



Article **Unveiling Digital Maturity: Key Drivers of Digital Transformation in the Greek Business Ecosystem**

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Abstract: In the current dynamic business landscape, digital transformation is recognized as a critical driver of entrepreneurship, innovation, and growth, particularly among small and medium-sized enterprises (SMEs). This study aims to investigate the key factors influencing digital transformation, focusing on their relevance in shaping strategic decisions and fostering innovation. Using a robust methodological approach, data were collected through an online survey, with Likert-scale questions assessing multiple dimensions of digital maturity across companies in various sectors of the Greek economy. The survey, conducted in the first semester of 2024, involved 156 companies from sectors such as retail, communication, technology, and public services, with significant representation from established organizations employing over 250 individuals and reporting annual turnovers exceeding EUR 50 million. The questionnaire items, adapted from existing validated scales, captured aspects such as digital skills, management intensity, business processes, innovation performance, departmental agility, and digital vision. By analyzing the responses, this study identifies critical drivers of digital transformation and highlights their role in guiding strategic decisions, emphasizing the evolving nature of digital entrepreneurship. The findings contribute to the broader discourse on digital transformation, offering actionable insights for organizations aiming to enhance their digital maturity and competitiveness in a rapidly changing global economy.

Keywords: digital transformation strategy; organizational change; Greek business environment; entrepreneurial intention; digital maturity

1. Introduction

In the contemporary era of advanced technology and pervasive digitization, the digital transformation of business processes is crucial, innovative, and imperative for organizations.

The dynamics of the digital revolution represent a transformative force, particularly in product development cycles, marking digitization as a significant milestone in our civilization's evolution (Groumpos, 2021). Digital transformation involves integrating digital technology into the core of enterprises and society, profoundly changing all business aspects (Cijan et al., 2019). This shift is driven by the increasing demands for organizational efficiency and competitiveness (Parviainen et al., 2022) and extends beyond traditional technical progress mechanisms (Rymarczyk, 2020), revolutionizing literature creation, dissemination, and consumption and challenging traditional paradigms (Matt et al., 2020).

Digital transformation is the process of evolving or developing new business activities and models, products and services, skills, and competencies by implementing digital technologies in a strategic way (Kaltum et al., 2016; Schallmo et al., 2017).



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Understanding the factors influencing digital transformation is crucial for organizations seeking to implement innovations successfully (Venkatraman, 2017).

The existing literature presents the competitive advantage that companies gained through digital transformation, but the knowledge of the assumptions/drivers behind the adoption of different technologies among businesses are scarce (Stentoft et al., 2021; Bouwman et al., 2019). Numerous studies describe digital transformation as a fusion of advanced information technology and digitized system integration (Almeida et al., 2020). While digital transformation is not a new concept, its form and the evolving needs of businesses are constantly changing.

This new form of entrepreneurship, which adopts digital technologies for venture creation (Nambisan, 2017), has transformed all aspects of existing entrepreneurship (EU, 2018) and is called digital entrepreneurship. It is defined as the "*practice of pursuing new venture opportunities presented by new media and internet technologies*" (Davidson & Vaat, 2010). Other researchers describe digital entrepreneurship as entrepreneurial opportunities formed (Hossain et al., 2024) and exploited by using advanced technological platforms, networking equipment, and data exploitation facilities (Malik et al., 2022). These entrepreneurial opportunities represent a new business ecosystem that is heavily dependent on technologically oriented issues.

At the organizational level, small, innovative, and rapidly growing digital entities have surpassed many traditional companies (Verhoef et al., 2021). While the core principles of traditional and digital entrepreneurship remain similar (Ngoasong, 2018), the key difference lies in the incorporation of digital technologies into various value-chain activities of the venture (N. Hair et al., 2012). Digital transformation has gained significant research interest regarding its contribution to the viability, the sustainability (Kanval et al., 2024), the innovativeness, and the growth of startups (Mackay et al., 2023). Through digital transformation, startups expand their operations and reinvent their products and services to meet customers' needs (Warner & Wager, 2019), offering a strategic means for organizations to expand to new markets (Martinez Dy, 2019) and reach new sources of revenues (Chen et al., 2024). These technologies may vary from e-shop creation, websites, and software development to more complex forms such as cloud computing spaces, chat boxes, artificial intelligence, multimedia platforms, etc. These are crucial for digital entrepreneurs to provide high-value-added services and be part of a digital ecosystem of modular services tailored to venture-specific requirements (Nambisan & Baron, 2019). The pandemic has brought the need for digital transformation into sharper focus. After the pandemic, the adoption of digital technologies among newly created companies has accelerated (Dua et al., 2021). There still exists a research gap related to how digital transformation changed entrepreneurship in both aspects: transforming existing entrepreneurship into a more digital phase or developing digital entrepreneurship from scratch (Corvello et al., 2022).

