especially among women and youth), limited industrial capacity, and lack of innovation (Prasanna et al., 2019).

SMEs frequently face challenges due to economic shocks and turbulences, which create an environment unsuitable for their growth and survival (World Economic Forum, 2022). They encounter obstacles in establishing a positive working culture, and responsible practices, while trying to integrate continuous business development and sustainability into their economic, social, and environmental progress (Doria et al., 2019). According to the "Future Readiness of SMEs and Mid-Sized Companies Insight Report" by World Economic Forum (2022), SMEs'

common top challenges can be categorized into six key groups (as can be seen in Figure 2) as survival and growth, talent, culture and values, technology and innovation, funding and access to capital, and the policy environment. Survival and growth cover sustaining and growing the business, managing low margins, and scaling operations and reaching new markets and customers. Talent involves constraints in allocating resources for enhancing employee skills as well as training and development of employees. Culture and values demonstrate the difficulties of sustaining a strong company culture and clear company purpose and value. Technology and innovation involve ensuring products and innovations that align with technological needs, implementing technological processes such as automation, and addressing challenges related to digital transformation. Funding and access to capital are related to scarcity of financial resources and difficulties in securing affordable funding. Finally, policy environment includes high taxation, inflation, corruption, and complexity of staying informed with changing regulations. Additionally, externally, they face competitive challenges especially from their larger rivals, that is, multinational corporations (MNCs) and transnational corporations (TNCs). These larger corporations have growing impact in economies of developing countries, with their dominance in global market pricing of commodities (Doria et al., 2019).

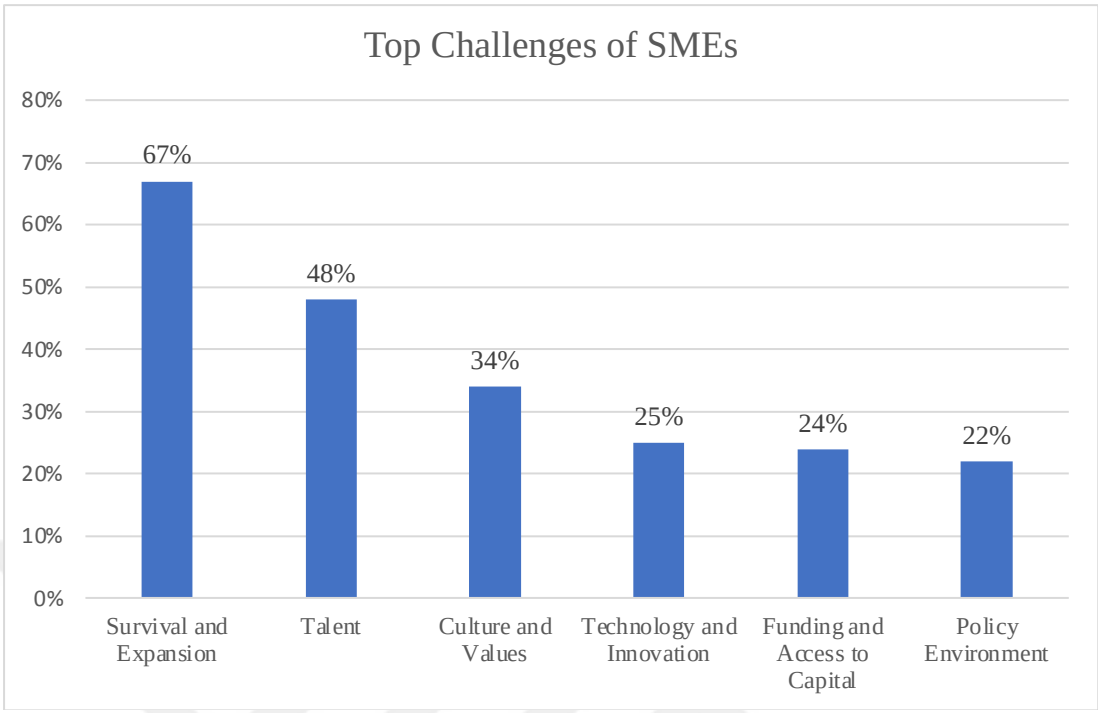

Figure 2. Top challenges of SMEs

As of 2021, the number of SMEs was estimated as 332.99 million worldwide, demonstrating a slight increase from 328.5 million in 2019. Notably, the number of SMEs in 2021 represented the peak for the years between 2000 and 2021 (Statista,2023). Global statistics demonstrate the broad impact of SMEs; they constitute 90% of all businesses and account for nearly 70% of global employment and Gross Domestic Product (GDP) (World Economic Forum, 2022).

3.2 Overview of SMEs in Türkiye

As of 2021, there were three million 568 thousand manufacturing and service SMEs in Türkiye, comprising 99.7% of the population and constituting 71% of all employment opportunities (TURKSTAT, 2022). As SMEs play such an essential role

in the Turkish economy, supporting these enterprises is crucial for fostering sustainable and balanced economic growth and social development. Consequently, developing and implementing new policies tailored to support SMEs should be a key focus **(**Başçi & Durucan, 2017).

However, Turkish SMEs face several challenges including financial constraints, lack of specialized knowledge, and lack of marketing expertise all of which have adverse impact on SMEs' growing initiatives. In the early stages of SME life, financial support is required due to their limited access to financing. As they grow, the need for financial assistance continues especially for the SMEs, which had insufficient capital at establishment. As a response to this demand, Turkish government established KOSGEB in 1990 to provide low-interest financial support.

Lack of specialized knowledge, another constraint for Turkish SMEs, leads them to lag behind their counterparts in developed countries. They face challenges in initiating R&D efforts and suffer from deficiencies in information about technological developments, despite having human capital potential. Lack of marketing constraint is yet another limitation. Several SMEs cannot comprehend the importance of their unique selling point due to their limited knowledge in marketing. Therefore, they cannot utilize the benefits of advertisement, promotion, market research, and sales techniques. For this reason, Turkish SMEs struggle to be competitive in export markets, facing challenges in developing and marketing their products effectively, and pricing them competitively in international markets (Razak et al., 2018).

3.3 Electrical and electronics industry

In 2019, the market size of electrical and electronics industry was around 4.5 trillion euros and was dominated by China with 40% of the market share, and an estimated worth of 1.8 trillion euros. The United States followed China with 14% of the market. Japan (6%), South Korea (4%), and Germany (3%) are also leading actors in the industry as shown in Figure 3 (Statista, 2023).

In Türkiye, there are approximately 2,033 firms operating in electronics industry. The Turkish electronics sector is consistently developing innovative, high-quality, and globally competitive products. Presently, the industry has matured and achieved a notable level of technical expertise (Republic of Turkey Ministry of Trade, 2019).

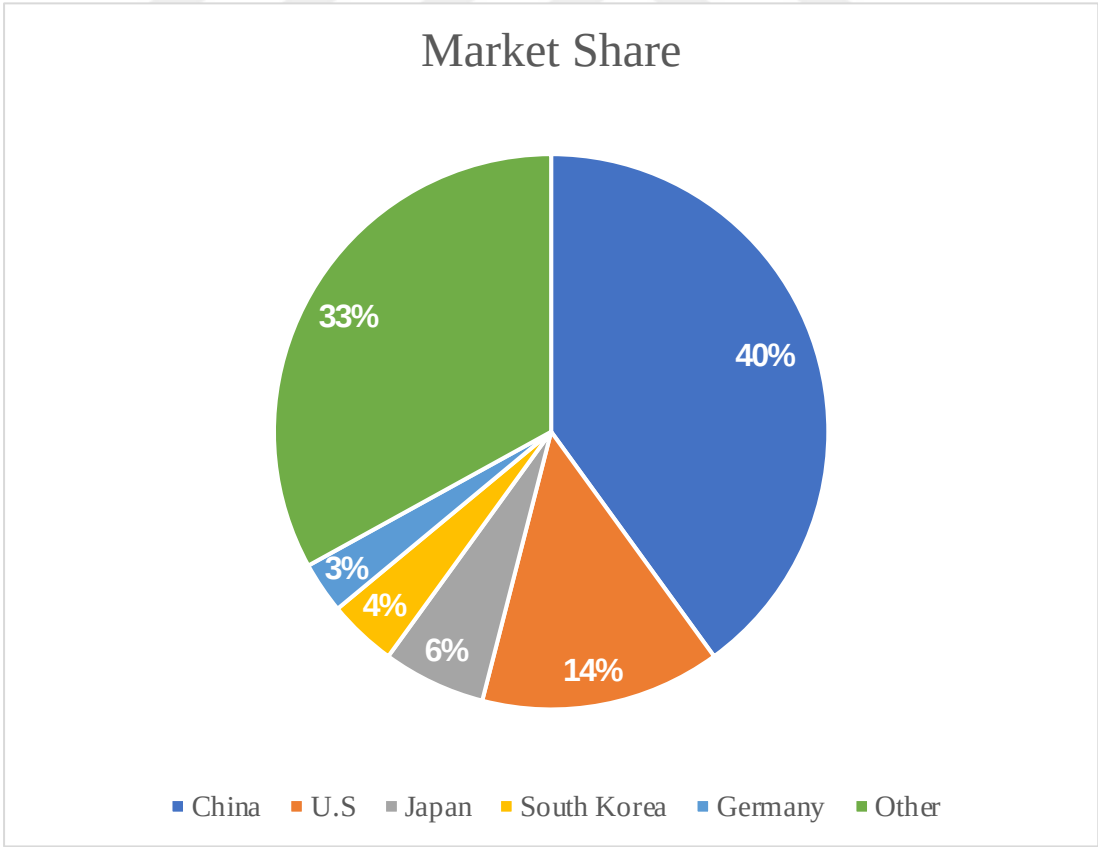

Figure 3. Market share of electrical and electronics industry

3.4 Digitalization of SMEs in Türkiye

Developing digital innovations influences the strategy, structure, operations, and performance of companies. Digitalization utilization contributes to the growth of SMEs in today's business landscape. Although, adoption of digitalization is crucial for SMEs, SMEs in emerging economies like Türkiye, lag in digital conversion (İncekara et al., 2023).

According to the study of İncekara et al. (2023), the primary obstacle to adopting digitalization in Turkish SMEs is the absence of financial resources, which leads them to postpone the digitalization initiatives. Secondly, some SMEs in Türkiye may not completely comprehend the extent of their ability to manage digitalization or internal resistance they may face due to it effectively. Moreover, most of the Turkish SMEs point to uncertainties regarding future digital standards as a notable obstacle. In addition, according to a study by INGEV (2021), expertise gap, and deficiencies in management are two other main challenges of higher digitalization adoption of Turkish SMEs. Expertise gap refers to the unfamiliarity with specific technologies or lack of knowledge to access them while deficiencies in management refers to absence of long-term digitalization strategies.

In a study on 149 Turkish SMEs, Dijital Dönüşüm Merkezi (DDM) (2020) investigated the areas in which SMEs needed digitalization the most and the challenges they faced in digitalization adoption. SMEs joining the study noted that they were aware of the significance of digitalization and needed digital transformation mainly in marketing, sales and customer relations, access to new markets/channels and data analysis. Access to governmental support or its lack of, difficulty in obtaining finance, lack of information and deficiencies in infrastructure, on the other hand, are the most commonly cited challenges.

In another report by INGEV (2021) named “SME Digitalization Monitor: Research on the Digitalization Level of Turkish SMEs”, 540 Turkish SMEs were examined and the following observations about digitalization were summarized. First of all, most SMEs in the sample perceive the benefits of digitalization and recognize it as a necessity. Therefore, they are aware of necessity of digitalization. Second, basic digital tools and services including websites, social media are utilized extensively. Third, the demand for digitalization increases with company size. Fourth, customer expectations emerge as a significant force for digitalization. Finally, due to the lack of long-term strategy planning, in SMEs, the increase in profitability resulting from digitalization is limited.

In Vodafone’s (2022) research on Digitalization Trends of SMEs in Türkiye, place of Türkiye in international digitalization indexes was presented. According to the report, Türkiye is not in a competitive position in the International Digital Economy and Society Index (I-DESI). The index, which includes indicators such as digital skills, digitalization of companies, information and communication sector, and R&D expenditure, allows comparative analysis of countries. According to the 2020 index, Türkiye ranks last among 44 countries with 34 points. Internet use is the index item where Türkiye is closest to the average of EU countries. While Türkiye gets 37 points in this component, the average score of EU countries is 47. Although Türkiye receives a high score in the connectivity item, it is still far behind compared to the EU and other countries. In this item, Türkiye gets 43 points, while EU countries get an average of 62 points and other countries including Australia, Brazil, Canada, Chile, China, Iceland, Israel, Japan, Korea, Mexico, New Zealand, Norway, Russia, Serbia, Switzerland, UK, and USA get an average of 59 points. Türkiye is falling behind in this field due to low broadband coverage, usage, and access.

Finally, for digital skills and the integration of companies into digital technologies items, Türkiye lags behind the average of EU countries the most, and also has the lowest scores. In the digital skills item, Türkiye is at a very low level compared to other countries and receives 23 points, while the average for EU countries is 42 points. For digital skills, there are areas such as prevalence of use of information systems (e.g. coding), graduates in information technology-related fields, and telecommunications employment. At the same time, companies in Türkiye are far behind EU countries in terms of integration of digitalization. According to the index, Türkiye gets 24 points in this field, while the average of EU countries is 41 points and the average of other countries listed is 46 points. In the sub-variables of the component, companies' use of up-to-date technologies is the area where our country lags behind. The other sub-variable where Türkiye has a relatively advantage is the approach of company managers to invest in developing technologies. The fact that Türkiye is at an advanced level compared to the EU and other countries in this field shows that companies are open and prepared for change.

CHAPTER 4

DATA AND METHODOLOGY

This chapter focuses on research design and is composed of three main sections. The first section summarizes sample selection and data collection method while the second section introduces variables of the study and their operationalizations. The third section reviews the statistical analyses used to evaluate data.

4.1 Sampling, data collection and methodology

This section focuses on sample selection, the profile of institutional informants, the survey, and data collection.

4.1.1 Sample

This study relies on the SME definition and categorization put forward by Türkiye's Small and Medium Enterprises Development Organization (abbreviated as KOSGEB in Turkish). KOSGEB (2023) defines SMEs as "businesses which have fewer than 250 employees and the annual net sales revenue or financial balance sheet of which does not exceed five hundred million Turkish Liras" and categorize them as micro, small, and medium enterprises based on the number of employees and annual turnover. Firms with fewer than 10 employees and an annual turnover of less than ten million Turkish Liras are labelled as micro enterprises while those with 10-49 employees and an annual turnover of more than ten, but less than one hundred million Turkish liras are categorized as small enterprises. Enterprises with 50-250

employees and the annual turnover of which does not exceed five hundred million Turkish Liras are categorized as medium enterprises (KOSGEB, 2023).

In forming the sample, only number of employees was taken into consideration. Additionally, considering that digitalization may be too low in micro enterprises, they were excluded from the sample. On the other hand, medium enterprises category was refined by establishing two sub-groups as lower-medium-size (50-149 employees) and upper-medium-size (150-250 employees) categories. Thus, the sample involves three groups of firms: small, lower-medium-sized, and upper-medium-sized SMEs. The sample consists of 26 companies that have 10-49 employees (Category 1), 26 companies that have 50-149 employees (Category 2), and 27 companies that have 150-250 employees (Category 3). Therefore, in total 79 SMEs within the electrical and electronics industry established the sample of the study.

4.1.1.1 Profile of institutional informants

In this section, the demographics of institutional informants such as gender, age, and education, as well as their employment duration, and position will be summarized. Furthermore, these characteristics will be examined in relation to company size category.

