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Digital transformation process of SME entrepreneurs: the perspective of century-old businesses

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ABSTRACT

This study explores digital transformation among century-old SMEs (established 1833–1921) in the food and beverage industry, focusing on their technological awareness and usage behaviors. Using a mixed method, convergent parallel design, it identifies four digital maturity stages: Technology Avoidant, Passive Acceptance, Technology Adaptation, and Researcher/Pioneer. These stages reveal diverse levels of digital integration influenced by both intrinsic motivations and external pressures. Unlike generic SME models, the framework highlights tradition driven resistance, nonlinear adoption paths, and a nuanced balance of internal and external drivers traits unique to historic SMEs navigating digital change.

KEYWORDS

Digital maturity; digital transformation; SME; technological readiness

Introduction

The digital transformation of businesses is increasingly recognized as a strategic imperative across industries, fundamentally reshaping how organizations operate, engage with stakeholders, and deliver value. While digital transformation represents a comprehensive, organization-wide change enabled by digital technologies, digitalization serves as its precursor by digitizing processes and creating a technological foundation (Vial, 2021). Despite the growing body of literature on digital transformation, the nuanced relationship between digitalization and digital transformation remains underexplored, particularly in the context of small and medium-sized enterprises (SME) (Verhoef et al., 2021). Existing research primarily focuses on the digital transformation processes of large enterprises with extensive resources, often overlooking the technological innovation barriers that Small and Medium-Sized Enterprises (SME) face. However, Indrawati et al. (2020) identify several critical barriers hindering SMEs' innovation, including insufficient government support, low-quality human capital, high innovation costs, economic instability, and weak business partnerships. These barriers often hinder SME from achieving the radical, technology-driven organizational change necessary for sustained competitiveness. These challenges underscore the need for more

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targeted research and policy interventions that specifically address the unique constraints SME encounter in their technological transformation efforts.

Given the critical role of SMEs in the global economy, which contribute significantly to employment and economic growth (OECD, 2019), understanding their digital transformation journeys is crucial. This gap is particularly evident in traditional industries such as food and beverage, where digital tools like online ordering systems, social media marketing, and service automation hold transformative potential. However, many SME in this industry struggle with technology adoption due to resistance to change, cultural inertia, and resource constraints (Lee et al., 2018). Among these, century-old businesses represent a compelling case, as their deep-rooted traditions can simultaneously foster resilience and impede innovation (Miller & Breton-Miller, 2005)

To address these gaps, this study explores the digital transformation stages of century-old food and beverage SME in Türkiye. Specifically, it examines their technological awareness and usage behaviors, categorizing them into distinct stages of digital maturity. This study's central research question is: How do century-old food and beverage SMEs in Türkiye navigate digital transformation, and what factors influence their digital maturity?

This research makes several key contributions. First, it integrates the concepts of digitalization and digital transformation, emphasizing their interdependence in the SME context. Second, it develops a structured framework to assess the digital maturity of SME, addressing the lack of models tailored to smaller, resource-constrained businesses. Third, it enhances the theoretical understanding of SME digital transformation by identifying specific barriers and enablers within the food and beverage industry, particularly in long-established firms. By providing actionable insights, this study offers valuable guidance for business owners, policymakers, and researchers seeking to support the sustainable digitalization of traditional enterprises.

Theoretical background and conceptual framework

Impact of digitalization and digital transformation in foodservice

Depending on the use of technology in food businesses, there are various digital solutions in several areas covering business operations, such as food safety and quality (Tan et al., 2023), traceability, logistics and supply chain management (Mangina & Vlachos, 2005), cost control, stock and inventory tracking, recipe and menu management. There are also digital solutions in mobile payment solutions, digital menu boards, online ordering systems, contactless payment solutions, inventory management systems, kitchen display systems, and enterprise reporting systems available in food service (Cavusoglu, 2019; Iskender et al., 2024). Finally, advanced technological applications such as robotic services and robotic kitchen equipment supported by artificial intelligence are also included in this field (Jang & Lee, 2020;

Özgüneş et al., 2020). With the use of such solutions, businesses have the opportunity to gain a competitive advantage and increase profit margins by reducing risks while increasing product diversity by accelerating innovation in the industry (Terzi et al., 2010)

The projection-based lighting systems used in restaurants are innovative technologies that differentiate customer experiences. With this technology, various ambiance can be created within a standard dining space; for instance, the dining area can transform from a desert theme to a forest theme based on the type of dish served, with sound and scent effects enhancing transitions. Sublimotion Restaurant in Ibiza, Spain, is a notable example of an augmented reality application in this field. Such technologies enable restaurants to differentiate themselves by offering a unique customer experience. Studies have shown that projection-based applications, such as visuals projected onto tables, can significantly enhance customer satisfaction (Echtler & Wimmer, 2014; Margetis et al., 2013). Another significant contribution of digitalization to the customer experience is collecting and analyzing data-driven customer feedback. Feedback obtained through digital platforms enables restaurants to enhance service quality and better meet customer expectations by making targeted improvements (Demartini et al., 2018). For instance, the digital delivery of customer satisfaction surveys allows customers to provide feedback quickly and easily, and these data can be evaluated in real-time, facilitating prompt responses and adjustments.