According to the Hellenic Federation of Enterprises (SEV) there is a growing tendency among Greek SMEs to shift toward Business-to-Business (B2B) transactions, and 12.4% of them are developing partnerships. Moreover, business networks and value chains are attracting innovative Greek SMEs for growth and development (Hellenic Federation of Enterprises, 2018). Such an environment is rather challenging for small and medium enterprises (SMEs), which are the majority of businesses in the Greek business ecosystem and represent 99.9% of all enterprises, contributing approximately 19.3% to the gross domestic product and offering employment to 87% of the workforce (Hellenic Federation of Enterprises, 2018). As of 2022, there were approximately 719,296 SMEs operating in Greece, with the vast majority (673,561 companies) being micro-sized enterprises employing up to nine employees and the rest of them employing between ten and forty-nine employees (41,584 companies), with more than fifty employees employed in (4,151) companies (Statista, 2018).

These companies face challenges such as limited access to finance, high taxation, and bureaucratic hurdles (Hellenic Federation of Enterprises, 2018), similar to the barriers that SMEs face globally, which are limited financial resources and limited organizational and cognitive resources (Skare et al., 2023). These challenges can slow down SMEs' pace to bridge the digital divide, which is needed to expand to foreign markets and new groups of consumers (Giones & Brem, 2017; McAdam et al., 2020). Digital entrepreneurship focuses on creating and growing new ventures depending on digital technologies and demonstrating the capacity of "digital narrative" businesses to achieve a global market presence from the ground up (Salam et al., 2021). Under this framework, digital transformation provides the necessary digital tools and resources that empower digital entrepreneurs to emerge and make informed, strategic business decisions (Denga & Rakshit, 2022).

This research focuses on Greek enterprises as a representative case study for understanding the digital transformation of small and medium-sized businesses. Through an empirical analysis of 156 companies across various industries, this paper offers a nuanced understanding of the interplay between technological adoption and business strategy. These findings are intended to guide policymakers, business leaders, and academics in designing strategies and frameworks that enhance digital maturity, drive innovation, and promote sustainable growth within and beyond the Greek business ecosystem.

2. Recent Research

The business environment in the 21st century faces significant challenges related to digital transformation as a source of entrepreneurship, innovation, and growth for SMEs (Bhuiyan, 2023). These include technological issues related to the implementation of automation, cloud computing services, big data analysis, and, recently, the development of artificial intelligence and the Internet of Things (Abbas & Myeong, 2024; Ullrich et al., 2023; Kostakis & Kargas, 2021). Several business aspects are affected, such as productivity (Heredia et al., 2022), innovation (Peng & Tao, 2022; Appio et al., 2021), organizational flexibility (Troise et al., 2022) alongside agile management principles (Kargas & Aretos, 2023), efficiency (Kraus et al., 2021), effective decision making (Corso et al., 2018), competitiveness (Ismail et al., 2017), sustainable advantages (Cahyadi, 2020), value creation for customers (Westerman et al., 2014), business evolution (Lee & Suh, 2022), personalized services (Cubric & Li, 2024), cultivation of a new digital culture (Krasonikolakis et al., 2020), cost reduction (Saini, 2018), effective resource management and outsourcing (Reis et al., 2018; Denga & Rakshit, 2022), economic benefits (Dana et al., 2022), and new business models suitable for digital environments (Brynjolfsson & Hitt, 2000; Vial, 2019; Frank et al., 2019).

All these aspects of digital transformation have changed the business ecosystem and the patterns of creating business value (Akter et al., 2023), revealing that digital transformation refers more to the process of organizational change rather than just implementing digital tools (Panchal et al., 2024). Such a process of change is not merely about technology but involves people and more precisely the way entrepreneurs think, act, and conduct business (Kargas et al., 2023; Fernandes & Burcharth, 2024). To perform effectively in a digital world, an innovation culture is required, new digital skills should be cultivated (Kargas et al., 2022; Kargas et al., 2024), and new business models should be integrated (Mackay et al., 2023). Conventional processes need to be redesigned into sophisticated systems that profoundly impact organizational functions and interactions with the public, collaborators, and the workforce (Favoretto et al., 2022).

The adoption of new digitally oriented strategic choices has prompted a reassessment of the fundamental assumptions underlying entrepreneurial processes and outcomes (Autio et al., 2017; Liao et al., 2013), while new forms of entrepreneurs arise, having both digital skills and business-related knowledge equity (Fernandes & Burcharth, 2024). Digital tools have increased the influence of customer feedback, and changes have been made in terms of the continuous improvement of products/services (Hafezieh et al., 2011). Nowadays, entrepreneurs use business methods such as an online presence and e-commerce (Milon, 2024), alongside social media interaction tools, to bond with customers (Chen et al., 2024). Digital services can now be offered to a global audience 24/7 (Ammirato et al., 2019). The elimination of entry and exit barriers is reducing the investments required to start a digital narrative business and the incurring operational costs (Ghezzi, 2019).

The relationship between digital transformation and entrepreneurship is interdependent (Malik et al., 2022), with a large variety of different patterns (Joel et al., 2024) that have been widely studied, but the existing literature indicates that only a few variables have been examined (Mir et al., 2023), such as entrepreneurs' characteristics (Nambisan, 2017), education, and digital skills (Garzoni et al., 2020). Other studies focus on external factors (Corvello et al., 2022) including technological accessibility, firm size, and existing communication structures (Babu et al., 2021) or other environmental factors (Manco-Chavez et al., 2020).

Some enterprises are deeply embedded in the digital realm, while others are just beginning their digital journey (Siedler et al., 2021). The degree of digital transformation process varies among companies as a result of several factors, including the sector and industry, organizational age and organizational size, revenues, and geographical distribution.