As can be seen in Table 1, respondents to the questionnaire are predominantly men (65.8%) between 31-45 years of age (64.6%). All but two institutional informants hold bachelor's degrees (97.5%). Moreover, more than half of them have been working in the same company between 1-5 years (54.4%). While about 30 percent of the respondents are owners of the company, 69.6 percent are either general

managers or functional managers. Considering the pivotal role owners play in SMEs, it is possible to say that data have been collected from people who have very good information about digitalization adoption.

Table 1. Demographic Profile of Institutional Informants for Entire Sample

		Frequency	Percent	Valid Percent	Cumulative Percent
Gender	Female	27	34.2	34.2	34.2
	Male	52	65.8	65.8	100.0
	Total	79	100.0	100.0	
Age	20-30	7	8.9	9.0	9.0
	31-45	51	64.6	65.4	74.4
	46-54	16	20.3	20.5	94.9
	55-66	4	5.1	5.1	100.0
	Total	78	98.7	100.0	
	Missing	1	1.3		
Education	High-school	2	2.5	2.5	2.5
	Bachelor	77	97.5	97.5	100.0
	Total	79	100.0	100.0	
Employment Duration	1-5 years	43	54.4	54.4	54.4
	6-10 years	28	35.4	35.4	89.9
	11-15 years	8	10.1	10.1	100.0
	Total	79	100.0	100.0	
Position in Company	Owner	22	27.8	27.8	27.8
	General Manager	31	39.2	39.2	67.0
	Functional Manager	24	30.4	30.4	97.4
	Assistant Functional Manager	1	1.3	1.3	98.7
	Specialist	1	1.3	1.3	100.0
	Total	79	100.0	100.0	

In small SMEs, similar with the entire sample, majority of the institutional informants are men (57.7%) within the age range of 31-45 (53.8%), and only in small SMEs there are respondents in the age range of 55-66 (15.4%). All but one of the respondents hold bachelor's degrees (96.2%). Majority of them have been working in the same company for 1-5 years (76.9%) and there are no respondents that have been working in the same company for more than 10 years. In small SMEs, 77 percent of the institutional informants are owners and functional managers (Table 2).

Table 2. Demographic Profile of Institutional Informants of Small SMEs

		Frequency	Percent	Valid Percent	Cumulative Percent
Gender	Female	11	42.3	42.3	42.3
	Male	15	57.7	57.7	100.0
	Total	26	100.0	100.0	
Age	20-30	2	7.7	7.7	7.7
	31-45	14	53.8	53.8	61.5
	46-54	6	23.1	23.1	84.6
	55-66	4	15.4	15.4	100.0
	Total	26	100.0	100.0	
Education	High-school	1	3.8	3.8	3.8
	Bachelor	25	96.2	96.2	100.0
	Total	26	100.0	100.0	
Employment Duration	1-5 years	20	76.9	76.9	76.9
	6-10 years	6	23.1	23.1	100.0
	Total	26	100.0	100.0	
Position in Company	Owner	10	38.5	38.5	38.5
	General Manager	5	19.2	19.2	57.7
	Functional Manager	10	38.5	38.5	96.2
	Specialist	1	3.8	3.8	100.0
	Total	26	100.0	100.0	

As can be seen in Table 3, in lower-medium-sized SMEs, the gap between male and female informants is the largest, with men representing 80.8 percent of all institutional informants. Similar to the entire sample, age range of 31-45 is predominant (76.9%). All the respondents hold bachelor's degrees (100%). Most of the respondents have been in the same company as between 1-5 years (61.5%) and they are predominantly general managers (76.9%).

Table 3. Demographic Profile of Institutional Informants of Lower-Medium-Sized SMEs

		Frequency	Percent	Valid Percent	Cumulative Percent
Gender	Female	5	19.2	19.2	19.2
	Male	21	80.8	80.8	100.0
	Total	26	100.0	100.0	
Age	20-30	3	11.5	11.5	11.5
	31-45	20	76.9	76.9	88.5
	46-54	3	11.5	11.5	100.0
	Total	26	100.0	100.0	
Education	Bachelor	26	100.0	100.0	100.0
Employment Duration	1-5 years	16	61.5	61.5	61.5
	6-10 years	7	26.9	26.9	88.5
	11-15 years	3	11.5	11.5	100.0
	Total	26	100.0	100.0	
Position in Company	Owner	6	23.1	23.1	23.1
	General Manager	15	57.7	57.7	76.9
	Functional Manager	5	19.2	19.2	100.0
	Total	26	100.0	100.0	

Finally, as shown in Table 4, in upper-medium-sized SMEs, respondents are again predominantly men (59.3%) within the age range of 31-45 (63.0%). All but one of the respondents hold bachelor's degrees (96.3%) and respondents of higher-medium-

sized SMEs has tenures in the range of 6-10 years. 40.7% of the institutional informants are general managers.

Table 4. Demographic Profile of Institutional Informants of Upper-Medium-Sized SMEs

		Frequency	Percent	Valid Percent	Cumulative Percent
Gender	Female	11	40.7	40.7	40.7
	Male	16	59.3	59.3	100.0
	Total	27	100.0	100.0	
Age	20-30	2	7.4	7.7	7.7
	31-45	17	63.0	65.4	73.1
	46-54	7	25.9	26.9	100.0
	Total	26	96.3	100.0	
	Missing	1	3.7		
Total		27	100.0		
Education	High-school	1	3.7	3.7	3.7
	Bachelor	26	96.3	96.3	100.0
	Total	27	100.0	100.0	
Employment Duration	1-5 years	7	25.9	25.9	25.9
	6-10 years	15	55.6	55.6	81.5
	11-15 years	5	18.5	18.5	100.0
	Total	27	100.0	100.0	
Position in Company	Owner	6	22.2	22.2	22.2
	General Manager	11	40.7	40.7	63.0
	Functional Manager	9	33.3	33.3	96.3
	Assistant Functional Manager	1	3.7	3.7	100.0
	Total	27	100.0	100.0	

4.1.2 Data collection and survey

Data was collected by the use of a questionnaire which had four sections with 40 questions. There were open-ended, categorical, and multiple-choice questions as well

as statements to be evaluated on five-point Likert Scales ranging from 1 (strongly disagree) to 5 (strongly agree).

The first section was prepared to collect information about institutional informants' gender, age, education level, positions, departments, and seniority. The second section aimed to acquire a general understanding of the company. Questions included company size in terms of both number of employees and revenues, age, industrial affiliation, ownership structure, and level of institutionalization. As far as ownership structure was concerned, the objective was twofold: to learn whether the firm was considered a family enterprise and whether there was a foreign partner. The third section probed about companies' extent of digitalization. Digital indicators and digital tools selected from Vodafone's (2022) research on Digitalization Trends of SMEs in Türkiye, based on micro data sets of Turkish Statistical Institute (TURKSTAT), were used. In addition, there were statements of five-point Likert Scale in this section to be able to assess top management support for, perceived challenges of, and perceived benefits of digitalization. The final section of the survey consisted of a variety of questions which were prepared to interpret digitalization practices and strategies of the companies. This section included questions about the employees' digital skills training, companies' investments for digitalization, whether the companies had strategies for digitalization, and existence of an IT Department.

The data was collected by "Artıbir Araştırma", a research company. The survey was prepared in an online platform and a link was set. For each SME, Artıbir got an appointment and questions were asked directly by the interviewer via the online link on tablet. Data collection process took four weeks to complete. At the beginning of the survey, participants were informed about the aim of this survey, and were assured about confidentiality.

4.2 Variables of the study

Level of digitalization is the dependent variable of the study while top management support, perceived benefits, perceived challenges, company size, level of institutionalization, investment in digitalization, and existence of an IT department are the independent variables.

4.2.1 Level of digitalization

In the questionnaire, informants were presented a list of digitalization indicators and digitalization tools and asked to check those that applied to their companies. One-point was given for each item checked and the sum was used as the level of digitalization measure. “High-speed internet access (above 30 mbps)”, which was included in the survey, was later excluded from the calculations since this item did not align as closely with the other items in capturing the core concept of digitalization as perceived by the respondents. Correlation analysis revealed that “High-speed internet access (above 30 mbps)” was not significantly correlated with any of the other items. Digitalization indicators and tools used in the scale can be seen in Table 5 and the scale has a Cronbach’s alpha (α) score of 0.605.

Table 5. Digitalization Indicators and Tools

Indicators of Digitalization	More than half of the employees have internet access
	Employment of IT experts
	Organization of IT-related trainings
	Use of Enterprise Resource Planning (ERP) software
	Use of Customer Relationship Management (CRM) software
	Use of cloud computing
Digital Tools	Website
	Social Media
	High-Speed Broadband
	Internet of Things (IoT)
	Big Data Analytics
	Artificial Intelligence (AI)
	IT (Information Technology) Security

4.2.2 Top management support

In this study, the scale developed by Lutfi et al. (2022) to measure top management support for adoption of Big Data in SMEs was adapted to evaluate top management support for digitalization. The scale is based on Likert scale responses where options range from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating a higher level of top management support. The four items comprising the scale include top management's promotion of the use of digital technologies in the business, support for digital technology use initiatives in the company, promotion of digital technologies as a strategic priority within the business, and interest in the news about digital technologies. Responses to the four items comprising the scale were summed up and divided by four to reflect top management's support. The four-item-scale had a high level of reliability with a Cronbach's alpha (α) score of 0.829.

4.2.3 Perceived benefits

While measuring perceived benefits, items were taken from various studies evaluating perceived benefits and drivers of digitalization in general or certain digital tools.

Perceived benefits were measured in various ways in the literature. Cihan (2019), for example, used "contribution to competitive advantage" while Masood and Sonntag (2020) used "improved manufacturing quality". Ghobakhloo and Ching's (2019), scale developed specifically for SMEs included "improved response to internal and external changes", "rapid access to the required information at the time of need", and "fulfilling the national and/or international requirements". They also included "requests for better information transmission and communication" as a factor driving adoption of digital technologies. The study of Tham and Atan (2021) examined digitalization readiness and adoption drivers by SMEs, and they utilized the item "information security concerns" in their scale. Digitalization, in turn, provides the benefit of enhanced data protection and security. All these items were included in the scale developed for this thesis.

In addition, items were taken and adapted from studies which do not specifically study digitalization adoption but refer to digital tools and some form of digitalization initiatives. "Improvement of organizational image" was added from Chau and Hui's (2001) study on EDI adoption by small businesses. "Reducing costs" was integrated from Stentoft et al. (2019), who examined adoption of Industry 4.0 in SMEs. In Chatzoglou and Chatzoudes' (2016) study, "pressure from suppliers" was identified as a factor driving e-business adoption by SMEs. As meeting supplier needs will be beneficial for supplier relations, this item was also adapted. On the other hand, Mustafa and Yaakub (2018) indicated the statement of "company's lack

of the resources to develop higher value-added products which would improve the competitiveness of company" as one of the drivers for adoption. Digitalization supports the production of higher value-added products, therefore, companies benefit from its adoption.

Finally, the scale included 11 items. Despite the fact that each study had a distinct focus, their topics did not conflict and in fact complemented one another. To be able to have a wide range of scale to measure the impact of perceived benefits and benefits resulting from drives of digitalization adoption of SMEs, the items were combined and modified. Items forming the scale, from both perceived benefits and perceived drivers, were combined to create a comprehensive understanding and merged under perceived benefits. A five-point Likert Scale where options range from 1 (strongly disagree) to 5 (strongly agree) was used. Responses to these eleven items comprising the scale were summed up and divided by eleven to reflect perceived benefits. The scale had a Cronbach's alpha (α) score of 0.612.

4.2.4 Perceived challenges

Perceived challenges variable was created by combining and adjusting items from previous related studies. Some of these studies focused on digitalization adoption directly, while others investigated challenges of digital tools and various forms of digitalization efforts.

The first study was Saleh and Manjunath (2021) who investigated the barriers of digitalization of business processes in SMEs in Yemen. From their scale the item "concerns about the changes expected in the business process" was adapted to fit in this study. Tham and Atan (2021) emphasized the impact of employees' resistance to

change when it comes to digitalization adoption in their study. They indicated that many organizations faced employee resistance when something new such as digitalization adoption was introduced to them. This item was included and adapted to the scale of this study.

One of the studies that did not focus on digitalization directly, but investigated a similar issue, awareness, and adoption difficulties of Industry 4.0 in Türkiye, is Cihan (2019). As far as difficulties were concerned, the focus was on economic reasons, lack of infrastructure, training and specialized knowledge deficiency, lack of skilled labor, and lack of R&D. In this study, this approach was adapted for measuring perceived adoption challenges of digitalization by SMEs. The reason that Cihan (2019) was chosen is that it also studied Turkish SMEs and their perspectives on new technology adaption challenges and awareness, issues similar to those covered in this study. Moreover, Ghobakhloo and Ching (2019) studied the factors affecting adoption and implementation of smart manufacturing-related information and digital technologies (SMIDT) in SMEs. Two perceived challenges-costs of digitalization training and new digital tools' compatibility with current business applications-were chosen and adapted to the current study. The reason why only these two items were included is that they were the statistically significant ones. Furthermore, the study of Masood and Sonntag (2020) identified common key challenges of adoption of new digital technologies as economic constraints, lack of knowledge of new digital technologies, and implementation time. Scale of Lutfi et al. (2022) utilized two items to measure the challenges of adoption of Big Data analytics including difficulties of learning to use the Big Data for employees, and difficulties of maintaining Big Data. In this study, these two items were modified and adapted to measure the perceived challenges of digitalization adoption. The following two

modifications as “learning to use the digital technologies are difficult for employees” and “difficulties experienced in the maintenance of these technologies after the use of new digital technologies” were used. Finally, Senarathna et al. (2018) developed a model to measure Cloud Computing adoption of SMEs. In their model, respondents were asked if security was a major concern for adoption of Cloud Computing and how they perceive it. In this study, it is modified for the adoption of digitalization and respondents were asked about their level of concern regarding data privacy and security while adopting digitalization in their firm.

The challenges found in previous studies vary according to their focus and depth; however, they have a common focus on identifying important barriers to the digitalization of SMEs. In this study, the questionnaire employed a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree) for these 13 items.

Responses to these items comprising the scale were summed up and divided by number of items to reflect perceived challenges. The 13-item scale had a high reliability with a Cronbach’s alpha (α) of 0.943.

4.2.5 Company size

This variable is measured by the number of employees. Institutional respondents were expected to choose among three categories. The categories were 10-49 employees (small companies), 50-149 employees (lower-medium-size category), and 150-250 employees (upper-medium-size category). Small companies were coded as “1”, lower-medium-sized SMEs were categorized as “2”, and upper-medium-sized SMEs were coded as “3”.

4.2.6 Level of institutionalization

In evaluation of a firm's level of institutionalization, answers to four categorical (Yes/No) questions were taken into consideration. Institutional informants were asked whether their company had a written company constitution, an employee performance evaluation system, systematic tracking of their performance system, and whether job description, roles and authority of the employees were clearly defined in writing within their company. Then, one-point was given for each "Yes" answer and the level of institutionalization was measured as the total score. As can be seen in Table 6, the 4-item scale had a high reliability with a Cronbach's alpha (α) of 0.824.

4.2.7 Investment in digitalization

Investment in digitalization was evaluated by one question probing whether the company had a digitalization budget. This is a categorical variable where those companies with a budget were categorized as "1" and those without a budget as "0".

4.2.8 Existence of an IT department

Presence of an IT department is seen as an indicator of a company's human resources endowments knowledgeable about IT. There was a categorical question that asked the respondents whether they had IT department. Answers of "Yes" was coded as "1" and answers of "No" was categorized as "0".