Digital solutions in the food and beverage industry are not merely technological advancements but are essential tools for promoting sustainability in the face of global demographic changes. With declining birth rates and increasing life expectancy, the importance of improved food safety, nutrition, public health, and sustainable food and beverage policies is increasing (Gu et al., 2021). Digital technologies such as inventory management systems, predictive analytics, and automated monitoring tools enable businesses to reduce food waste, optimize supply chains, and ensure compliance with food safety standards (Demartini et al., 2018). Moreover, the use of data-driven decision-making processes helps companies anticipate market trends and adjust their operations accordingly, thereby supporting sustainable and resource-efficient food production and distribution (Ichsan et al., 2019) (Kimes, 2008). emphasizes that the role of technology in restaurant revenue management goes beyond merely enhancing operational efficiency; it also serves as a strategic tool for driving revenue growth. Accordingly, technology provides significant advantages in areas such as increasing customer turnover, optimizing capacity and seating arrangements, developing pricing and sales strategies, controlling costs, reducing food waste, and enabling data-driven decision-making. These contributions positively impact restaurants' revenue management strategies, thus supporting their overall financial performance. Digital transformation is reshaping not only individual businesses but also the industry and, ultimately,

the economy as a whole. Consequently, digitalization is associated with economic growth (Brodny & Tutak, 2022). When the leading countries in digital transformation are examined, it is observed that they are generally economically strong and have higher gross domestic product per capita than other countries. These countries can compete using digital technologies with sustainable economies and development models. States investing in future technologies first analyze the current situation to strengthen their infrastructure, then develop strategies and road maps aligning with their goals (Digital Economy and Society Index DESI, 2020). In this context, businesses must create digital transformation roadmaps to achieve their goals.

The impact of digital technologies in the food and beverage industry extends across various areas, from customer satisfaction to economic growth, social responsibility, and environmental sustainability. Businesses are leveraging innovations such as online ordering and reservation systems, contactless payment methods, and digital menus to provide customers with faster and more seamless services. Digital solutions also offer operational benefits in inventory management, food safety, cost control, and error reduction. Digital solutions that help reduce food waste and implement traceability systems support the development of corporate social responsibility and contribute to societal well-being. These technologies promote the more efficient use of resources and encourage the adoption of high-value business models that enhance productivity, thereby contributing to both environmental and economic sustainability for businesses.

Key areas of digital transformation in businesses

Given the benefits and impact of digital transformation, many researchers have sought answers to various questions in this field. The most prominent question is, where should digital transformation begin? Digital transformation focuses on businesses' digitalization goals and strategies. Strategic planning involves the allocation of resources and the definition of strategies to achieve organizational objectives. However, no universally accepted digital transformation strategy exists in the literature (Dang & Vartiainen, 2019). This situation makes it challenging for decision-makers to develop a feasible digital transformation strategy. In developing a digital transformation strategy, managers need a framework that identifies areas of digital transformation, helps make sense of the process, and provides appropriate systems to align the goals among stakeholders (Berghaus & Back, 2016).

To establish a successful digital transformation strategy, companies must first accurately define the framework for digital transformation and plan accordingly (Zineb & Bouchaib, 2020). Digital transformation is not only about enhancing technological infrastructure but also requires updating strategies and mind-sets. The transformation needed for the digital age involves

reshaping strategic approaches rather than focusing solely on improving information technology infrastructure. A digital transformation strategy encompasses using technology to optimize processes, reduce risks, and improve the efficiency of existing business activities (D. L. D. L. Rogers, 2016). A long-term strategic approach enhances the success of the transformation process, emphasizing the transformation of products, processes, and organizational structures through new technologies.