The question of whether establishing and developing a new company in a business environment with intense digitalization leads to a higher degree of digital maturity compared to older and well-established companies is an issue under research (Ribeiro-Navarrete et al., 2023). Escoz Barragan and Becker (2024) researched SME digital orientation and concluded that it is beneficial to a company's performance if this process takes place at an early age of the company or if this process is continually intensified towards a highly digital orientation. That forms the following hypothesis:

H1. *The age of a company is related to digital maturity.*

The adoption of new digitally oriented strategic choices has prompted a reassessment of the fundamental assumptions underlying entrepreneurial processes and outcomes (Autio et al., 2017; Liao et al., 2013), while new forms of entrepreneurs arise, having both digital skills and business-related knowledge equity (Fernandes & Burcharth, 2024). Digital means have increased customers' feedback influence, and changes have occurred in terms of the continued improvement and evolution of products/services (Hafezieh et al., 2011). Nowadays, entrepreneurs are using business methods such as an online presence and e-commerce capabilities (Milon, 2024) alongside social media interaction tools to bond with customers (Chen et al., 2024). What traditionally was known about the "time" (when) and the "space" (where) of entrepreneurship has also been transformed due to the digital revolution, since 24/7 digital services could be offered to a global audience (Ammirato et al., 2019). Finally, it should be considered that advances in digital technologies have also reduced entry and exit barriers, particularly reducing the investments required to start a digital narrative business and the incurring operational costs (Ghezzi, 2019).

According to Escoz Barragan and Becker (2024), the resource investments of digital orientation face initial barriers, which are outweighed during the long-term performance of the company.

Existing research states that digital transformation enhances revenues (Iansiti & Lakhani, 2014), but empirical results reveal a digital paradox, with revenue growth after investments in digital technologies being lower than expected (Gebauer et al., 2020;

Kohtamäki et al., 2020). Such an issue is associated with the findings of other studies, indicating that increased revenues are not directly related to digital transformation, but it is more about an indirect relationship generated from cost minimization (Kasperovica & Lace, 2021) or efficient resource usage (Clauss, 2017). Despite existing research, the relationship between digital transformation and revenue is still an issue that needs further empirical analysis (da Cost et al., 2022).

H2. *Company revenues are related to digital maturity.*

According to the existing literature, a company's size is crucial for digital maturity since large firms have more opportunities to acquire the financial, technological, and human resources necessary to undergo digital transformation (Westerman & McAfee, 2012). Large firms acquire agile structures, which may provide benefits to conduct change (Moeuf et al., 2019), while SMEs may have a higher motivation to adapt to digital business principles in order to survive and grow (Ardito et al., 2021). The digital transformation for small and medium size enterprises (SMEs) is an academic and business issue for research (Eller et al., 2020).

H3. The size of a company is related to digital maturity.

The term "digital transformation" is used in this study to describe the most advanced level of digital maturity, in comparison with other terms such as "digitization" and "digitalization", which aim to describe less mature phases of transforming processes and operations (Bican & Brem, 2020). Digitization indicates the implementation of digital means in everyday processes, with the aim of transforming analog information into a fully (or merely) digital form (Fors, 2013). Digitalization also aims to describe the process of changing social, economic, and institutional processes and contexts by implementing digital technologies and applying principles related to digital business (Sussan & Acs, 2017; Tilson et al., 2010).

3. Methodology

The means of assessing digital maturity was via an online survey questionnaire covering multiple aspects of digital transformation. The research framework used in our study was initially established by Ribeiro-Navarrete et al. (2023). Fieldwork was carried out during the first semester of 2024.

An initial email was sent to the companies' representatives to explain the research objectives and, if they agreed to participate, to arrange a follow-up phone call for further clarification regarding the questionnaire. A total of approximately 5100 emails were sent, with a response rate of 3.05%. The person who was responsible and aware of the digital transformation strategy and procedures in the company participated in this study, answering the survey questions, which were rated on a 7-point Likert scale, e.g., from 1 for "completely disagree" to 7 for "completely agree" to indicate the extent of digital transformation and procedures in the company. The questionnaire research items encompassed nine strategic dimensions, including traditional and innovative ones (Ardito et al., 2021), and were conceptualized by Ribeiro-Navarrete et al. (2023), who developed a synthetic indicator by following the methodology developed by Pena (1977).

Questions were organized covering nine dimensions, as follows:

- Technological implementation and digital skills (Ulas, 2019; Venkatraman, 1994);
- Digital management (Westerman & McAfee, 2012; He et al., 2023);
- Digital orientation and development (Nasiri et al., 2020; Westerman & McAfee, 2012; He et al., 2023);

- Performance stemming from digital innovation (Vickery et al., 2003; Liang & Frosen, 2020; Tippins & Sohi, 2003; He et al., 2023);
- Environmental performance (Ardito et al., 2021);
- Digital vision and departmental agility (Li et al., 2021);
- Digital orientation (Nasiri et al., 2020).

The questionnaire was first presented in the original study of Ribeiro-Navarrete et al. (2023) and was applied in the Greek business environment without changes.