Table 6. Reliability Analysis of the Scales

Variable Name	Cronbach's Alpha (α)	Number of Items
Level of Digitalization	0.605	13
Top Management Support	0.829	4
Perceived Benefits	0.612	11
Perceived Challenges	0.943	13
Level of Institutionalization	0.824	4

4.3 Methodology and statistical analyses

Quantitative research methods were employed in this study to test seven hypotheses. Analyses began with the reliability checks of measures used and continued with normality tests, descriptive statistics, and correlation analysis. Internal reliabilities of the scales were assessed by calculating Cronbach's alpha (α) and the results can be seen in Table 6. Kolmogorov-Smirnov Normality Tests were run for the entire sample as well as each size category. Results showed that variables are not normally distributed (Table 7, 8, 9, and 10). In comparison of small, lower-medium, and upper-medium-size categories, non-parametric tests of Kruskal-Wallis and Mann-Whitney were preferred. Given the relatively large size of the entire sample, linear regression was used to test the hypotheses. This study's data analyses were conducted by using IBM SPSS Statistics 29.

4.3.1 Normality tests for all company sizes

The Kolmogorov-Smirnov test was employed to see whether the variables were normally distributed for the entire sample. The results indicated that, variables were not normally distributed as can be seen in Table 7.

Table 7. Kolmogorov-Smirnov Normality Tests for Entire Sample

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Level of Digitalization	0.175	79	0.000	0.932	79	0.000
Top Management Support	0.201	79	0.000	0.844	79	0.000
Perceived Benefits	0.110	79	0.020	0.941	79	0.001
Perceived Challenges	0.124	79	0.004	0.961	79	0.017
Company Size Category	0.226	79	0.000	0.792	79	0.000
Level of Institutionalization	0.252	79	0.000	0.834	79	0.000
Investment in Digitalization	0.350	79	0.000	0.636	79	0.000
Existence of an IT Department	0.415	79	0.000	0.605	79	0.000

a. Lilliefors Significance Correction

For small SMEs, Kolmogorov-Smirnov test was conducted, and findings revealed that this subsample is not normally distributed either (Table 8).

Table 8. Kolmogorov-Smirnov Normality Tests for Small SMEs

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Level of Digitalization	0.215	26	0.003	0.871	26	0.004
Top Management Support	0.169	26	0.053	0.889	26	0.009
Perceived Benefits	0.200	26	0.009	0.869	26	0.003
Perceived Challenges	0.160	26	0.087	0.957	26	0.328
Level of Institutionalization	0.320	26	0.000	0.758	26	0.000
Investment in Digitalization	0.474	26	0.000	0.524	26	0.000

a. Lilliefors Significance Correction

As can be seen in Table 9, sample is not normally distributed for lower-medium-sized SMEs.

Table 9. Kolmogorov-Smirnov Normality Tests for Lower-Medium-Sized SMEs

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Level of Digitalization	0.162	26	0.076	0.925	26	0.060
Top Management Support	0.212	26	0.004	0.911	26	0.028
Perceived Benefits	0.114	26	.200*	0.971	26	0.645
Perceived Challenges	0.160	26	0.087	0.939	26	0.128
Level of Institutionalization	0.205	26	0.006	0.885	26	0.007
Investment in Digitalization	0.356	26	0.000	0.637	26	0.000
Existence of an IT Department	0.474	26	0.000	0.524	26	0.000

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

For upper-medium-sized SMEs, similarly, sample is not normally distributed as shown in Table 10.

Table 10. Kolmogorov-Smirnov Normality Tests for Upper-Medium-Sized SMEs

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Level of Digitalization	0.128	27	.200*	0.964	27	0.453
Top Management Support	0.272	27	0.000	0.628	27	0.000
Perceived Benefits	0.193	27	0.011	0.933	27	0.082
Perceived Challenges	0.150	27	0.122	0.932	27	0.076
Level of Institutionalization	0.299	27	0.000	0.793	27	0.000
Investment in Digitalization	0.460	27	0.000	0.549	27	0.000
Existence of an IT Department	0.495	27	0.000	0.476	27	0.000

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

CHAPTER 5

ANALYSIS AND FINDINGS OF THE RESEARCH

In this chapter, descriptive findings, results of the nonparametric tests comparing different size categories, correlation analysis, and hypothesis testing with regression analysis are presented.

5.1 Descriptive findings and comparison of size categories

In this part, company profiles of the entire sample, as well as different size categories are provided. Additionally, descriptive findings and comparison of firms in different size categories along variables of the study by the use of non-parametric tests are presented.

5.1.1 Company profiles

This section begins with description of company profiles of the total sample and continues with similar information for each size category.

5.1.1.1 Entire sample

As can be seen in Table 11, more than one third of the SMEs in the sample have revenues between 50-99.99 Million TL. About 30 percent, on the other hand, have revenues between 150-250 Million TL. SMEs tend to be young with 72.4 percent below 10 years of age. None of them has a foreign partner while about 60 percent of them make exports, and percentage of exports in their annual turnover is majorly between 15-24% (31.6%). Despite prevalence of family firms in Türkiye, about 90

percent of the SMEs in the sample do not consider themselves as family firms. Investigation of foreign partner presence reveals that, as can be expected for SMEs, there are no firms with a foreign partner.

Table 11. Company profile for entire sample

		Frequency	Percent	Valid Percent	Cumulative Percent
Company Revenue	Missing	1	1.3	1.3	1.3
	Between 5-24.99 Million TL	13	16.5	16.5	17.7
	Between 25-49.99 Million TL	11	13.9	13.9	31.6
	Between 50-99.99 Million TL	28	35.4	35.4	67.1
	Between 100-149.99 Million TL	3	3.8	3.8	70.9
	Between 150-250 Million TL	23	29.1	29.1	100.0
	Total	79	100.0	100.0	
Age of the Enterprise	1-5 years	27	34.2	34.2	34.2
	6-10 years	30	38.0	38.0	72.2
	11-15 years	18	22.8	22.8	94.9
	16-20 years	3	3.8	3.8	98.7
	More than 25 years	1	1.3	1.3	100.0
	Total	79	100.0	100.0	
Family-Owned Business	No	69	87.3	87.3	87.3
	Yes	10	12.7	12.7	100.0
	Total	79	100.0	100.0	
Foreign Partner	No	79	100.0	100.0	100.0
Export Operations	No	32	40.5	40.5	40.5
	Yes	47	59.5	59.5	100.0
	Total	79	100.0	100.0	
Percentage of Exports in Annual Turnover	0	32	40.5	40.5	40.5
	5-14	13	16.5	16.5	57.0
	15-24	25	31.6	31.6	88.6
	25-30	8	10.1	10.1	98.7
	31-60	1	1.3	1.3	100.0
	Total	79	100.0	100.0	

5.1.1.2 Different company sizes

As shown in Table 12, in small SMEs, half of the participants report revenues ranging between 5-24.99 Million TL (50%). All the companies are younger than 10 years old with about two third of them younger than five years of age. Among these small SMEs, majority of them are not family-owned (84.6%). Regarding export operations, 65.4% of the companies engage in exporting, although exports do not make a significant contribution to their annual turnover.

Table 12. Company Profile for Small SMEs

		Frequency	Percent	Valid Percent	Cumulative Percent
Company Revenue	Between 5-24.99 Million TL	13	50	50	50
	Between 25-49.99 Million TL	5	19.2	19.2	69.2
	Between 50-99.99 Million TL	7	26.9	26.9	96.2
	Between 100-149.99 Million TL	1	3.8	3.8	100
	Total	26	100	100	
Age of the Enterprise	1-5 years	17	65.4	65.4	65.4
	6-10 years	9	34.6	34.6	100
	Total	26	100	100	
Industry	Electrical	10	38.5	38.5	38.5
	Electronics	16	61.5	61.5	100
	Total	26	100	100	
Family-Owned Business	No	22	84.6	84.6	84.6
	Yes	4	15.4	15.4	100
	Total	26	100	100	
Export Operations	No	17	65.4	65.4	65.4
	Yes	9	34.6	34.6	100
	Total	26	100	100	
Percentage of Exports in Annual Turnover	0	17	65.4	65.4	65.4
	5-14	3	11.5	11.5	76.9
	15-24	5	19.2	19.2	96.2
	25-30	1	3.8	3.8	100
	Total	26	100	100	

In general, lower-medium-sized SMEs, have higher annual turnovers and are older than small SMEs. Slightly more than super majority have revenues between 50-99.99 Million TL (76.9%), while half of them is in business for 6-10 years. Majority of lower-medium size category has export operations (61.5%), and the export sales account for 5-14% of their revenues in 30.8 percent of them (Table 13).

Table 13. Company Profile for Lower-Medium-Sized SMEs

		Frequency	Percent	Valid Percent	Cumulative Percent
Company Revenue	Between 25-49.99 Million TL	5	19.2	19.2	19.2
	Between 50-99.99 Million TL	20	76.9	76.9	96.2
	Between 100-149.99 Million TL	1	3.8	3.8	100
	Total	26	100	100	
Age of the Enterprise	1-5 years	7	26.9	26.9	26.9
	6-10 years	13	50	50	76.9
	11-15 years	6	23.1	23.1	100
	Total	26	100	100	
Industry	Electrical	15	57.7	57.7	57.7
	Electronics	11	42.3	42.3	100
	Total	26	100	100	
Family-Owned Business	No	24	92.3	92.3	92.3
	Yes	2	7.7	7.7	100
	Total	26	100	100	
Export Operations	No	10	38.5	38.5	38.5
	Yes	16	61.5	61.5	100
	Total	26	100	100	
Percentage of Exports in Annual Turnover	0	10	38.5	38.5	38.5
	5-14	8	30.8	30.8	69.2
	15-24	6	23.1	23.1	92.3
	25-30	2	7.7	7.7	100
	Total	26	100	100	

Finally, for the upper-medium-size category, majority of the companies have annual revenues between 150-250 Million TL (85.2%), higher than the two other categories, as can be expected. They are also older with about 45 percent of them operating between 11-15 years. Majority of these companies have export operations (81.5%). Among the ones that have foreign sales, the proportion of exports in their annual turnover is between 15-24% for 51.9 percent of them (Table 14).

Table 14. Company Profile for Upper-Medium-Sized SMEs

		Frequency	Percent	Valid Percent	Cumulative Percent
Company Revenue	0	1	3.7	3.7	3.7
	Between 25-49.99 Million TL	1	3.7	3.7	7.4
	Between 50-99.99 Million TL	1	3.7	3.7	11.1
	Between 100-149.99 Million TL	1	3.7	3.7	14.8
	Between 150-250 Million TL	23	85.2	85.2	100
	Total	27	100	100	
Age of the Enterprise	1-5 years	3	11.1	11.1	11.1
	6-10 years	8	29.6	29.6	40.7
	11-15 years	12	44.4	44.4	85.2
	16-20 years	3	11.1	11.1	96.3
	More than 25 years	1	3.7	3.7	100
	Total	27	100	100	
Industry	Electrical	14	51.9	51.9	51.9
	Electronics	13	48.1	48.1	100
	Total	27	100	100	
Family-Owned Business	No	23	85.2	85.2	85.2
	Yes	4	14.8	14.8	100
	Total	27	100	100	
Export Operations	No	5	18.5	18.5	18.5
	Yes	22	81.5	81.5	100
	Total	27	100	100	
Percentage of Exports in Annual Turnover	0	5	18.5	18.5	18.5
	5-14	2	7.4	7.4	25.9
	15-24	14	51.9	51.9	77.8
	25-30	5	18.5	18.5	96.3
	31-60	1	3.7	3.7	100
	Total	27	100	100	

5.1.2 Level of digitalization

As mentioned previously, a 13-item scale was created to evaluate the level of digitalization. According to the results, the majority of respondents (68.4%) report that their firms offer internet access for more than half of their employees. All surveyed SMEs indicate having websites (100%). Majority of SMEs do not employ IT experts (51.9%) or provide IT-related trainings (72.2%). Moreover, most of them do not utilize IoT (88.6%), Big Data Analytics (86.1%), and AI (98.7%). Use of ERP software (74.7%), CRM software (78.5%), and cloud computing (57%), high-speed broadband (59.5%), social media (93.7%), and IT security (74.7%), on the other hand, are highly prevalent (Table 15).

Table 15. Frequencies of Digitalization Indicators and Digital Tools

More than half of the employees have internet access				
	Frequency	Percent	Valid Percent	Cumulative Percent
Present	54	68.4	68.4	68.4
Absent	25	31.6	31.6	100.0
Total	79	100.0	100.0	
Employment of IT experts				
Present	38	48.1	48.1	48.1
Absent	41	51.9	51.9	100.0
Total	79	100.0	100.0	
Organization of IT-related trainings				
Present	22	27.8	27.8	27.8
Absent	57	72.2	72.2	100.0
Total	79	100.0	100.0	
Use of Enterprise Resource Planning (ERP) software				
Present	59	74.7	74.7	74.7
Absent	20	25.3	25.3	100.0
Total	79	100.0	100.0	
Use of Customer Relationship Management (CRM) software				
Present	62	78.5	78.5	78.5
Absent	17	21.5	21.5	100.0
Total	79	100.0	100.0	
Use of cloud computing				
Present	45	57.0	57.0	57.0
Absent	34	43.0	43.0	100.0
Total	79	100.0	100.0	
Website				
Present	79	100.0	100.0	100.0
Social Media				
Present	74	93.7	93.7	93.7
Absent	5	6.3	6.3	100.0
Total	79	100.0	100.0	
High-Speed Broadband				
Present	47	59.5	59.5	59.5
Absent	32	40.5	40.5	100.0
Total	79	100.0	100.0	
Internet of Things (IoT)				
Present	9	11.4	11.4	11.4
Absent	70	88.6	88.6	100.0
Total	79	100.0	100.0	
Big Data Analytics				
Present	11	13.9	13.9	13.9
Absent	68	86.1	86.1	100.0
Total	79	100.0	100.0	
Artificial Intelligence (AI)				
Present	1	1.3	1.3	1.3
Absent	78	98.7	98.7	100.0
Total	79	100.0	100.0	
IT (Information Technology) Security				
Present	59	74.7	74.7	74.7
Absent	20	25.3	25.3	100.0
Total	79	100.0	100.0	

In summary, as shown in Table 16, the mean value of digitalization level for the entire sample is 7.08, based on responses to 13 digitalization tools and indicators, indicating a moderate level of digitalization among the respondents. The majority of the SMEs in the sample fall within the range 5.00-7.00, representing 58.3% percent of the sample.

Table 16. Digitalization Level of Participating SMEs

	Frequency	Percent	Valid Percent	Cumulative Percent
4.00	6	7.6	7.6	7.6
5.00	14	17.7	17.7	25.3
6.00	16	20.3	20.3	45.6
7.00	16	20.3	20.3	65.8
8.00	8	10.1	10.1	75.9
9.00	7	8.9	8.9	84.8
10.00	5	6.3	6.3	91.1
11.00	4	5.1	5.1	96.2
12.00	2	2.5	2.5	98.7
13.00	1	1.3	1.3	100.0
Total	79	100.0	100.0	
Mean	7.08			
Median	7.00			

Level of digitalization was also examined for each company size category. Survey results demonstrate that presence of internet access of more than half of employees, employment of IT experts, organization of IT-related trainings, use of ERP software, and IT security presence increase with company size. Ultimately, the mean value of the digitalization level increases as SME size increases.

In small SMEs, only one company has IoT (3.8%), and big data analytics is nonexistent in these enterprises. Similarly, artificial intelligence is not present in small SMEs, and all of them report that they have websites. All but one report that they also use social media (96.2%) (Table 17).