A digital transformation strategy manages the changes resulting from integrating digital technologies and provides a plan to support companies' post-transformation operations (Matt et al., 2015). Klein (2020) identified three key areas where digital transformation occurs in businesses: business models, business processes, and organizational structure. The most prominent area of digital transformation is business models, with 80% of companies focusing on this aspect, followed by business processes at 68%, and organizational structure at 56%. Analyzing the relationship between these areas reveals a cyclical connection between business models and business processes (Bonakdar et al., 2013; Veit et al., 2014). The primary area of digital transformation, business models, demonstrates how companies create and capture value economically, socially, or otherwise. These models define how companies deliver products to customers, which customers they serve, and how they generate revenue (Kaplan, 2012; Osterwalder & Pigneur, 2010). Digital technologies have driven significant changes in business models, affecting everything from value creation to revenue generation (Blunck & Werthmann, 2017; Veit et al., 2014). By leveraging the potential of digital technologies, companies can convert this potential into economic value (Ehret & Wirtz, 2017). Digital business models may digitize existing models (e.g., renting cars online) or create new models enabled by digital technologies (e.g., the Uber ride-sharing platform). Thus, digital transformation can lead to adapting existing business models and introducing new ones (Klein, 2020). Innovative business models should be developed with market- and industry-specific dynamics to ensure sustainable use of traditional technologies (Girotra & Netessine, 2013). Another area affected by digital transformation is business processes. Digital technologies in production reshape the entire value chain from the procurement of raw materials to production, sales, and after-sales services (Blunck & Werthmann, 2017). Technologies create value across various functions, including product development, R&D, innovation, supply chain management, sales, and marketing. However, adapting to evolving business models and processes within existing organizational structures is challenging, so transforming organizational structures is essential.

Digitalization of the business environment necessitates the development of employee skills and competencies. As hierarchical structures evolve toward lean management with increasing responsibility, managing a workforce spanning four generations becomes increasingly important (Störmer et al., 2014).

With digital transformation, organizational charts expand, adding new units and departments, leading to horizontal or vertical growth (Eryılmaz, 2020, p. 9). Singh et al. (2023) emphasized the importance of small business leaders' technical knowledge and skills in adapting to changing market conditions. Accordingly, it has been stated that leaders with innovative visions in technology and marketing are directly effective in increasing the business's overall performance. Accordingly, managers' and employees' skills and competencies are critical in the digital transformation.

Conceptual framework

Understanding how century-old food and beverage industry SMEs navigate digital transformation requires a multi-theory conceptual framework that integrates technology readiness, adoption, and maturity stages. This study proposes an integrated conceptual framework combining the Parasuraman and Colby (2015) Technology Readiness Index (TRI 2.0), the Davis (1989) Technology Acceptance Model (TAM), and SME Digital Transformation Models to assess digital adoption behavior and transformation stages systematically.

The study incorporates three key dimensions to understand digital transformation among century-old SMEs. First, the Technology Readiness Index (TRI) 2.0 framework examines internal factors such as readiness, which reflects the organization's preparedness to adopt new technologies; willingness, indicating openness and positive attitudes toward digital change; and perceived risks, which involve concerns over cost, complexity, or security. Second, the Technology Acceptance Model (TAM) assesses how SMEs perceive digital tools in terms of usefulness – the extent to which technology improves performance – and ease of use, or how effortless the technology is to operate. Third, external enablers such as market demand, government policies, and technological advancements are critical drivers that influence or accelerate digital adoption outside the organization. Together, these factors provide a comprehensive understanding of the internal mind-set and external pressures shaping the digital transformation journey of historic SMEs. Integrating TRI 2.0 and TAM, this framework assesses initial attitudes toward technology and explains how perceived value and usability shape adoption decisions.

Methodology

Research design

This study employs a mixed-methods approach, integrating both qualitative and quantitative methods to provide a comprehensive understanding of the digital transformation stages of SMEs in the food and beverage industry. A convergent parallel design was adopted, allowing the independent collection

and analysis of qualitative and quantitative data, which were subsequently integrated for interpretation (Creswell & Plano Clark, 2017). This approach was chosen to enhance the depth and validity of findings, enabling the triangulation of data and the generation of more robust insights.

A flow diagram of the mixed-methods research with a convergent design is shown in Figure 1.

Sampling and theoretical saturation

In particular, relatively older businesses established before the digital age may be more hesitant to adapt to innovation (Ross et al., 2016). Therefore, the population in this study consists of restaurants and diners active in Türkiye and have more than 100 years of food and beverage business status as of the year of establishment, which is attributed to longevity. The research aimed to reach the entire population, and centennial businesses actively operating in the food and beverage industry in Türkiye, which constitutes the universe, were listed (AGMER, 2018; Yüzyıllık Markalar Derneği, n.d.; Dil, 2016; Erkara, 2010). Accordingly, 30 food and beverage establishments in 13 different cities of Türkiye passed a century, with establishment dates ranging from 1833 to 1921. As a result of face-to-face and personal communication with businesses, it was determined that 27 active businesses constitute the universe. The research determined three businesses were closed for various reasons, and the remaining 27 were still active. The average age of the enterprises in the universe was 132. While the sample does not explicitly control for variations in industry size, it captures long-established SME, providing insights into digital transformation challenges unique to traditional businesses. Geographic representation includes urban and semi-urban settings, reducing location bias. The findings are compared with existing literature on SME digitalization to mitigate potential contextual limitations.