Additionally, information data were utilized to categorize companies according to their age, their industry sector, and their size. Our aim was to identify the most relevant factors contributing to companies' digital transformation and thus highlight the importance of these drivers in shaping guiding strategies, resulting in appropriate decisions leading to the evolving field of digital transformation.

Prior to the administration of the current study, a pre-test was conducted to ensure the clarity and overall adequacy of the questionnaire. In total, 156 companies participated in the survey from the following sectors: retail (12.2%), communication (6.4%), financial services (3.8%), business (3.8%), engineering (1.9%), military services (3.8%), health services (5.1%), public sector (7.1%), technology (53.8%), and other (1.9%). Most of the companies in the sample that participated were in operation for 20–40 years and employed more than 250 employees. Their turnover was above 50 million per year. The descriptive statistics of the companies are presented in Table 1.

	Years	Frequency %		EUR Million	Frequency (%)
	1–3	6.4%		<2	21.8%
Company age (in years)	4–6	2.6%		2–5	12.8%
	7–10	6.4%	Turnover of sale	5–10	1.9%
	11-15	8.3%	revenues (in	10	10.9%
	16-20	12.8%	million euros)	10–20	3.2%
	20-40	35.9%		20–50	10.3%
	>40	27.6%		>50	39.1%
				Retail	12.2%
Company size (number of employees)	Employees	%	-	Communication	6.4%
	1–3	0.6%	-	Financial services	3.8%
	4–9	7.7%		Business	3.8%
	10-20	14.1%	Sector	Engineering	1.9%
	21-30	5.8%		Military services	3.8%
	31-50	2.6%		Health services	5.1%
	51-250	13.5%		Public sector	7.1%
	>250 employees	55.8%		Technology	53.8%
				Transportation/Logistic	cs 1.9%

Table 1. Descriptive statistics.

4. Results

Organizations must integrate, develop, and reconfigure both their internal and external capabilities to adapt to the evolving organizational environment. Achieving and maintaining a competitive edge requires reliance on the synergy of digital assets and business resources to drive innovation in products and processes (Pinto et al., 2023).

To identify the factors influencing digital maturity, an Exploratory Factor Analysis (EFA) was conducted using 156 questionnaires. Principal Component Analysis (J. Hair et al., 2006) was employed as the extraction method, and Varimax rotation was applied to enhance the model's explanatory power. The factors were categorized into five groups

(Market, Strategy, Operations, Technology, and Organizational Culture) based on eigenvalues greater than 1 (Table 2). These factors explained 46.558% of the total variance. The Kaiser–Meyer–Olkin measure was 0.818, indicating the suitability of sampling adequacy. This was further corroborated by the significant result of Bartlett's test of sphericity ($\chi^2 = 8052.872$; *p* < 0.0001). Cronbach's α coefficients for each factor were as follows: Market: $\alpha = 0.911$; Business Strategy: $\alpha = 0.876$; Operations: $\alpha = 0.825$; Technology: $\alpha = 0.819$; Organizational Culture: $\alpha = 0.676$.

Table 2. Factor analysis.

Dimensions		Strategy	Operations	Technology	Culture
All employees participate in the digital transformation discussion.	0.709				
We have superior digital solutions compared to our competitors.	0.691				
We use or we will use big data technology.	0.673				
We use or we will use data analytics technology.	0.666				
Our managers share a common digital transformation vision.	0.664				
We use or we will use data visualization technology.	0.662				
We are encouraged to explore new ways of using digital technologies.	0.648				
Our customer service involves using digital channels.	0.624				
We use or we will use smart manufacturing application technology.	0.617				
We have superior quality in terms of digital solutions compared to our competitors.	0.592				
We use a digital logistics system to achieve dynamically connected nodes, capable to provide real-time feedback.	0.570				
We share a common vision related with the role of digital technology on our business strategy.	0.569				
We continually test new digital technologies.	0.564				
We introduce new digital solutions to the market.	0.558				
Our digital strategy is constrantly reevaluated and adapted to condition.		0.682			
Our digital strategy aim to keep us in the next 5 to 10-year.		0.674			
We share a common vision on how various digital technologies can enable our business strategy.		0.644			
Our digital strategy has been implemented to all our business units.		0.586			
We share a common vision of how digital technologies can create business value.		0.582			
Following the development of new digital technologies, we have introduced new business models		0.574			

Dimensions	Market	Strategy	Operations	Technology	Culture
There exist spesific managers responsible for managing digital initiatives.		0.531			
In order to achieve strategic balance, we integrate digital technologies into our business strategy.		0.527			
We constantly reevaluate the effectiveness of using digital technologies.		0.515			
There exist an operating customer relationship management system and/or a product data management system.			0.676		
Our digital systems connect core business activities with suppliers, customers, employees, etc.			0.649		
We use key performance indicators to assess digital initiatives			0.586		
To achieve effectiveness we have integrated our business strategy with our digital strategy.			0.584		
We have a larger set of alternative digital solutions compares to our competitors.			0.541		
We use or we will use wireless local area network technology.			0.509		
We use or we will use cloud computing technology.			0.509		
There exists an operating digital transformation strategy			0.501		
We use or we will use Internet of Things (IoT).				0.705	
We use or we will use computer-aided office technology.				0.650	
We use or we will use data warehousing technology.				0.616	
We use or we will use blockchain technology.				0.599	
We use or we will use customer to organization radio frequency identification technology.				0.597	
We use or we will use smart manufacturing application technology.				0.555	
We use or we will use supply chain management technologies.				0.552	
We use or we will use blockchain contract management technology.				0.551	
We use or we will use 5G technologies.				0.548	
We give emphasis on reducing our emission of waste.					0.662
There exist spesific managers responsible for managing digital initiatives.					0.586
We give emphasis on reducing our consumption of hazardous and toxic materials.					0.566
There is a structured coordination for our digital initiatives.					0.503

Table 2. Cont.