Table 17. Frequencies of Digitalization Indicators and Digital Tools for Small SMEs

More than half of the employees have internet access				
	Frequency	Percent	Valid Percent	Cumulative Percent
Present	13	50.0	50.0	50.0
Absent	13	50.0	50.0	100.0
Total	26	100.0	100.0	
Employment of IT experts				
Present	4	15.4	15.4	15.4
Absent	22	84.6	84.6	100.0
Total	26	100.0	100.0	
Organization of IT-related trainings				
Present	1	3.8	3.8	3.8
Absent	25	96.2	96.2	100.0
Total	26	100.0	100.0	
Use of Enterprise Resource Planning (ERP) software				
Present	16	61.5	61.5	61.5
Absent	10	38.5	38.5	100.0
Total	26	100.0	100.0	
Use of Customer Relationship Management (CRM) software				
Present	18	69.2	69.2	69.2
Absent	8	30.8	30.8	100.0
Total	26	100.0	100.0	
Use of cloud computing				
Present	15	57.7	57.7	57.7
Absent	11	42.3	42.3	100.0
Total	26	100.0	100.0	
Website				
Present	26	100.0	100.0	100.0
Social Media				
Present	25	96.2	96.2	96.2
Absent	1	3.8	3.8	100.0
Total	26	100.0	100.0	
High-Speed Broadband				
Present	14	53.8	53.8	53.8
Absent	12	46.2	46.2	100.0
Total	26	100.0	100.0	
Internet of Things (IoT)				
Present	1	3.8	3.8	3.8
Absent	25	96.2	96.2	100.0
Total	26	100.0	100.0	
Big Data Analytics				
Absent	26	100.0	100.0	100.0
Artificial Intelligence (AI)				
Absent	26	100.0	100.0	100.0
IT (Information Technology) Security				
Present	15	57.7	57.7	57.7
Absent	11	42.3	42.3	100.0
Total	26	100.0	100.0	

In small SMEs, as can be seen in Table 18, mean value of digitalization is 5.69. It can be said that among small SMEs there is a relatively lower level of digitalization. Additionally, small companies majorly fall within the range of 5.00-7.00 (88.4%).

Table 18. Digitalization Level of Small SMEs

	Frequency	Percent	Valid Percent	Cumulative Percent
4.00	3	11.5	11.5	11.5
5.00	9	34.6	34.6	46.2
6.00	7	26.9	26.9	73.1
7.00	7	26.9	26.9	100.0
Total	26	100.0	100.0	
Mean	5.69			
Median	6.00			

In lower-medium-sized SMEs, respondents report that all of them has websites, and all but one, use social media (96.2%). However, none of the lower-medium-sized SMEs report that they use artificial intelligence, and none of them except one use IoT (96.2%). Lower-medium-sized SMEs indicate that around 85 percent of them use CRM software (Table 19).

Table 19. Frequencies of Digitalization Indicators and Digital Tools for Lower-Medium-Sized SMEs

More than half of the employees have internet access				
	Frequency	Percent	Valid Percent	Cumulative Percent
Present	18	69.2	69.2	69.2
Absent	8	30.8	30.8	100.0
Total	26	100.0	100.0	
Employment of IT experts				
Present	11	42.3	42.3	42.3
Absent	15	57.7	57.7	100.0
Total	26	100.0	100.0	
Organization of IT-related trainings				
Present	3	11.5	11.5	11.5
Absent	23	88.5	88.5	100.0
Total	26	100.0	100.0	
Use of Enterprise Resource Planning (ERP) software				
Present	18	69.2	69.2	69.2
Absent	8	30.8	30.8	100.0
Total	26	100.0	100.0	
Use of Customer Relationship Management (CRM) software				
Present	22	84.6	84.6	84.6
Absent	4	15.4	15.4	100.0
Total	26	100.0	100.0	
Use of cloud computing				
Present	15	57.7	57.7	57.7
Absent	11	42.3	42.3	100.0
Total	26	100.0	100.0	
Website				
Present	26	100.0	100.0	100.0
Social Media				
Present	25	96.2	96.2	96.2
Absent	1	3.8	3.8	100.0
Total	26	100.0	100.0	
High-Speed Broadband				
Present	11	42.3	42.3	42.3
Absent	15	57.7	57.7	100.0
Total	26	100.0	100.0	
Internet of Things (IoT)				
Present	1	3.8	3.8	3.8
Absent	25	96.2	96.2	100.0
Total	26	100.0	100.0	
Big Data Analytics				
Present	3	11.5	11.5	11.5
Absent	23	88.5	88.5	100.0
Total	26	100.0	100.0	
Artificial Intelligence (AI)				
Absent	26	100.0	100.0	100.0
IT (Information Technology) Security				
Present	21	80.8	80.8	80.8
Absent	5	19.2	19.2	100.0
Total	26	100.0	100.0	

In lower-medium-sized SMEs, majority of them report using between 6.00-8.00 of the digital tools and indicators out of 13.00 (65.4%). The mean value is 6.69 as can be seen in Table 20, which indicates a moderate level of digitalization.

Table 20. Digitalization Level of Lower-Medium-Sized SMEs

	Frequency	Percent	Valid Percent	Cumulative Percent
4.00	3	11.5	11.5	11.5
5.00	3	11.5	11.5	23.1
6.00	6	23.1	23.1	46.2
7.00	7	26.9	26.9	73.1
8.00	4	15.4	15.4	88.5
9.00	2	7.7	7.7	96.2
12.00	1	3.8	3.8	100.0
Total	26	100.0	100.0	
Mean	6.69			
Median	7.00			

Finally, in upper-medium-sized SMEs, predominantly, respondents inform that they use ERP software (92.6%), social media (88.9%), and have internet access for more than half of their employees (85.2%). Majority of them employ IT experts (85.2%) and have IT security (85.2%). On the other hand, 96.3% of them state that they do not have AI usage, 74.1% of them do no use IoT, and 70.4% of them do not utilize big data analytics (Table 21).

Table 21. Frequencies of Digitalization Indicators and Digital Tools for Upper-Medium-Sized SMEs

More than half of the employees have internet access				
	Frequency	Percent	Valid Percent	Cumulative Percent
Present	23	85.2	85.2	85.2
Absent	4	14.8	14.8	100.0
Total	27	100.0	100.0	
Employment of IT experts				
Present	23	85.2	85.2	85.2
Absent	4	14.8	14.8	100.0
Total	27	100.0	100.0	
Organization of IT-related trainings				
Present	18	66.7	66.7	66.7
Absent	9	33.3	33.3	100.0
Total	27	100.0	100.0	
Use of Enterprise Resource Planning (ERP) software				
Present	25	92.6	92.6	92.6
Absent	2	7.4	7.4	100.0
Total	27	100.0	100.0	
Use of Customer Relationship Management (CRM) software				
Present	22	81.5	81.5	81.5
Absent	5	18.5	18.5	100.0
Total	27	100.0	100.0	
Use of cloud computing				
Present	15	55.6	55.6	55.6
Absent	12	44.4	44.4	100.0
Total	27	100.0	100.0	
Website				
Present	27	100.0	100.0	100.0
Social Media				
Present	24	88.9	88.9	88.9
Absent	3	11.1	11.1	100.0
Total	27	100.0	100.0	
High-Speed Broadband				
Present	22	81.5	81.5	81.5
Absent	5	18.5	18.5	100.0
Total	27	100.0	100.0	
Internet of Things (IoT)				
Present	7	25.9	25.9	25.9
Absent	20	74.1	74.1	100.0
Total	27	100.0	100.0	
Big Data Analytics				
Present	8	29.6	29.6	29.6
Absent	19	70.4	70.4	100.0
Total	27	100.0	100.0	
Artificial Intelligence (AI)				
Present	1	3.7	3.7	3.7
Absent	26	96.3	96.3	100.0
Total	27	100.0	100.0	
IT (Information Technology) Security				
Present	23	85.2	85.2	85.2
Absent	4	14.8	14.8	100.0
Total	27	100.0	100.0	

As shown in Table 22, majority of the upper-medium-sized SMEs fall in the range between 8.00-11.00 (66.6%) in terms of digitalization. The mean value is 8.81, indicating a relatively high level of digitalization among the respondents.

Table 22. Digitalization Level of Upper-Medium-Sized SMEs

	Frequency	Percent	Valid Percent	Cumulative Percent
5.00	2	7.4	7.4	7.4
6.00	3	11.1	11.1	18.5
7.00	2	7.4	7.4	25.9
8.00	4	14.8	14.8	40.7
9.00	5	18.5	18.5	59.3
10.00	5	18.5	18.5	77.8
11.00	4	14.8	14.8	92.6
12.00	1	3.7	3.7	96.3
13.00	1	3.7	3.7	100.0
Total	27	100.0	100.0	
Mean	8.81			
Median	9.00			

In order to analyze level of digitalization among different size categories, Kruskal-Wallis Test was conducted. As can be seen in Table 23, there is a significant difference among each company size categories ($p < 0.01$).

Table 23. Kruskal-Wallis Test for Level of Digitalization and Company Size

	Company Size Category	N	Mean Rank
Level of Digitalization	10-49 employees	26	24.73
	50-149 employees	26	37.12
	150-250 employees	27	57.48
	Total	79	

Test Statistics[a,b]

	Level of Digitalization
Kruskal-Wallis H	28.283
df	2
Asymp. Sig.	0.000

a. Kruskal Wallis Test

b. Grouping Variable: Company Size Category

Several Mann-Whitney U Tests were conducted to have deep analyses and to explore which pairwise categories are significantly different from each other. Results indicated that there is a statistically significant difference in all pairwise comparisons. Specifically, there are differences between small and lower-medium-sized SMEs ($p < 0.05$), small and upper-medium-sized SMEs ($p < 0.01$), and between lower-medium-sized and upper-medium-sized SMEs ($p < 0.01$).

Table 24. Mann-Whitney U Test for Level of Digitalization and Company Size

Ranks				
	Company Size Category	N	Mean Rank	Sum of Ranks
Level of Digitalization	10-49 employees	26	21.83	567.50
	50-149 employees	26	31.17	810.50
	Total	52		

Test Statistics[a]	
	Level of Digitalization
Mann-Whitney U	216.500
Wilcoxon W	567.500
Z	-2.280
Asymp. Sig. (2-tailed)	0.023
a. Grouping Variable: Company Size Category	

Ranks				
	Company Size Category	N	Mean Rank	Sum of Ranks
Level of Digitalization	10-49 employees	26	16.40	426.50
	150-250 employees	27	37.20	1004.50
	Total	53		

Test Statistics[a]	
	Level of Digitalization
Mann-Whitney U	75.500
Wilcoxon W	426.500
Z	-4.959
Asymp. Sig. (2-tailed)	0.000
a. Grouping Variable: Company Size Category	

Ranks				
	Company Size Category	N	Mean Rank	Sum of Ranks
Level of Digitalization	50-149 employees	26	19.44	505.50
	150-250 employees	27	34.28	925.50
	Total	53		

Test Statistics[a]	
	Level of Digitalization
Mann-Whitney U	154.500
Wilcoxon W	505.500
Z	-3.527
Asymp. Sig. (2-tailed)	0.000
a. Grouping Variable: Company Size Category	

As shown in Table 25, for small SMEs, median value is 6.00, for lower-medium-sized SMEs, it is 7.00, and for upper-medium-sized SMEs, the median is 9.00. The Kruskal-Wallis and Mann-Whitney tests indicated a statistically significant difference in level of digitalization among different size categories. Therefore, it can be said that as company size increases, the level of digitalization increases.

Table 25. Median Values of Level of Digitalization

Level of Digitalization		
Company Size Category	N	Median
10-49 employees	26	6.00
50-149 employees	26	7.00
150-250 employees	27	9.00

5.1.3 Top management support

Regarding top management support, majority of respondents agree that they have top management support for digitalization initiatives of their companies, with a mean value of 3.87. Majority of the respondents (68.4%) provide ratings in the higher range, namely, between 3.75-4.50 (Table 26).

Table 26. Level of Top Management Support for Entire Sample

	Frequency	Percent	Valid Percent	Cumulative Percent
1.00	1	1.3	1.3	1.3
1.25	1	1.3	1.3	2.5
1.75	1	1.3	1.3	3.8
2.50	5	6.3	6.3	10.1
2.75	1	1.3	1.3	11.4
3.00	2	2.5	2.5	13.9
3.25	2	2.5	2.5	16.5
3.50	6	7.6	7.6	24.1
3.75	10	12.7	12.7	36.7
4.00	16	20.3	20.3	57.0
4.25	14	17.7	17.7	74.7
4.50	14	17.7	17.7	92.4
4.75	5	6.3	6.3	98.7
5.00	1	1.3	1.3	100.0
Total	79	100.0	100.0	
Mean	3.87			
Median	4.00			

In small, SMEs, majority of the responses are similar with the entire sample. Predominantly, respondents think that top management supports digitalization adoption, with a mean value of 3.81. Majorly, responses range between 3.50-4.50 (73%), as shown in Table 27.

Table 27. Level of Top Management Support for Small SMEs

	Frequency	Percent	Valid Percent	Cumulative Percent
1.25	1	3.8	3.8	3.8
2.50	2	7.7	7.7	11.5
3.00	2	7.7	7.7	19.2
3.50	3	11.5	11.5	30.8
3.75	3	11.5	11.5	42.3
4.00	4	15.4	15.4	57.7
4.25	5	19.2	19.2	76.9
4.50	4	15.4	15.4	92.3
4.75	1	3.8	3.8	96.2
5.00	1	3.8	3.8	100.0
Total	26	100.0	100.0	
Mean	3.81			
Median	4.00			

In lower-medium-sized SMEs, the most frequent response is rated as 4.00, representing 23.1% of them. Majority of the responses range between 3.75-4.50 (61.5%), and the mean value is 3.71. Therefore, predominantly, the respondents think that top management supported digitalization adoption (Table 28).

Table 28. Level of Top Management Support for Lower-Medium-Sized SMEs

	Frequency	Percent	Valid Percent	Cumulative Percent
1.75	1	3.8	3.8	3.8
2.50	3	11.5	11.5	15.4
2.75	1	3.8	3.8	19.2
3.25	2	7.7	7.7	26.9
3.50	1	3.8	3.8	30.8
3.75	5	19.2	19.2	50.0
4.00	6	23.1	23.1	73.1
4.25	1	3.8	3.8	76.9
4.50	4	15.4	15.4	92.3
4.75	2	7.7	7.7	100.0
Total	26	100.0	100.0	
Mean	3.71			
Median	3.88			

Finally, in upper-medium-sized SMEs, the most frequent response is rated as 4.25 (29.6%). Predominantly, the respondents' answers fall between the range 4.00-4.50 (74%) as can be seen in Table 29. The mean value is 4.07, which suggests that predominantly, respondents view top management as supportive for digitalization initiatives (Table 29).

Table 29. Level of Top Management Support for Upper-Medium-Sized SMEs

	Frequency	Percent	Valid Percent	Cumulative Percent
1.00	1	3.7	3.7	3.7
3.50	2	7.4	7.4	11.1
3.75	2	7.4	7.4	18.5
4.00	6	22.2	22.2	40.7
4.25	8	29.6	29.6	70.4
4.50	6	22.2	22.2	92.6
4.75	2	7.4	7.4	100.0
Total	27	100.0	100.0	
Mean	4.07			
Median	4.25			

In this study, top management support and company size relationship was also assessed. Kruskal-Wallis Test was conducted to find if there is a statistical difference in terms of top management support across company size categories. The results of Kruskal-Wallis test yield a statistical significance ($p < 0.1$) (Table 30).