ANOVA analysis was applied between groups of companies of different ages, sizes, and revenues, belonging to different sectors.

Pearson's Chi-square test of independence determined that there was an association between the age of a company, its sector, and the grade of its digital maturity.

Equal variances not assumed, the F-statistic (9, 146) = 3.919 (p < 0.05), indicating differences among the means of the groups of companies belonging to different age groups and sectors; thus, the hypothesis was supported. Post hoc analysis with the Bonferroni criterion presented the finding that statistically significant differences existed between the digital maturity of the public sector (mean 7.00) and companies belonging to the sectors of communication (mean 4.40) and technology (mean 5.07) relative to their digital maturity. Digitalization in public governance has created a new model, digital era governance, in which digital technologies are crucial (Ravselj et al., 2022). The public sector after the COVID-19 pandemic was pushed to overcome bureaucratic obstacles and keep up the pace for digital transformation (Jones et al., 2021). However, other companies may face constraints such as limited resources, a shortage of skilled personnel, and competing priorities, often leading them to neglect the digitization process. This complexity is further compounded in its interconnectedness across the organizational framework (Kane et al., 2016).

Westerman et al. (2014) suggest that older enterprises have legacy systems, rigid structures, and a resistance to change, thus making digital transformation slower. These older companies are prone to bureaucratic decision-making processes and are based on outdated information systems, according to Fichman et al. (2014). Nevertheless, some older companies are able to leverage their experience, have adequate resources, and make strategic decisions in adopting digital technologies (Bharadwaj et al., 2016).

On the other hand, companies with younger people in organizational roles and companies created within the digital era are extensively using digital business models, cloud computing, AI, and blockchain applications.

Traditional telecom companies have to compete with giants, such as tech-first companies dominating the market globally. Despite the degree of digital maturity that an enterprise may have achieved, the evolution process is constant since information technologies are also changing exponentially (Jabłonski & Jabłonski, 2019). Researchers indicate that, initially, most companies should expect indirect and less significant results for their performance due to the large investments needed to reach the required level of digital maturity (Grooss et al., 2022). Escoz Barragan and Becker (2024) conclude that the initially negative impact of digital orientation diminishes as the intensity of the orientation increases.

Pearson's Chi-square test of independence determined that there was an association between the revenues of a company, its sector, and the grade of its digital maturity. Equal variances not assumed, the F statistic (9, 146) = 6.434 (p < 0.05), indicating differences among the means of the groups of companies having different revenues and belonging to different sectors; thus, the hypothesis was supported. Post hoc analysis with the Bonferroni criterion indicated that differences existed between the digital maturity in companies belonging to the retail sector (mean 2.00) and that of companies belonging to the sector of communication (mean 4.90), the sector of financial services (mean 6.33), the public sector (mean 6.45), and the sector of technology (mean 4.77). The companies of the retail sector sectors digital maturity among companies of other sectors. The post hoc analysis also indicated statistically significant differences among the means of digital maturity for companies belonging to the health services (mean 1.38), the communication sector (4.9), the financial services sector (6.33), the public sector (6.45), and the technology sector (4.77). The companies providing health services had the lowest digital maturity compared to companies providing health services had the lowest digital maturity compared to companies with the same revenues belonging to different sectors.

According to the results, digital maturity was not random across sectors or revenue groups. This aligns with prior research that emphasizes the sector-specific nature of digital transformation (Westerman et al., 2014; Kane et al., 2016).

Pearson's Chi-square test of independence determined that there was an association between the size of a company, its sector, and the grade of its digital maturity. Equal variances not assumed, the F statistic (9, 146) = 8.859 (p < 0.05), indicating differences among the means of the groups of companies of different sizes and sectors; thus, the hypothesis was supported. Post hoc analysis with the Bonferroni criterion indicated that differences existed between the digital maturity of companies with the same number of employees. Post hoc analysis with the Bonferroni criterion presented differences between the digital maturity in the retail sector (mean 3.00) and that of companies belonging to the sector of communication (mean 6.4), the sector of financial services (mean 6.83), the public sector (mean 7.0), the sector of technology (mean 5.74), the business sector (mean 6.17), engineering (mean 6.67), military (mean 6.67), and health (mean 6.25). The companies of the retail sector presented the lowest digital maturity levels among companies belonging to other sectors. The reliance on traditional business models and the cost-sensitive operations of the retail sector may be the reason this sector lacks digital maturity. The tight profit margins and the high acquisition costs make digital transformation in the retail sector slower (Rigby, 2011). Still, there are traditional retailers who remain digitally immature, unable to catch up with evolutions.

Digital transformation encompasses a broad spectrum of changes across various business dimensions, including processes, employee skill development, and promotional strategies, all driven by implementing digital transformation (Malik et al., 2022).

Larger companies have ample financial and human resources to invest in digital transformation (Fichman et al., 2014; Bharadwaj et al., 2016). These companies have structured procedures towards digitalization. The need to address global markets and acquire operational efficiency leads them to adopt digital strategies earlier than small firms. Therefore, they are able to leverage big data, artificial intelligence, and automation procedures more effectively (Bughin, 2020). According to McKinsey's Digital Quotient Report (2020), enterprises with over 500 employees have a 35% higher likelihood of advanced adoption compared to small firms.

Small and medium-sized enterprises face problems such as small scales, weak anti-risk ability, insufficient funds, and lending difficulties (Li, 2022) and are lacking in expertise personnel. They cannot take advantage of economies of scale to invest in cutting-edge digital tools as quickly as large enterprises (Sebastian et al., 2017). The industries that are highly regulated, such as the finance and military industries, may have increased digital maturity due to compliance requirements (Mergel et al., 2019). In the health sector, the hospitals and health providers are deficient in digital adoption, while telemedicine drives digital innovation (Agarwal et al., 2010).

We performed cluster analysis (Sharma, 1996) to identify the actual groups of the respondent companies and identify common patterns relative to their digital maturity stages. Using the K-means method, the effects were grouped into three clusters: the cluster of intermediate maturity, which consists of 21 companies; the second cluster of digitally mature companies, which consists of 87 companies; and, finally, the third cluster, which has 48 companies at an early stage of the digital transformation process.

The first group consists of large companies that possess ample, dedicated resources for their daily operations, enabling them to drive digital innovation. These companies have clearly defined roles, responsibilities, and decision-making processes. Their capacity to invest in new techniques and equipment enhances their digital maturity (Pinto et al., 2023). ANOVA analysis was utilized to cluster groups of companies and the dimensions of digital maturity, such as Market, Strategy, Operations, Technology, and Culture. The results, with equal variances not assumed, showed F = 17.531 (df = 2, p < 0.05), indicating significant differences among the means of the clusters of companies in terms of digital maturity and the five dimensions of digital maturity.

The "market" dimension of digital maturity presents differences between the means of cluster cases. Post hoc analysis with the Bonferroni criterion resulted in statistically significant differences between the clusters. Businesses with strong customer orientation may experience a greater impact of the influences of the digital age in comparison to other organizations (Berghaus, 2016).

According to ANOVA results in the dimension of "technology", equal variances assumed, F = 5.690 (df = 2, p < 0.05), indicating differences among the means of groups of companies. According to the Tahmane criterion, statistically significant differences existed between the clusters of mature companies and the cluster of companies with intermediate maturity. According to the results indicating that F = 3.495 (df = 2, p < 0.05), post hoc analysis also revealed statistically significant differences between the turnover of sales (in million euros) between companies belonging to the intermediate digital maturity cluster (mean 3.43) and the cluster with digitally mature companies (mean 4.90).

For the "organizational culture" results, F = 2.356 (df = 2, p < 0.05), post hoc analysis with the Bonferroni criterion resulted in the finding that the dimension of "organizational culture" had statistically significant differences between the mean of the cluster of companies at an early stage of maturity (mean: -0.73963), the cluster of companies that were digitally mature (mean: 0.30879), and the cluster of companies with intermediate digital maturity (mean: 0.41129). Pinto et al. (2023) support these results, mentioning that technology and organizational culture set the path to digital maturity. Concerning the dimensions of "Strategy" and "Operations", statistically significant differences were not observed between the different clusters.

Digital transformation entails new distributions of power and new—often challenging—organizational learning processes. Companies regarding digital transformation as important for their development tend to redefine organizational roles and responsibilities, and they set new performance indicators to better address it. They cultivate a sense of the digital transformation process as a strategic priority in their strategic agenda (Berghaus, 2016).

Digital transformation encompasses significant changes in strategy, processes, and products, necessitating a company to redefine its organizational structure (Berghaus, 2016). A digital transformation strategy involves the development of a new vision, comprehensive planning, and the implementation of organizational change processes.

5. Discussion

Entrepreneurs are major drivers of innovations. The widespread diffusion of information technologies appears to lower the barriers to entrepreneurial activity (Fichman et al., 2014).

This paper recognized the research gap on the relationship between digital transformation and factors such as companies' age, size, and revenues, aiming to explore whether these critical factors drive digital transformation in the business ecosystem of Greece. By assessing the digital maturity of companies across diverse sectors, this study provides valuable insights into how organizations adopt and integrate digital technologies into their operations, strategies, and culture. It examines key dimensions of digital transformation, including skill development, innovation performance, management agility, and digital vision, while also identifying the challenges and opportunities faced by businesses in this evolving landscape.

Organizations must comprehend the aspects shaping their digital environment to effectively digitize processes and maintain competitiveness in a dynamic and volatile market. According to the results, digital maturity is not uniformly distributed across companies at different sectors of the Greek economy. In the analysis conducted, companies were grouped into three clusters of digital maturity—early stage, intermediate, and mature companies. Significant variations exist within the dimensions of digital maturity, such as Market, Strategy, Operations, Technology and Organizational Culture.