Table 30. Kruskal-Wallis Test for Top Management Support and Company Size

	Company Size Category	N	Mean Rank
Top Management Support	10-49 employees	26	38.13
	50-149 employees	26	34.21
	150-250 employees	27	47.37
	Total	79	

Test Statistics[a,b]

	Top Management Support
Kruskal-Wallis H	4.716
df	2
Asymp. Sig.	0.095

a. Kruskal Wallis Test
b. Grouping Variable: Company Size Category

In order to have a comprehensive investigation for the relationship between company sizes and top management support, Mann-Whitney tests were conducted. Test was employed for small and lower medium-sized, lower-medium, and upper-medium-sized companies, and small and upper-medium-sized SMEs.

Mann-Whitney tests demonstrated that there is a statistically significant difference only between lower-medium-size and upper-medium-size categories ($p < 0.05$) (Table 31).

Table 31. Mann-Whitney U Test for Top Management Support and Company Size

	Company Size Category	N	Mean Rank	Sum of Ranks
Top Management Support	50-149 employees	26	22.42	583.00
	150-250 employees	27	31.41	848.00
	Total	53		

Test Statistics[a,b]

	Top Management Support
Mann-Whitney U	232.000
Wilcoxon W	583.000
Z	-2.145
Asymp. Sig. (2-tailed)	0.032

a. Grouping Variable: Company Size Category

In order to interpret this result, median values for each group should be used (Pallant, 2016). The median value of lower-medium-sized SMEs is 3.88, while it is 4.25 for upper-medium-sized SMEs. Therefore, upper-medium size category has a higher level of top management support on digitalization than lower-medium size category (Table 32).

Table 32. Median Values of Top Management Support

Top Management Support		
Company Size Category	N	Median
50-149 employees	26	3.88
150-250 employees	27	4.25

5.1.4 Perceived benefits

According to the survey responses, majority of the participants believe that digitalization provides the presented benefits to their companies; the mean value is 4.38 out of five (Table 33). The scores that fall within the range of 4.27-4.55 constitute 58.3% of the overall responses. Therefore, it can be said that respondents associate the list of benefits with digitalization.

Table 33. Level of Perceived Benefits of Entire Sample

	Frequency	Percent	Valid Percent	Cumulative Percent
3.18	1	1.3	1.3	1.3
3.82	3	3.8	3.8	5.1
3.91	1	1.3	1.3	6.3
4.00	1	1.3	1.3	7.6
4.09	6	7.6	7.6	15.2
4.18	7	8.9	8.9	24.1
4.27	10	12.7	12.7	36.7
4.36	12	15.2	15.2	51.9
4.45	11	13.9	13.9	65.8
4.55	13	16.5	16.5	82.3
4.64	5	6.3	6.3	88.6
4.73	4	5.1	5.1	93.7
4.82	1	1.3	1.3	94.9
4.91	3	3.8	3.8	98.7
5.00	1	1.3	1.3	100.0
Total	79	100.0	100.0	
Mean	4.38			
Median	4.36			

The level of perceived benefits from digitalization varies between 3.18 and 5.00 with a mean of 4.37. The score for 65.3% of the small SMEs is between 4.27-4.55 (Table 34).

Table 34. Level of Perceived Benefits of Small SMEs

	Frequency	Percent	Valid Percent	Cumulative Percent
3.18	1	3.8	3.8	3.8
3.82	1	3.8	3.8	7.7
4.09	1	3.8	3.8	11.5
4.18	2	7.7	7.7	19.2
4.27	5	19.2	19.2	38.5
4.36	5	19.2	19.2	57.7
4.45	2	7.7	7.7	65.4
4.55	5	19.2	19.2	84.6
4.64	1	3.8	3.8	88.5
4.73	1	3.8	3.8	92.3
4.91	1	3.8	3.8	96.2
5.00	1	3.8	3.8	100.0
Total	26	100.0	100.0	
Mean	4.37			
Median	4.36			

In lower-medium-sized SMEs, the most frequent score is 4.27 (19.2%). The level of perceived benefits ranges between 3.82 and 4.91 with a mean of 4.39. The score for 73% of the SMEs is between 4.27-4.91.

Table 35. Level of Perceived Benefits of Lower-Medium-Sized SMEs

	Frequency	Percent	Valid Percent	Cumulative Percent
3.82	2	7.7	7.7	7.7
4.00	1	3.8	3.8	11.5
4.09	2	7.7	7.7	19.2
4.18	2	7.7	7.7	26.9
4.27	5	19.2	19.2	46.2
4.36	2	7.7	7.7	53.8
4.45	2	7.7	7.7	61.5
4.55	3	11.5	11.5	73.1
4.64	2	7.7	7.7	80.8
4.73	2	7.7	7.7	88.5
4.82	1	3.8	3.8	92.3
4.91	2	7.7	7.7	100.0
Total	26	100.0	100.0	
Mean	4.39			
Median	4.36			

Finally, for 85.1% of the upper-medium sized SMEs, perceived benefits score ranges between 4.09-4.55, demonstrating that this category of SMEs has high expectations regarding the benefits of digitalization.

Table 36. Level of Perceived Benefits of Upper-Medium-Sized SMEs

	Frequency	Percent	Valid Percent	Cumulative Percent
3.91	1	3.7	3.7	3.7
4.09	3	11.1	11.1	14.8
4.18	3	11.1	11.1	25.9
4.36	5	18.5	18.5	44.4
4.45	7	25.9	25.9	70.4
4.55	5	18.5	18.5	88.9
4.64	2	7.4	7.4	96.3
4.73	1	3.7	3.7	100.0
Total	27	100.0	100.0	
Mean	4.39			
Median	4.45			

Additionally, Kruskal-Wallis test was conducted to examine if there were differences among company categories as far as perceived benefits scores are concerned. However, the results demonstrate that three company size categories do not show a statistically significant difference in terms of perceived benefits ($p > 0.05$). It can be said that company size and benefits that accrue to firms from digitalization are not related.

Table 37. Kruskal-Wallis Test for Perceived Benefits and Company Size

	Company Size Category	N	Mean Rank
Perceived Benefits	10-49 employees	26	39.65
	50-149 employees	26	39.90
	150-250 employees	27	40.43
	Total	79	

Test Statistics[a,b]

	Perceived Benefits
Kruskal-Wallis H	0.016
df	2
Asymp. Sig.	0.992

a. Kruskal Wallis Test

b. Grouping Variable: Company Size

5.1.5 Perceived challenges

The mean value of the overall sample for perceived challenges is 2.81. Thus, it can be stated that SMEs think that they do not or will not face great challenges in digitalization adoption. Scores of respondents are diverse, and the most common score is 3.00 (8.9%).

Table 38. Level of Perceived Challenges of Entire Sample

	Frequency	Percent	Valid Percent	Cumulative Percent
1.23	1	1.3	1.3	1.3
1.31	1	1.3	1.3	2.5
1.38	1	1.3	1.3	3.8
1.46	4	5.1	5.1	8.9
1.54	3	3.8	3.8	12.7
1.62	2	2.5	2.5	15.2
1.69	2	2.5	2.5	17.7
1.77	2	2.5	2.5	20.3
2.00	1	1.3	1.3	21.5
2.08	3	3.8	3.8	25.3
2.15	1	1.3	1.3	26.6
2.23	1	1.3	1.3	27.8
2.31	1	1.3	1.3	29.1
2.38	3	3.8	3.8	32.9
2.46	1	1.3	1.3	34.2
2.54	1	1.3	1.3	35.4
2.62	1	1.3	1.3	36.7
2.69	2	2.5	2.5	39.2
2.77	1	1.3	1.3	40.5
2.85	2	2.5	2.5	43.0
2.92	5	6.3	6.3	49.4
3.00	7	8.9	8.9	58.2
3.08	2	2.5	2.5	60.8
3.15	4	5.1	5.1	65.8
3.23	3	3.8	3.8	69.6
3.31	2	2.5	2.5	72.2
3.38	3	3.8	3.8	75.9
3.46	2	2.5	2.5	78.5
3.54	4	5.1	5.1	83.5
3.62	4	5.1	5.1	88.6
3.92	3	3.8	3.8	92.4
4.00	1	1.3	1.3	93.7
4.08	1	1.3	1.3	94.9
4.15	1	1.3	1.3	96.2
4.31	1	1.3	1.3	97.5
4.46	1	1.3	1.3	98.7
4.54	1	1.3	1.3	100.0
Total	79	100.0	100.0	
Mean	2.81			
Median	3.00			

Similar with the entire sample, scores of the respondents demonstrate diversity within each company size category. The mean value is 2.91, and the most frequent score is 3.00 (15.4%) for small SMEs (Table 39).

Table 39. Level of Perceived Challenges of Small SMEs

	Frequency	Percent	Valid Percent	Cumulative Percent
1.46	1	3.8	3.8	3.8
1.69	1	3.8	3.8	7.7
2.08	1	3.8	3.8	11.5
2.23	1	3.8	3.8	15.4
2.38	2	7.7	7.7	23.1
2.46	1	3.8	3.8	26.9
2.77	1	3.8	3.8	30.8
2.85	1	3.8	3.8	34.6
2.92	3	11.5	11.5	46.2
3.00	4	15.4	15.4	61.5
3.08	1	3.8	3.8	65.4
3.15	2	7.7	7.7	73.1
3.38	2	7.7	7.7	80.8
3.54	2	7.7	7.7	88.5
3.62	1	3.8	3.8	92.3
3.92	2	7.7	7.7	100.0
Total	26	100.0	100.0	
Mean	2.91			
Median	3.00			

As can be seen in Table 40, the mean value, which is 3.09, is the highest in lower-medium-sized SMEs compared to other company size categories. The most common score among them is 3.62, with 11.5% of the SMEs having this score.

Table 40. Level of Perceived Challenges of Lower-Medium-Sized SMEs

	Frequency	Percent	Valid Percent	Cumulative Percent
1.23	1	3.8	3.8	3.8
1.54	1	3.8	3.8	7.7
1.62	2	7.7	7.7	15.4
2.08	1	3.8	3.8	19.2
2.15	1	3.8	3.8	23.1
2.54	1	3.8	3.8	26.9
2.92	2	7.7	7.7	34.6
3.00	2	7.7	7.7	42.3
3.15	1	3.8	3.8	46.2
3.23	1	3.8	3.8	50.0
3.31	1	3.8	3.8	53.8
3.46	2	7.7	7.7	61.5
3.54	2	7.7	7.7	69.2
3.62	3	11.5	11.5	80.8
4.00	1	3.8	3.8	84.6
4.08	1	3.8	3.8	88.5
4.15	1	3.8	3.8	92.3
4.31	1	3.8	3.8	96.2
4.54	1	3.8	3.8	100.0
Total	26	100.0	100.0	
Mean	3.09			
Median	3.27			

Mean value is the lowest in the upper-medium-sized SMEs, indicating that this category of firms is more confident in that they can cope with challenges of digitalization adoption more easily (Table 41). Responses are diverse, ranging from 1.31-4.46. The most frequent score is 1.46 with three respondents' and it is 11.1% of the participants.

Based on these findings, the perception of challenges in digitalization adoption seems to differ according to the company sizes. However, in order to explore if there is a statistically significant difference among different company size categories in terms of perceived challenges, Kruskal-Wallis test was conducted.

Table 41. Level of Perceived Challenges of Upper-Medium-Sized SMEs

	Frequency	Percent	Valid Percent	Cumulative Percent
1.31	1	3.7	3.7	3.7
1.38	1	3.7	3.7	7.4
1.46	3	11.1	11.1	18.5
1.54	2	7.4	7.4	25.9
1.69	1	3.7	3.7	29.6
1.77	2	7.4	7.4	37.0
2.00	1	3.7	3.7	40.7
2.08	1	3.7	3.7	44.4
2.31	1	3.7	3.7	48.1
2.38	1	3.7	3.7	51.9
2.62	1	3.7	3.7	55.6
2.69	2	7.4	7.4	63.0
2.85	1	3.7	3.7	66.7
3.00	1	3.7	3.7	70.4
3.08	1	3.7	3.7	74.1
3.15	1	3.7	3.7	77.8
3.23	2	7.4	7.4	85.2
3.31	1	3.7	3.7	88.9
3.38	1	3.7	3.7	92.6
3.92	1	3.7	3.7	96.3
4.46	1	3.7	3.7	100.0
Total	27	100.0	100.0	
Mean	2.44			
Median	2.39			

Kruskal-Wallis test demonstrate that there is a statistically significant difference among company size categories ($p < 0.05$) in perception of challenges of digitalization adoption.

Table 42. Kruskal-Wallis Test for Perceived Challenges and Company Size

	Company Size Category	N	Mean Rank
Perceived Challenges	10-49 employees	26	42.06
	50-149 employees	26	48.48
	150-250 employees	27	29.85
	Total	79	

Test Statistics[a,b]

	Perceived Challenges
Kruskal-Wallis H	9.056
df	2
Asymp. Sig.	0.011

a. Kruskal Wallis Test
b. Grouping Variable: Company Size Category

Further analyses with Mann-Whitney tests revealed that upper-medium companies are statistically significantly different from both small and lower-medium sized firms ($p < 0.05$ for both). Median values of small and lower-medium-sized SMEs are 3.00 and 3.27, respectively while the same figure is 2.39 for upper-medium-sized SMEs. Therefore, it can be said that upper-medium-sized SMEs feel less challenged than small and lower-medium-sized SMEs (Table 43 and Table 44).

Table 43. Mann-Whitney U Tests for Perceived Challenges and Company Size

	Company Size Category	N	Mean Rank	Sum of Ranks
Perceived Challenges	50-149 employees	26	32.83	853.50
	150-250 employees	27	21.39	577.50
	Total	53		

Test Statistics[a]	
	Perceived Challenges
Mann-Whitney U	199.500
Wilcoxon W	577.500
Z	-2.697
Asymp. Sig. (2-tailed)	0.007

a. Grouping Variable: Company Size Category

	Company Size Category	N	Mean Rank	Sum of Ranks
Perceived Challenges	10-49 employees	26	31.71	824.50
	150-250 employees	27	22.46	606.50
	Total	53		

Test Statistics[a]	
	Perceived Challenges
Mann-Whitney U	228.500
Wilcoxon W	606.500
Z	-2.182
Asymp. Sig. (2-tailed)	0.029

a. Grouping Variable: Company Size Category

Table 44. Medians of Perceived Challenges in Different Company Sizes

Perceived Challenges		
Company Size Category	N	Median
10-49 employees	26	3.00
50-149 employees	26	3.27
150-250 employees	27	2.39
Total	79	3.00

5.1.6 Level of institutionalization

Although institutionalization score is 0.75 for slightly more than one third of the sample, pointing out to a relatively high score of institutionalization, it is 0.00 for 27.8% of the sample. The overall mean score is 0.52 (Table 45).

Table 45. Level of Institutionalization of Entire Sample

	Frequency	Percent	Valid Percent	Cumulative Percent
0.00	22	27.8	27.8	27.8
0.25	6	7.6	7.6	35.4
0.50	10	12.7	12.7	48.1
0.75	27	34.2	34.2	82.3
1.00	14	17.7	17.7	100.0
Total	79	100.0	100.0	
Mean	.52			
Median	.75			

A detailed examination was held for each company size category to evaluate level of institutionalization. In small SMEs, half of the firms have an institutionalization score of 0.00, demonstrating that none of the predictors of institutionalization are valid for them. The mean value for this group is 0.35 (Table 46).

Table 46. Level of Institutionalization of Small SMEs

	Frequency	Percent	Valid Percent	Cumulative Percent
0.00	13	50.0	50.0	50.0
0.25	1	3.8	3.8	53.8
0.50	2	7.7	7.7	61.5
0.75	8	30.8	30.8	92.3
1.00	2	7.7	7.7	100.0
Total	26	100.0	100.0	
Mean	0.35			
Median	0.125			

In lower-medium size category, level of institutionalization is slightly higher with a mean value of 0.48. In this category, slightly more than 30 percent of the firms have a score of 0.75, displaying a moderate level of institutionalization (Table 47).