The results indicate that the age and sector play a significant role in a company's digital maturity.

Financial and technology companies are heavily investing in digital transformation and in technologies such as artificial intelligence, cloud computing, and automation. Thus, the financial service sector and the technology sector presented higher digital maturity scores, which aligns with the findings of Bughin (2020). Supportive to this finding is McKinsey's Industrial Digitalization Index (2020), which ranks finance and technology among the most digitally mature industries. Also, the communication sector has been a pioneer in digitalization, with investments in 5G technologies, the Internet of Things (IoT), and cloud computing.

The retail sector is undergoing rapid digitalization, but traditional retailers face major barriers such as legacy infrastructure, low digital investments, and dependence on physical stores (Rigby, 2011). Companies that belong to sectors such as manufacturing, healthcare, and logistics bear high initial costs and operate in an industry with increased complexity. Digital transformation in retail is highly uneven, with large, multinational technology companies engaged in e-commerce, cloud computing, online advertising, digital streaming, and artificial intelligence, and they compete with traditional brick-and-mortar retailers.

The health services sector received low digital maturity scores. This sector faces barriers such as regulatory and privacy concerns, and also high implementation costs. These hurdles slow down digital adoption (Agarwal et al., 2010). There are still many hospitals and healthcare providers that lack digital technology processes; they have outdated information system infrastructures and fragmented digital systems. According to Bughin (2020), artificial intelligence and telemedicine transformations have been adopted by some healthcare providers, and that implies lower overall digital maturity.

Larger companies have more resources available to drive digital transformation. They also have structured digital strategies, and they implement people in the procedure of digital transformation (Fichman et al., 2014). Our results indicate that we cannot provide a general principle for all kinds of companies, supporting the idea that the smaller a company, the less digitally mature it will be (Zoppelletto et al., 2023). In some sectors (e.g., retail), results support the idea that limited resources lead to less digital maturity (Westerman & McAfee, 2012). On the other hand, SMEs exist in other sectors (e.g., communication and technology sectors); their size is not a barrier, and they present high levels of digital transformation. Such a result supports existing findings that micro-enterprises can achieve high levels of digital maturity (Scuotto et al., 2021).

The results of the statistical analysis indicate that the public sector shows unexpectedly high digital maturity. Governmental agencies are traditionally seen as lagging in digital efficiency (Andersen & Henriksen, 2006). In the new digital era governance, digital transformation highlights the smart governance, e-government policies, and open data initiatives that have accelerated public sector digital transformation (Ravselj et al., 2022; Mergel et al., 2019). The European Commission's (2022) reports confirm that public digital services in many European countries have become on par with, or even surpass, private sector digital transformation due to strategic governmental funding. The Greek Government has increased its digital efforts in initializing open data and artificial-intelligence-driven decision making, thus enhancing digital maturity in the public sector. Smart city initiatives present digital maturity in governmental investments (European Commission, 2022). The

public sector has applied e-government policies and has thus made public organizations digitally advanced. An example of public services' digital maturity is the e-government model of Estonia, with 99% of its services provided digitally.

This study additionally contributes to the literature regarding the relationship between revenues and digital transformation. Companies with higher revenues are able to allocate more resources to foster digital transformation (Fichman et al., 2014). These companies fully exploit their economies of scale and lead in digital maturity to justify their investments (Bharadwaj et al., 2016). Smaller firms often lack the capital or the culture to make largescale investments (Fichman et al., 2014). The results of our analysis indicate a direct relationship between some sectors (e.g., retail) and an indirect positive result in service sectors, where increased revenues are more related to cost minimization or time efficiency digital tools. Both tensions are supported by existing results. For example, the positive relationship between digital maturity and sales performance has been empirically explained as a result of digital marketing's tools and new digital strategies for promotion (Eremina et al., 2019). Moreover, big data analytic technologies are a means for increased financial performance, with direct and indirect effects (Parra et al., 2019). Industries with higher competition and regulatory pressure, such as the technology and finance sectors, tend to adopt digital tools faster than others. Differences in compliance requirements between sectors, such as the finance and healthcare sectors, result in different maturity trajectories (Sebastian et al., 2017).

A company's age may directly affect their digital transformation maturity, especially in the case of startups or digital narrative companies (Sreenivasan & Suresh, 2023). Some older companies face difficulties in adopting digital business conditions and accordingly formalizing their business strategies (Pesch et al., 2021). They have legacy system constraints, and some younger companies benefit from digital agility (Westerman et al., 2014; Kane et al., 2016).

Companies with digital maturity use more efficient, customized channels not only physically but also digitally to reduce costs and time (Pinto et al., 2023). Significant differences exist in the market dimension, suggesting that organizations with more digital maturity are better equipped and aware of the demands of the digital age in terms of customer orientation and responsiveness. Our results are aligned with prior research (e.g., Berghaus, 2016), which underscores the influence of customer orientation and strategic prioritization on organizations' digital transformation. Ladu et al. (2024) found that the extensive utilization of digital technologies, including mobile technologies, cloud computing, and IT systems, is positively correlated with organizations exhibiting higher digital maturity. Our findings also indicate that a greater use of digital technologies is linked to elevated levels of digital maturity. The Technology dimension revealed a gap existing between the intermediate and mature clusters. Advanced technological infrastructures and investments into cutting-edge tools enable companies to capitalize on efficiency and innovations, while intermediate clusters may have barriers such as resource limitations and resistance to change. According to Caska and Suarman (2020), such barriers are, among others, a lack of government support, poor human resource quality, a lack of funding, and economic conditions.

Our findings emphasize the significance of cultivating an organizational culture that promotes a digital mindset and aligns cultural values with technological advancements. Companies that are digitally mature embrace innovations and collaboration and invest in continuous learning and the extension of employees' skills and knowledge capital. Digitally mature companies exhibit greater agility, flexibility, decentralization, digital orientation, and collaboration, fostering a culture of experimentation. Such businesses invest in digital technologies to transform their operations, thereby enhancing customer relationships, improving employee engagement, and streamlining processes. Companies in the early stages of maturity may lack the structural and cultural framework necessary to effectively support digital initiatives.

The absence of statistically significant differences for the dimensions of "strategy" and "operations" may indicate that these dimensions are more influenced by industry standards or regulatory requirements than a company's digital maturity. These two dimensions are considered fundamental to digital transformation. The results presented indicate the complexity and novelty that a digital transformation process requires, especially for SMEs. The results imply that external support is needed for SMEs to overcome barriers and to accelerate their digital transformation journey (Khitskov et al., 2017). Such support can be found from private consultancy sectors or governmental and academic initiatives (Ghobakhloo et al., 2022). In particular, the government and academia may contribute to several structural barriers/enablers related to incentives, financial and technological resources, skills/competencies, and policies.

In the Greek business ecosystem, it seems that digital transformation is mainly related to the implementation of digital technologies. This approach downsizes the whole process, since less emphasis is put on "people" (employees and entrepreneurs), the necessary changes (in terms of operational and organizational changes), and "culture" (the development of a digitally oriented perspective on how business is conducted in the 21st century). Developing, as a whole, all of these perspectives is time consuming and resource intensive, which reveals why SMEs face difficulties. Moreover, Greek SMEs seem to lack updated plans about how to digitally transform. A digital readiness preassessment would be a valuable tool for further determining their maturity levels and to reveal specific gaps, especially in terms of the skills/competencies needed.

6. Conclusions

Research has highlighted the key drivers of digital transformation in the Greek business ecosystem. A company's age plays a dual role, either facilitating digital transformation or acting as a barrier. The sector under study has a significant influence on whether new companies achieve high digital maturity or not. More digitally oriented sectors (e.g., communication and technology) foster digital-native start-ups or companies with a high degree of digital maturity.

Moreover, the business sector also affects the relationship between digital transformation and financial performance. In most cases, this relationship is indirect (e.g., through cost minimization and reduced time to produce or provide services) due to the high investment required for implementing digital technologies and making necessary operational changes. Companies with a higher revenue are able to allocate more resources to digital transformation (Fichman et al., 2014). The retail and the health sector lag in digital maturity due to the constraints of low margins, regulations, or obsolete legislation systems, which slow down the transformation procedure (Agarwal et al., 2010; Rigby, 2011). At the same time, the public sector initiates e- government procedures and open data policies, which significantly boosts digital maturity (Mergel et al., 2019).

The most critical factors driving digital transformation in the Greek business ecosystem include the presence of a digital strategy, the redesign of operations to align with this strategy, the effectiveness of digital technology implementation, the cultivation of an organizational culture open to change, and the development of digital skills and competencies.

7. Future Research and Limitations

Future research could focus on sector-specific factors influencing digital maturity. This could provide insight into the ways different industry characteristics shape digital transformation. Investigating how different sectors within the Greek economy, such as tourism, agriculture, and manufacturing, are adopting digital transformation practices could moreover provide a more granular understanding of sector-specific drivers and barriers. This would be even more significant, alongside studying the role of government initiatives and policies in facilitating or hindering digital transformation. The importance of government tools such as funding programs, regulatory frameworks, and support mechanisms was not evaluated in the analysis provided. Finally, it would be valuable to conduct comparative studies between Greek SMEs and those in other European countries to identify the best practices and areas for improvement. This would provide valuable insights into how Greek SMEs can leverage international experiences to accelerate their digital transformation journey.

As far as the limitations of our research are concerned, it should be mentioned that even though our study provides valuable insights into the factors influencing digital maturity, it is important to acknowledge some of them. The primary limitation is the generalizability of our findings. Our research was conducted across several sectors, and while we aimed to capture a broad perspective, the heterogeneity of digital transformation processes means that sector-specific nuances might not have been fully addressed. Moreover, such a limitation makes it difficult to generalize results, since digital transformation follows different paths according to companies' sizes. Larger companies face less severe barriers in terms of accessibility to financial, human, and technological resources compared to SMEs. Our results, rather, provide a "direction" for further research than a direct pathway regarding the factors that can affect all companies' digital transformation procedures regardless of their size or sector.

Additionally, the availability and quality of data varied across sectors, which might have impacted the consistency of our results. Future research with a more focused scope on individual sectors or regions could provide a deeper understanding of the unique challenges and opportunities in digital transformation.

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