Table 47. Level of Institutionalization of Lower-Medium-Sized SMEs

	Frequency	Percent	Valid Percent	Cumulative Percent
0.00	6	23.1	23.1	23.1
0.25	4	15.4	15.4	38.5
0.50	5	19.2	19.2	57.7
0.75	8	30.8	30.8	88.5
1.00	3	11.5	11.5	100.0
Total	26	100.0	100.0	
Mean	0.48			
Median	0.50			

In upper-medium size category, institutionalization score varies between 0.00 and 1.00 with a mean of 0.70. This is the highest mean among three size categories. The most common score in this category is 0.75, similar to lower-medium size category (Table 48).

Table 48. Level of Institutionalization of Upper-Medium-Sized SMEs

	Frequency	Percent	Valid Percent	Cumulative Percent
0.00	3	11.1	11.1	11.1
0.25	1	3.7	3.7	14.8
0.50	3	11.1	11.1	25.9
0.75	11	40.7	40.7	66.7
1.00	9	33.3	33.3	100.0
Total	27	100.0	100.0	
Mean	0.70			
Median	0.75			

Kruskal-Wallis test indicates that there are statistically significant differences among three categories ($p < 0.05$) in terms of level of institutionalization (Table 49).

Table 49. Kruskal-Wallis Test for Level of Institutionalization and Company Size

	Company Size Category	N	Mean Rank
Level of Institutionalization	10-49 employees	26	30.88
	50-149 employees	26	37.38
	150-250 employees	27	51.30
	Total	79	

Test Statistics[a,b]

	Level of Institutionalization
Kruskal-Wallis H	11.800
df	2
Asymp. Sig.	0.003

a. Kruskal Wallis Test
b. Grouping Variable: Company Size Category

As shown in Table 50 and Table 51, Mann-Whitney tests were employed to explore the pairwise differences. There are significant differences between lower-medium-sized (median value as 0.50) and upper-medium-sized SMEs (median value as 0.75) as well as between small (median value as 0.125), and upper-medium-sized SMEs ($p < 0.05$). In both comparisons, upper-medium size category has a higher level of institutionalization compared to small and lower-medium-sized SMEs.

Table 50. Mann-Whitney U Tests for Level of Institutionalization and Company Size

	Company Size Category	N	Mean Rank	Sum of Ranks
Level of Institutionalization	50-149 employees	26	21.88	569.00
	150-250 employees	27	31.93	862.00
	Total	53		

Test Statistics[a]	
	Level of Institutionalization
Mann-Whitney U	218.000
Wilcoxon W	569.000
Z	-2.449
Asymp. Sig. (2-tailed)	0.014

a. Grouping Variable: Company Size Category

	Company Size Category	N	Mean Rank	Sum of Ranks
Level of Institutionalization	10-49 employees	26	20.38	530.00
	150-250 employees	27	33.37	901.00
	Total	53		

Test Statistics[a]	
	Level of Institutionalization
Mann-Whitney U	179.000
Wilcoxon W	530.000
Z	-3.196
Asymp. Sig. (2-tailed)	0.001

a. Grouping Variable: Company Size Category

Table 51. Medians of Level of Institutionalization in Different Company Sizes

Level of Institutionalization 94-97		
Company Size Category	N	Median
10-49 employees	26	0.125
50-149 employees	26	0.50
150-250 employees	27	0.75

5.1.7 Investment in digitalization

For all categories, majority of the respondents (51.9 %) report that their companies do not have investment in digitalization. As company size increases, investment in digitalization presence increases. In small SMEs, only 23.1% have digitalization investments, while in lower-medium-sized SMEs, the percentage increases to 46.2%. Finally, in upper-medium-sized SMEs, 74% of the respondents indicate that they have investments in digitalization.

Table 52. Investment in Digitalization

		Frequency	Percent	Valid Percent	Cumulative Percent
Entire Sample	Yes	38	48.1	48.1	48.1
	No	41	51.9	51.9	100.0
	Total	79	100.0	100.0	
Small SMEs	Yes	6	23.1	23.1	23.1
	No	20	76.9	76.9	100.0
	Total	26	100.0	100.0	
Lower-Medium-Sized SMEs	Yes	12	46.2	46.2	46.2
	No	14	53.8	53.8	100.0
	Total	26	100.0	100.0	
Upper-Medium-Sized SMEs	Yes	20	74.1	74.1	74.1
	No	7	25.9	25.9	100.0
	Total	27	100.0	100.0	

Kruskal-Wallis analysis demonstrate that there is a statistically significant difference among different company sizes in terms of investment in digitalization where $p < 0.005$ (Table 53).

Table 53. Kruskal-Wallis Test for Investment in Digitalization and Company Size

	Company Size Category	N	Mean Rank
Digitalization Budget	10-49 employees	26	30.12
	50-149 employees	26	39.23
	150-250 employees	27	50.26
	Total	79	

Test Statistics[a,b]

	Digitalization Budget
Kruskal-Wallis H	13.682
df	2
Asymp. Sig.	0.001

a. Kruskal Wallis Test
b. Grouping Variable: Company Size Category

Thus, Mann-Whitney tests were employed to explore which pairs of company sizes differ significantly in terms of investment in digitalization. According to the analyses, two of the pairs have significant difference. Between lower-medium and upper-medium-sized SMEs, there is a statistically significant difference in the context of digitalization investment ($p < 0.05$). Similarly, there is also a statistically significant difference between small and upper-medium-sized SMEs, in terms of investment in digitalization ($p < 0.05$) (Table 54).

Table 54. Mann-Whitney U Tests for Investment in Digitalization and Company Size

	Company Size Category	N	Mean Rank	Sum of Ranks
Digitalization Budget	50-149 employees	26	23.23	604.00
	150-250 employees	27	30.63	827.00
	Total	53		

Test Statistics[a]

	Digitalization Budget
Mann-Whitney U	253.000
Wilcoxon W	604.000
Z	-2.058
Asymp. Sig. (2-tailed)	0.040

	Company Size Category	N	Mean Rank	Sum of Ranks
Digitalization Budget	10-49 employees	26	20.12	523.00
	150-250 employees	27	33.63	908.00
	Total	53		

	Digitalization Budget
Mann-Whitney U	172.000
Wilcoxon W	523.000
Z	-3.677
Asymp. Sig. (2-tailed)	0.000

a. Grouping Variable: Company Size Category

5.1.8 Existence of an IT department

As shown in Table 55, across all company size categories, majority of the SMEs do not have an IT department (64.6%). Specifically, none of the small SMEs have an IT department. For lower-medium-sized SMEs, the presence of an IT department is seen in only 23.1% of the category. In contrast, more than super majority of the upper-medium-sized SMEs have an IT department (81.5%).

Table 55. Existence of an IT Department

		Frequency	Percent	Valid Percent	Cumulative Percent
Entire Sample	Yes	28	35.4	35.4	35.4
	No	51	64.6	64.6	100.0
	Total	79	100.0	100.0	
Small SMEs	No	26	100.0	100.0	100.0
Lower-Medium-Sized SMEs	Yes	6	23.1	23.1	23.1
	No	20	76.9	76.9	100.0
	Total	26	100.0	100.0	
Upper-Medium-Sized SMEs	Yes	22	81.5	81.5	81.5
	No	5	18.5	18.5	100.0
	Total	27	100.0	100.0	

Kruskal-Wallis analysis reveal a statistically significant difference among different company sizes in terms of existence of an IT department ($p < 0.001$) (Table 56).

Table 56. Kruskal-Wallis Test for Existence of an IT Department and Company Size

	Company Size Category	N	Mean Rank
IT Department	10-49 employees	26	26.00
	50-149 employees	26	35.12
	150-250 employees	27	58.19
	Total	79	

Test Statistics[a,b]	
	IT Department
Kruskal-Wallis H	40.504
df	2
Asymp. Sig.	0.000

a. Kruskal Wallis Test
b. Grouping Variable: Company Size Category

Mann-Whitney tests were employed to explore which pairs of company sizes differ significantly in terms of existence of an IT department. According to the results, all pairwise comparisons exhibit a significant difference, with p values less than 0.001. In conclusion, with the increase of the company size, IT department presence increases (Table 57).

Table 57. Mann-Whitney U Tests for Existence of an IT Department and Company Size

	Company Size Category	N	Mean Rank	Sum of Ranks
IT Department	10-49 employees	26	23.50	611.00
	50-149 employees	26	29.50	767.00
	Total	52		

Test Statistics[a]

	IT Department
Mann-Whitney U	260.000
Wilcoxon W	611.000
Z	-2.579
Asymp. Sig. (2-tailed)	0.010

a. Grouping Variable: Company Size Category

	Company Size Category	N	Mean Rank	Sum of Ranks
IT Department	50-149 employees	26	19.12	497.00
	150-250 employees	27	34.59	934.00
	Total	53		

Test Statistics[a]

	IT Department
Mann-Whitney U	146.000
Wilcoxon W	497.000
Z	-4.218
Asymp. Sig. (2-tailed)	0.000

a. Grouping Variable: Company Size Category

	Company Size Category	N	Mean Rank	Sum of Ranks
IT Department	10-49 employees	26	16.00	416.00
	150-250 employees	27	37.59	1015.00
	Total	53		

Test Statistics[a]

	IT Department
Mann-Whitney U	65.000
Wilcoxon W	416.000
Z	-5.961
Asymp. Sig. (2-tailed)	0.000

a. Grouping Variable: Company Size Category

5.2 Inter-Correlation analysis of the variables for all and different company sizes categories

Spearman's correlation analysis was conducted to evaluate the relationship between the dependent variable and independent variables, due to the non-normal distribution of the sample. Table 58 presents the correlation matrix of all variables.

The strongest positive correlation (Correlation coefficient: 0.719) is between existence of an IT department and level of digitalization ($p < 0.001$). This is followed by existence of investment in IT and level of digitalization (Correlation coefficient is 0.693 and $p < 0.001$). Level of digitalization also has positive moderate correlations with company size (Correlation coefficient is 0.597 and $p < 0.001$) and level of institutionalization (correlation coefficient is 0.384 and $p < 0.001$). Thus, correlation analysis points out to that larger and more institutionalized SMEs with IT departments and investments in IT tend to have higher levels of digitalization (Table 58).

Table 58. Inter-Correlation Analysis of the Variables of Entire Sample

Spearman's rho									
		Level of Dig.	TMS	PB	PC	CS	Level of Ins.	Inv. in Dig.	Existence of an IT Dept.
Level of Digitalization	Correlation Coefficient	1.000	0.173	0.173	-0.111	.597**	.384**	.693**	.719**
	Sig. (2-tailed)		0.127	0.127	0.328	0.000	0.000	0.000	0.000
	N	79	79	79	79	79	79	79	79
Top Management Support	Correlation Coefficient	0.173	1.000	.261*	-.315**	0.171	-0.040	0.065	0.063
	Sig. (2-tailed)	0.127		0.020	0.005	0.133	0.725	0.572	0.583
	N	79	79	79	79	79	79	79	79
Perceived Benefits	Correlation Coefficient	0.173	.261*	1.000	-0.088	0.014	-0.012	0.182	0.158
	Sig. (2-tailed)	0.127	0.020		0.442	0.902	0.917	0.108	0.165
	N	79	79	79	79	79	79	79	79
Perceived Challenges	Correlation Coefficient	-0.111	-.315**	-0.088	1.000	-.224*	0.186	0.044	-0.069
	Sig. (2-tailed)	0.328	0.005	0.442		0.048	0.100	0.701	0.545
	N	79	79	79	79	79	79	79	79
Company Size	Correlation Coefficient	.597**	0.171	0.014	-.224*	1.000	.381**	.418**	.700**
	Sig. (2-tailed)	0.000	0.133	0.902	0.048		0.001	0.000	0.000
	N	79	79	79	79	79	79	79	79
Level of Institutionalization	Correlation Coefficient	.384**	-0.040	-0.012	0.186	.381**	1.000	.413**	.417**
	Sig. (2-tailed)	0.000	0.725	0.917	0.100	0.001		0.000	0.000
	N	79	79	79	79	79	79	79	79
Investment in Digitalization	Correlation Coefficient	.693**	0.065	0.182	0.044	.418**	.413**	1.000	.611**
	Sig. (2-tailed)	0.000	0.572	0.108	0.701	0.000	0.000		0.000
	N	79	79	79	79	79	79	79	79
Existence of an IT Department	Correlation Coefficient	.719**	0.063	0.158	-0.069	.700**	.417**	.611**	1.000
	Sig. (2-tailed)	0.000	0.583	0.165	0.545	0.000	0.000	0.000	
	N	79	79	79	79	79	79	79	79

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Spearman’s correlation analyses were also conducted for each company size category. In small SMEs, there are no IT departments, therefore it is excluded from correlation analysis. Only investment in digitalization has a statistically significant correlation with level of digitalization and it is a moderate positive correlation (Correlation coefficient: .457, and $p < 0.005$). The results suggest that level of digitalization covaries with existence of digitalization investment for small SMEs.

Table 59. Inter-Correlation Analysis of the Variables of Small SMEs

		Level of Digitalization	Top Management Support	Perceived Benefits	Perceived Challenges	Level of Institutionalization	Digitalization Budget
Level of Dig.	Corr. Coef.	1.000	0.305	0.105	-0.228	-0.009	.457*
	Sig. (2-tailed)		0.130	0.609	0.263	0.967	0.019
	N	26	26	26	26	26	26
TMS	Corr. Coef.	0.305	1.000	.398*	-0.209	-0.064	0.252
	Sig. (2-tailed)	0.130		0.044	0.305	0.755	0.215
	N	26	26	26	26	26	26
PB	Corr. Coef.	0.105	.398*	1.000	-0.387	-.467*	0.326
	Sig. (2-tailed)	0.609	0.044		0.051	0.016	0.104
	N	26	26	26	26	26	26
PC	Corr. Coef.	-0.228	-0.209	-0.387	1.000	0.264	-0.128
	Sig. (2-tailed)	0.263	0.305	0.051		0.193	0.532
	N	26	26	26	26	26	26
Level of Ins.	Corr. Coef.	-0.009	-0.064	-.467*	0.264	1.000	0.086
	Sig. (2-tailed)	0.967	0.755	0.016	0.193		0.676
	N	26	26	26	26	26	26
Inv. in Dig.	Corr. Coef.	.457*	0.252	0.326	-0.128	0.086	1.000
	Sig. (2-tailed)	0.019	0.215	0.104	0.532	0.676	
	N	26	26	26	26	26	26

*. Correlation is significant at the 0.05 level (2-tailed).

For lower-medium size category, existence of a digitalization budget (Correlation coefficient: 0.703 and $p < 0.001$) and IT department (Correlation coefficient as 0.589 and $p < 0.005$) demonstrate statistically significant and positive correlations with level of digitalization. Therefore, as for the entire sample, these two variables covary with the level of digitalization for this category of SMEs.

Table 60. Inter-Correlation Analysis of the Variables of Lower-Medium-Sized SMEs

		Level of Digitalization	Top Management Support	Perceived Benefits	Perceived Challenges	Level of Institutionalization	Digitalization Budget	IT Department
Level of Digitalization	Corr. Coef.	1.000	0.183	0.108	0.163	0.055	.703**	.589**
	Sig. (2-tailed)		0.370	0.600	0.425	0.790	0.000	0.002
	N	26	26	26	26	26	26	26
Top Management Support	Corr. Coef.	0.183	1.000	0.226	-0.116	0.020	0.000	0.080
	Sig. (2-tailed)	0.370		0.266	0.573	0.922	1.000	0.697
	N	26	26	26	26	26	26	26
Perceived Benefits	Corr. Coef.	0.108	0.226	1.000	0.287	0.142	0.000	0.214
	Sig. (2-tailed)	0.600	0.266		0.155	0.489	1.000	0.293
	N	26	26	26	26	26	26	26
Perceived Challenges	Corr. Coef.	0.163	-0.116	0.287	1.000	0.368	0.309	0.158
	Sig. (2-tailed)	0.425	0.573	0.155		0.064	0.124	0.439
	N	26	26	26	26	26	26	26
Level of Institutionalization	Corr. Coef.	0.055	0.020	0.142	0.368	1.000	0.217	0.088
	Sig. (2-tailed)	0.790	0.922	0.489	0.064		0.288	0.671
	N	26	26	26	26	26	26	26
Digitalization Budget	Corr. Coef.	.703**	0.000	0.000	0.309	0.217	1.000	.592**
	Sig. (2-tailed)	0.000	1.000	1.000	0.124	0.288		0.001
	N	26	26	26	26	26	26	26
IT Department	Corr. Coef.	.589**	0.080	0.214	0.158	0.088	.592**	1.000
	Sig. (2-tailed)	0.002	0.697	0.293	0.439	0.671	0.001	
	N	26	26	26	26	26	26	26

**. Correlation is significant at the 0.01 level (2-tailed).

Finally, in upper-medium size category, four variables exhibited statistical significance in relation to the level of digitalization. These variables are investment in digitalization (Correlation Coefficient: 0.592, $p < 0.005$), existence of an IT department (Correlation Coefficient: 0.550, $p < 0.005$), perceived benefits (Correlation Coefficient: 0.485, $p < 0.05$), and level of institutionalization (Correlation Coefficient: 0.388, $p < 0.05$). Therefore, it is possible to say that more institutionalized SMEs which perceive more benefits from digitalization and, have an IT budget and department tend to have higher levels of digitalization.

Table 61. Inter-Correlation Analysis of the Variables of Upper-Medium-Sized SMEs

		Level of Digitalization	Top Management Support	Perceived Benefits	Perceived Challenges	Level of Institutionalization	Digitalization Budget	IT Department
Level of Digitalization	Corr. Coef.	1.000	-0.312	.485*	-0.099	.388*	.592**	.550**
	Sig. (2-tailed)		0.113	0.010	0.622	0.045	0.001	0.003
	N	27	27	27	27	27	27	27
Top Management Support	Corr. Coef.	-0.312	1.000	0.115	-.485*	-0.365	-0.356	-.458*
	Sig. (2-tailed)	0.113		0.568	0.010	0.061	0.068	0.016
	N	27	27	27	27	27	27	27
Perceived Benefits	Corr. Coef.	.485*	0.115	1.000	-0.310	0.238	0.353	0.373
	Sig. (2-tailed)	0.010	0.568		0.115	0.233	0.071	0.055
	N	27	27	27	27	27	27	27
Perceived Challenges	Corr. Coef.	-0.099	-.485*	-0.310	1.000	.404*	0.158	0.337
	Sig. (2-tailed)	0.622	0.010	0.115		0.037	0.433	0.086
	N	27	27	27	27	27	27	27
Level of Institutionalization	Corr. Coef.	.388*	-0.365	0.238	.404*	1.000	.597**	.466*
	Sig. (2-tailed)	0.045	0.061	0.233	0.037		0.001	0.014
	N	27	27	27	27	27	27	27
Digitalization Budget	Corr. Coef.	.592**	-0.356	0.353	0.158	.597**	1.000	.588**
	Sig. (2-tailed)	0.001	0.068	0.071	0.433	0.001		0.001
	N	27	27	27	27	27	27	27
IT Department	Corr. Coef.	.550**	-.458*	0.373	0.337	.466*	.588**	1.000
	Sig. (2-tailed)	0.003	0.016	0.055	0.086	0.014	0.001	
	N	27	27	27	27	27	27	27

**. Correlation is significant at the 0.01 level (2-tailed).

5.3 Hypothesis testing

5.3.1 Regression analysis

Linear regression analysis was conducted to identify the factors influencing the extent of digitalization in the surveyed SMEs. The model has an adjusted R^2 score of 0.617 and is significant at $p < 0.001$ level, VIF values are less than 5.00. Thus, the model does not have a multi-collinearity problem.

The analysis demonstrates that investment in digitalization and existence of an IT department are statistically significant predictors of level of digitalization ($p < 0.001$) (Table 62, Table 63, Table 64, and Table 65).

These results indicate that SMEs investing in digitalization initiatives and those with dedicated IT departments tend to demonstrate a higher level of digitalization. However, other independent variables including top management support, perceived benefits, perceived challenges, company size, and level of institutionalization do not display statistical significance in determining the extent of digitalization within surveyed SMEs. In summary, the extent of digitalization is determined by the actions of enterprises such as investment initiatives and presence of a committed IT department. The results of hypothesis testing are presented in Table 66.

Table 62. Descriptive Statistics of the Variables

	Mean	Std. Deviation	N
Extent of Digitalization	7.0886	2.13752	79
Top Management Support	3.8671	0.77194	79
Perceived Benefits	4.3820	0.28391	79
Perceived Challenges	2.8072	0.84381	79
Company Size	2.01	0.824	79
Level of Institutionalization	0.5158	0.37626	79
Existence of an IT Department	0.35	0.481	79
Investment in Digitalization	0.48	0.503	79

Table 63. Model Summary and ANOVA

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.807[a]	0.651	0.617	1.32329

a. Predictors: (Constant), Level of Institutionalization, Perceived Benefits, Perceived Challenges, Investment in Digitalization, Top Management Support, Company Size, Existence of an IT Department

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	232.051	7	33.150	18.931	<.001[b]
	Residual	124.329	71	1.751		
	Total	356.380	78			

a. Dependent Variable: Extent of Digitalization

b. Predictors: (Constant), Level of Institutionalization, Perceived Benefits, Perceived Challenges, Investment in Digitalization, Top Management Support, Company Size, Existence of an IT Department

Table 64. Coefficients

Coefficients[a]													
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	3.541	2.513		1.409	0.163	-1.469	8.551					
	Top Management Support	0.066	0.227	0.024	0.292	0.771	-0.387	0.520	0.196	0.035	0.020	0.729	1.371
	Perceived Benefits	0.439	0.587	0.058	0.749	0.456	-0.730	1.609	0.197	0.089	0.053	0.809	1.235
	Perceived Challenges	-0.257	0.207	-0.101	-1.243	0.218	-0.669	0.155	-0.163	-0.146	-0.087	0.737	1.356
	Company Size	0.360	0.270	0.139	1.332	0.187	-0.179	0.899	0.603	0.156	0.093	0.452	2.213
	Level of Institutionalization	0.040	0.478	0.007	0.084	0.933	-0.913	0.993	0.357	0.010	0.006	0.695	1.440
	Investment in Digitalization	1.416	0.391	0.333	3.622	0.001	0.637	2.196	0.664	0.395	0.254	0.581	1.722
	Existence of an IT Department	1.863	0.510	0.419	3.652	0.000	0.846	2.879	0.742	0.398	0.256	0.372	2.685

Table 65. Collinearity Diagnostics

Collinearity Diagnostics[a]											
				Variance Proportions							
Model	Dim.	Eigenvalue	Condition Index	(Constant)	TMS	PB	PC	CS	Level of Institutionalization	Investment in Digitalization	Existence of an IT Department
1	1	6.620	1.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2	0.753	2.965	0.00	0.00	0.00	0.01	0.00	0.00	0.09	0.15
	3	0.239	5.266	0.00	0.00	0.00	0.00	0.03	0.01	0.76	0.28
	4	0.232	5.338	0.00	0.00	0.00	0.00	0.00	0.86	0.07	0.02
	5	0.093	8.457	0.00	0.03	0.00	0.37	0.16	0.04	0.01	0.24
	6	0.048	11.783	0.00	0.18	0.00	0.12	0.67	0.04	0.03	0.27
	7	0.014	22.059	0.07	0.75	0.05	0.50	0.10	0.04	0.01	0.00
	8	0.002	60.283	0.93	0.04	0.94	0.00	0.05	0.00	0.01	0.03

a. Dependent Variable: Level of Digitalization

Table 66. The Results of the Hypothesis Testing

Hypothesis No	Hypothesis Developed	Result
1	Top management support is expected to have a positive impact on the extent of digitalization.	Not Supported
2	Perceived benefits are expected to have a positive impact on the extent of digitalization.	Not Supported
3	Perceived challenges are expected to have a negative impact on the extent of digitalization.	Not Supported
4	Size is expected to have a positive impact on the extent of digitalization.	Not Supported
5	The level of institutionalization is expected to have a positive impact on the extent of digitalization.	Not Supported
6	Existence of investment in digitalization is expected to have a positive impact on the extent of digitalization.	Supported
7	Existence of an IT department is expected to have a positive impact on the extent of digitalization.	Supported

CHAPTER 6

CONCLUSION

SMEs play a crucial role in economic and social development of countries globally. In both developed and developing countries, SMEs are recognized as backbones of the economy which drive growth. Specifically, in developing countries, SMEs' contribution to alleviate poverty, inequality, and unemployment cannot be underestimated (World Economic Forum, 2022). In Türkiye, 99.7% of the businesses are SMEs (TURKSTAT, 2022). It is a remarkable ratio which draws attention to SMEs' contribution to the Turkish economy by creating new job opportunities and fostering economic growth and social development.

Importance of digitalization is increasingly recognized globally and firms, particularly smaller-scale ones like SMEs, encounter both benefits and challenges of adopting digitalization. SMEs face both internal constraints such as lack of resources, and deficient infrastructure, as well as external pressures to compete against their rivals and larger counterparts. In order to stay competitive, companies must respond effectively by digitalization adoption initiatives.

As previously mentioned, one of the main constraints encountered by SMEs is limited financial resources. Sufficient financial resources can lead prioritizing digitalization strategies in SMEs. Another challenge is lack of infrastructure and IT can be included in this category. The capabilities of IT department are related with the successful digital transformation. Existence of a committed IT department, equipped with technical expertise, and sufficient human capital, has a positive impact on digitalization adoption.

The purpose of this study is to examine the impact of various factors on the extent of digitalization in Turkish SMEs, specifically focusing on the electrical and electronics industry a mature industry which has accumulated a significant level of technical expertise and continues to develop. The factors under consideration include top management support, perceived benefits, perceived challenges, company size, level of institutionalization, investment in digitalization, existence of an IT department. Seven hypotheses were developed and two of the independent variables were statistically significant.

Top management support is recognized as one of the key facilitators for digitalization. Successful adoption and sustainability of digitalization can be achieved with support of top management. Decision of digitalization adoption in SMEs is shaped by the perceived benefits that new technologies can provide. It was expected that perception of more benefits leads to increase the extent of digitalization. However, there are some barriers that SMEs face while adopting digitalization, and these perceived challenges were considered to have a negative impact on the extent of digitalization. On the other hand, SME size was considered a determinant that has an impact on extent of digitalization. Additionally, level of institutionalization, defined as processes for establishing formal structures, was expected to contribute to the extent of digitalization in SMEs. Finally, investment in digitalization and existence of an IT department, the concrete actions that SMEs can take, were suggested to have a positive impact on extent of digitalization.

For the entire sample as well as different company size categories, each variable is investigated by conducting non-parametric tests of Kruskal-Wallis and Mann-Whitney. With these non-parametric tests, the relationship between company size and other variables was analyzed. Results suggested that with the increase of

SME size, level of digitalization and IT department presence increase. Upper-medium-sized SMEs feel less challenged, have higher level of institutionalization, and their tendency to invest in digitalization is higher than small and lower-medium-sized SMEs. The only statistically significant difference between lower-medium and upper-medium-sized SMEs emerged in the level of top management support. Perceived benefits from digitalization, on the other hand, is high regardless of size category.

Among explored determinants of digitalization, although top management support is recognized as one of the key facilitators for digitalization adoption, it did not yield a statistically significance impact in the analyses of this thesis. Additionally, despite the common belief that, perceived benefits shape digitalization decisions, this variable did not demonstrate a strong statistical relationship with the extent of digitalization. On the other hand, perceived challenges were expected to have a negative impact on digitalization. However, it did not emerge as statistically significant in the analyses either.

Correlation analyses revealed that both in the entire sample, and within different size categories, presence of digitalization investments and existence of an IT department emerge as common factors associated with higher levels of digitalization. For the entire sample, larger and more institutionalized SMEs with IT departments and investments in digitalization tend to have higher levels of digitalization. While small SMEs that have investments in digitalization are more likely to have a higher level of digitalization, in lower-medium-sized SMEs, the presence of both digitalization investments and an IT department tend to be associated with a higher level of digitalization. In upper-medium-sized SMEs, more institutionalized ones which perceive more benefits from digitalization, have

digitalization investments and IT departments tend to have higher levels of digitalization. Regarding the regression analyses in this study, results demonstrated that the extent of digitalization in SMEs is affected by concrete actions including investment initiatives and existence of a dedicated IT department. Therefore, SMEs that engage in digitalization initiatives, is supported by investments, and IT department.

Analyses consistently showed that the existence of an IT department and investments in digitalization had a positive impact on the extent of digitalization in Turkish SMEs operating in electrical and electronics industry. A dedicated budget for digitalization leads SMEs to strategic resource allocation. The financial commitment of digitalization should not be seen as an economic burden; it leads to a higher extent of digitalization. In this research, the importance of the investments for digitalization adoption is emphasized. For the other significant finding, existence of an IT department, results demonstrated the pivotal role of an IT department for digitalization initiatives. IT departments play a crucial role for technological progress within organizations. The existence of a dedicated IT department that has technical knowledge, human resources, and the ability to utilize emerging technologies is a crucial determinant of successful digitalization adoption. In this thesis, the significance of IT department presence is emphasized.

In conclusion, concrete actions of allocating financial resources and recognizing the role of IT departments have the potential to lead to a successful digitalization journey for SMEs. These findings provide valuable insights for SMEs that aims to go digital and remain competitive in today's digitalized business landscape.

APPENDIX A

QUESTIONNAIRE IN TURKISH

DEMOGRAFİ

D1: Cinsiyetiniz: Kadın □ Erkek □

D2: Yaşınız:

D3: Eğitiminiz:

a. Lise □
b. Ön lisans □
c. Lisans □
d. Master □
e. Doktora □

1.BÖLÜM (A)

S1. Şirketinizdeki çalışan sayısı:

S2. Şirketinizin cirosu:

- 5 Milyon TL'den az
- 5-24.99 Milyon TL arası
- 25-49.99 Milyon TL
- 50-99.99 Milyon TL arası
- 100-149.99 Milyon TL
- 150-250 Milyon TL arası
- Cevap yok

S3. Şirketinizin yaşı:

1-5 yıl □ 6-10 yıl □ 11-15 yıl □ 16-20 yıl □ 21-25 yıl □ 25 yıldan fazla □

S4. Şirketinizin yabancı ortağı var mı? Evet □ Hayır □

S5. Şirketinizin kurucusunun aile üyeleri şirkette çalışıyor mu? Evet □ Hayır □

S6. Şirketiniz bir aile işletmesi midir? Evet □ Hayır □

S7. İhracat yapıyor musunuz? Evet □ Hayır □

S7a. İhracat yapıyorsanız, ihracat geliriniz toplam cironuzun % kaçıdır?

S8. Şirketteki göreviniz (Örneğin Genel Müdür, Genel Müdür Yardımcısı, Departman Müdürü, Departman Müdür Yardımcısı, gibi):

S9. Departmanınız:

S10. Bu şirkette kaç yıldır çalışıyorsunuz?

1-5 yıl □ 6-10 yıl □ 11-15 yıl □ 16-20 yıl □ 21-25 yıl □ 25 yıldan fazla □

S11. Şirketiniz hangi sektörde faaliyet göstermektedir?

S12. IT/Bilgi İşlem departmanınız var mı? Evet □ Hayır □

S12a. IT/Bilgi İşlem departmanınızda kaç kişi çalışmaktadır?

2. BÖLÜM (B)

S13. Aşağıdaki dijitalleşme göstergelerinden hangileri şirketinizi yansıtmaktadır?

a. Yüksek hızlı internete erişim (30 mbps'den yüksek) □
b. Çalışanların yarısından fazlasının internete erişimleri □
c. Bilişim uzmanı istihdamı □
d. Bilişim ile ilgili eğitimlerin düzenlenmesi □
e. Kurumsal Kaynak Planlama (ERP) yazılımı kullanımı (SAP, Oracle ERP, Microsoft Dynamics, Netsis, Logo ERP, Canias gibi) □
f. Müşteri İlişkileri Yönetimi (CRM) yazılımı kullanımı (Salesforce, Microsoft Dynamics 365, Oracle CX, SAP CRM gibi) □
g. Bulut bilişim kullanımı □

h. Cevap yok/ fikri yok

S14. Şirketinizde aşağıdaki dijital araçlardan hangileri kullanılmaktadır?

i. Websitesi □

j. Sosyal Medya □

k. Yüksek Hızlı Genişbant □

l. Nesnelerin İnterneti (IoT) □

m. Büyük Veri Analitiği □

n. Yapay Zeka □

o. BIT (Bilgi İşlem Teknolojileri) Güvenliği □

p. Cevap yok/ fikri yok

(C) Lütfen aşağıdaki ifadelere ne ölçüde katıldığınızı belirtiniz: (1) Kesinlikle katılmıyorum, (2) Katılmıyorum, (3) Ne katılıyorum ne katılmıyorum, (4) Katılıyorum, (5) Kesinlikle katılıyorum					
	1	2	3	4	5
1. Önümüzdeki beş yıl içinde, şirketimiz yeni dijital teknolojilere yatırım yapacak veya bunların uygulanmasını geliştirecek.					
2. Üst yönetimimiz, yeni dijital teknolojilerin kullanımını teşvik ediyor.					
3. Üst yönetimimiz, yeni dijital teknolojilerin kullanımı yönünde inisiyatif almak isteyen çalışanlarına destek sağlıyor.					
4. Üst yönetimimiz, yeni dijital teknolojileri uygulamaya koymayı işletmemiz için stratejik bir öncelik olarak tanıtıyor.					
5. Üst yönetimimiz, yeni dijital teknolojilerin benimsenmesine ilişkin haberlerle ilgileniyor					
(D) Aşağıda dijitalleşme sürecinde karşılaşılması olası güçlükler sıralanmıştır. Çalışmakta olduğunuz şirketi düşündüğünüzde, bunların dijitalleşme sürecinde şirketinizi zorladığına/zorlayabileceğine ne ölçüde katıldığınızı belirtiniz: (1) Kesinlikle katılmıyorum, (2) Katılmıyorum, (3) Ne katılıyorum ne katılmıyorum, (4) Katılıyorum, (5) Kesinlikle katılıyorum					
1. Ekonomik güçlükler					
2. Altyapı eksikliği					
3. Bilgi / eğitim eksikliği					
4. Nitelikli çalışan eksikliği					
5. Ar-Ge eksikliği					
6. Dijitalleşmenin zaman alacak olması					
7. Dijitalleşme eğitiminin maliyeti					
8. Şirketimizin kullanmakta olduğu bazı iş uygulamaları ile uyumlu olmama					
9. Dijitalleşmenin iş süreçlerinde yaratması beklenen değişikliklerle ilgili endişeler					
10. Çalışanların değişime direnci					
11. Veri gizliliği veya güvenliği konusundaki endişeler					
12. Çalışanların yeni dijital teknolojileri kullanmayı öğrenirken yaşadığı zorluklar					
13. Yeni dijital teknolojiler kullanılmaya başladıktan sonra bu teknolojilerin bakımında yaşanan güçlükler					
14. Diğer (Lütfen belirtiniz)					
(E) Aşağıda dijitalleşmenin olası faydaları sıralanmıştır. Çalışmakta olduğunuz şirketi düşündüğünüzde, dijitalleşmenin şirketinize bu faydaları sağladığına/sağlayabileceğine ne ölçüde katıldığınızı belirtiniz: (1) Kesinlikle katılmıyorum, (2) Katılmıyorum, (3) Ne katılıyorum ne katılmıyorum, (4) Katılıyorum, (5) Kesinlikle katılıyorum					
1. Verimlilik artar					
2. Maliyetler azalır					
3. Rekabet gücü artar					
4. Operasyonel esneklik artar					
5. Üretim kalitesi iyileşir					
6. Personel yaratıcılığı ve yenilikçiliği artar					
7. İç ve dış değişikliklere daha iyi cevap verilir					
8. Bilgi paylaşımı iyileşir					
9. İhtiyaç duyulan bilgiye hızlı erişim sağlanır					
10. Yönetim becerileri iyileşir					
11. Yerel ve/veya uluslararası gereksinimler karşılanır					
12. Müşteri/tedarikçi standartlarının gereksinimleri karşılanır					
13. Karlılık artar					
14. Günlük faaliyet maliyetleri azalır					
15. Kuruluş imajı iyileştirilir					
16. Diğer (lütfen belirtiniz)					

(F) Aşağıda şirketleri dijitalleşmeye iten faktörler sıralanmıştır. Çalışmakta olduğunuz şirketi düşündüğünüzde, bunların şirketiniz için de geçerli olduğuna ne ölçüde katıldığınızı belirtiniz: (1) Kesinlikle katılmıyorum, (2) Katılmıyorum, (3) Ne katılıyorum ne katılmıyorum, (4) Katılıyorum, (5) Kesinlikle katılıyorum					
1. Müşteri gereksinimleri					
2. Maliyetleri azaltma ihtiyacı					
3. Rekabet baskısı					
4. Tedarikçi talepleri					
5. Yasal düzenlemeler					
6. Daha iyi bilgi paylaşımı ve iletişim talepleri					
7. Dijitalleşmiş rakiplere karşı pazar payı kaybetme tehdidi					
8. Şirketin rekabetçiliğini artıracak daha yüksek katma değerli ürünler geliştirmek için kaynakların eksikliği					
9. Stratejik ortakların talepleri					
10. Bilgi güvenliği endişeleri					
11. Yeni dijital teknolojilerin faydasını kavramış çalışanların yönlendirmesi					
12. Diğer (lütfen belirtiniz)					

3.BÖLÜM (G)

S15. Şirketinizde çalışanlarınıza dijital yetkinliklerini arttıracak eğitimler veriyor musunuz?

Evet □ Hayır □

S15a. Eğer eğitim veriyorsanız ne sıklıkta eğitim veriyorsunuz?

Ayda 1 kez □ Yılda 2 kez veya daha fazla □ Yılda 1 kez □ 2 yılda bir kez □ Düzenli değil □ Diğer ___

S15b. Eğitim almış beyaz yakalı çalışanların toplam çalışanlara oranı nedir?

S15c. Eğitim almış mavi yakalı çalışanların toplam çalışanlara oranı nedir?

S16. Şirketinizin dijitalleşme için ayırdığı bir bütçesi var mı?

Evet □ Hayır □

S16a. Eğer varsa cironuzun yüzde kaçı dijital yatırımlara ayrılıyor?

S16b. Yoksa şirketiniz önümüzdeki beş yılda bir bütçe ayırmayı düşünüyor mu?

Evet □ Hayır □

S16c. Bu bütçenin cironuzun yüzde kaçı olmasını planlıyorsunuz?

S17. Şirketinizin yazılı bir dijital stratejisi var mı?

Evet □ Hayır □

S18. Şirketiniz dijital trendler ve gelişmeler hakkında bilgi sahibi olmak için herhangi bir kaynak kullanıyor mu?

Evet □ Hayır □

S18a. Eğer kullanıyorsa hangi kaynakları kullanıyor? (Örneğin: Sosyal medya, sektörel yayınlar, danışmanlık şirketleri profesyonel ağlar veya dernekler, konferanslar veya fuarlar, Webinarlar vb.)

S19. Dijital dönüşüm konusunda herhangi bir destekten yararlandınız mı? (Örneğin: KOSGEB, Kalkınma Ajansı, Tübitak destekleri gibi)

Evet □ Hayır □

S19a. Eğer yararlandıysanız hangi desteklerden yararlandınız?

S20. İşletmenizde yazılı bir işletme anayasası var mı?

Evet □ Hayır □

S21. İşletmeniz çalışanlarının işletmedeki görevleri, rolleri, yetki ve sorumlulukları yazılı olarak açıkça belirlenmiş midir?

Evet □ Hayır □

S22. İşletmenizde çalışanlar için uygulanan bir performans sistemi mevcut mu?

Evet □ Hayır □

S22a. Bu performans sisteminin sistematik takibi yapılıyor mu?

Evet □ Hayır □

APPENDIX B

QUESTIONNAIRE IN ENGLISH

DEMOGRAPHICS

D1: Gender: Female □ Male □

D2: Age:

D3: Education:

a. High school □
b. Associate degree □
c. Bachelor □
d. Master □
e. Ph.D. □

1.SECTION (A)

S1. Number of Employees:

S2. Annual Revenue:

- Less than 5 Million TL
- Between 5-24.99 Million TL
- Between 25-49.99 Million TL
- Between 50-99.99 Million TL
- Between 100-149.99 Million TL
- Between 150-250 Million TL
- No answer

S3. Age of the Enterprise:

1-6 years □ 6-10 years □ 11-15 years □ 16-20 years □ 21-25 years □ More than 25 years □

S4. Does your firm have a foreign partner? Yes □ No □

S5. Are family members of the founder of your company working in the company?

Yes □ No □

S6. Is your company a family-owned business? Yes □ No □

S7. Do you have export operations? Yes □ No □

S7a. If yes what is the percentage of exports in your annual turnover?

S8. What is your role in this company? (e.g. General Manager, Assistant General Manager, Department Manager, Assistant Department Manager, etc.)

S9. Department:

S10. How many years have you worked for this company?

1-5 years □ 6-10 years □ 11-15 years □ 16-20 years □ 21-25 years □ More than 25 years □

S11. What industry does your company operate in?

S12. Do you have an IT Department? Yes □ No□

S12a. How many employees do you have in your IT department?

2. SECTION (B)

S13. Which of the following digitalization indicators reflect your company?

a. High-speed internet access (above 30 mbps) □
b. More than half of the employees have internet access □
c. Employment of IT experts □
d. Organization of IT-related trainings □
e. Use of Enterprise Resource Planning (ERP) software (e.g. SAP, Oracle ERP, Microsoft Dynamics, Netsis, Logo ERP, Canias) □
f. Use of Customer Relationship Management (CRM) software (e.g. Salesforce, Microsoft Dynamics 365, Oracle CX, SAP CRM) □

g. Use of cloud computing □

h. No answer

S14. Which of the following digital tools are used in your company?

i. Website □

j. Social Media □

k. High-Speed Broadband □

l. Internet of Things (IoT) □

m. Big Data Analytics □

n. Artificial Intelligence (AI) □

o. IT (Information Technology) Security □

p. No answer

(C) To what extent do you agree or disagree with the following statements: Strongly disagree (1), Disagree (2), Neither agree nor disagree (3), Agree (4), Strongly agree (5)					
	1	2	3	4	5
6. Within the next five years, our company will invest in or develop the implementation of new digitalization technologies.					
7. Our top management promotes the use of new digital technologies in the business.					
8. Our top management creates support for new digital technologies initiatives within the business.					
9. Our top management promotes new digital technologies as a strategic priority within the business.					
10. Our top management is interested in the news about new digital technologies adoption.					
(D) To what extent do you agree or disagree with the following challenges related to adopting digital technologies in your company: Strongly disagree (1), Disagree (2), Neither agree nor disagree (3), Agree (4), Strongly agree (5)					
15. Economical reasons					
16. Lack of infrastructure					
17. Lack of information/education					
18. Lack of qualified employees					
19. Lack of R&D					
20. Implementation time					
21. Cost of digitalization training					
22. Compatibility with preferred work practices					
23. Concerns about the changes expected in the business process					
24. Employees' resistance to change					
25. Concerns over data privacy or security					
26. Learning to use new digital technologies is difficult for employees.					
27. New digital technologies are difficult to maintain.					
28. Other (Please specify)					
(E) To what extent do you agree or disagree with the following benefits related to adopting digital technologies in your company: Strongly disagree (1), Disagree (2), Neither agree nor disagree (3), Agree (4), Strongly agree (5)					
17. Increased efficiency					
18. Decreased costs					
19. Increased competitiveness					
20. Improved operational flexibility					
21. Improved manufacturing quality					
22. Improvement of staff creativity and innovativeness					
23. Improved response to internal and external changes					
24. Improved information sharing					
25. Rapid access to the required information at the time of need					
26. Improved management skills					
27. Fulfilling the national and/or international requirements					
28. Fulfilling the requirements of customer/supplier standards					
29. Increased profitability					
30. Reduced day to day activities costs					
31. Improved organization image					
32. Other (Please specify)					

(F) To what extent do you agree or disagree with the following drivers for adopting digital technologies in your company: Strongly disagree (1), Disagree (2), Neither agree nor disagree (3), Agree (4), Strongly agree (5)					
13. Customer requirements					
14. Reducing costs					
15. Competitive pressure					
16. Supplier demand					
17. Government policies and regulations					
18. Requests for better information transmission and communication					
19. Threat of losing market share to digitalized counterparts					
20. Lack of the resources to develop higher value-added products that will improve the competitiveness of company					
21. Requests of important business partners					
22. Information security concerns					
23. The employees' readiness that has the right motivation to judge and work with new digital technologies					
24. Other (Please specify)					

3.SECTION (G)

S15. Does your company organize trainings to improve the digital skills of your employees?

Yes □ No □

S15a. If yes, how frequently do you organize these trainings?

Once in a month □ Twice in a year or more □ Once in a year □ Once every two years □ Not frequently □ Other ___

S15b. What is the ratio of white-collar employees who have received training to the total number of employees?

S15c. What is the ratio of blue-collar employees who have received training to the total number of employees?

S16. Does your company have a digitalization budget?

Yes □ No □

S16a. If yes, what percentage of your revenue is allocated to digital investments?

S16b. If not, is your company considering allocating a budget for digital investments in the next five years?

Yes □ No □

S16c. What percentage of your revenue do you plan to allocate for this budget?

S17. Does your company have a written digital strategy?

Yes □ No □

S18. Does your company use any sources to stay informed about digital trends and developments?

Yes □ No □

S18a. If yes, which sources does your company use? (e.g. Social media, industry publications, consulting firms, professional networks or associations, conferences or exhibition, webinars etc.)

S19. Have you benefited from any financial support regarding digital transformation? (e.g. KOSGEB, development agency, Tubitak financial supports etc.)

Yes □ No □

S19a. If yes, which financial support have you benefited from?

S20. Does your company have a written company constitution? Yes □ No □

S21. Are the job description, roles and authority of your employees clearly defined in writing within your company? Yes □ No □

S22. Does your company have a performance system for your employees?

Yes □ No □

S22a. Is systematic tracking of this performance system conducted?

Yes □ No

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