First, the businesses that constitute the research universe were analyzed according to the concept of digital business in the literature. According to Xu (2014), a digital business is defined as one that uses digital technologies and networks in activities such as buying and selling goods and services, serving customers, collaborating with business partners, and communicating and conducting transactions within the business. In this context, the existence of digital identities indicates that businesses have reached a certain level in the digital transformation process and have awareness and experience of using technology. Therefore, a purposeful sampling method was employed to ensure representation from businesses with digital identities (e.g., website, social media presence, or e-commerce capabilities). This approach aligns with the study's aim to evaluate digital transformation in businesses with varying degrees of technological integration.

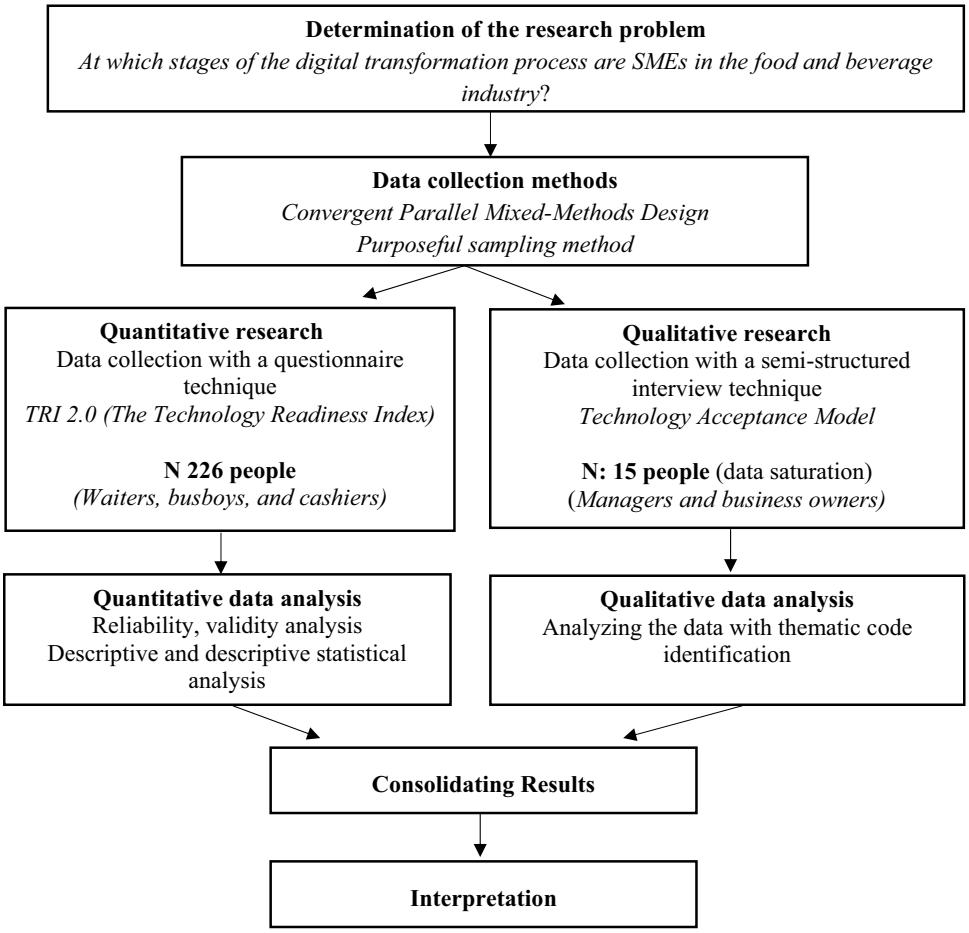

Figure 1. Flow diagram of mixed methods research with convergent design.

The study examined the digital transformation of 27 century-old food and beverage SME in Türkiye, using both quantitative and qualitative methods to achieve a comprehensive understanding. The quantitative sample comprised 226 employees, selected using a confidence level of 95% and a margin of error of 5%. Purposeful sampling was employed to ensure the representation of businesses with digital identities (e.g., websites, social media presence, or e-commerce capabilities), reflecting varying degrees of technological integration. Based on the validated Technology Readiness Index (TRI 2.0) by Parasuraman and Colby (2015), the survey measured technological readiness across four dimensions: optimism, innovativeness, discomfort, and insecurity, using a 5-point Likert scale. It also included demographic questions and items to assess awareness of digital technologies relevant to the food and beverage industry.

The qualitative component included semi-structured interviews with 15 managers and business owners, selected through purposeful sampling to

represent distinct stages of digital transformation. The sample size was determined using the principle of data saturation, achieved when no new themes emerged after the twelfth interview (Guest et al., 2006). The interviews, averaging 35 minutes, were conducted face-to-face, online, or via telephone and were guided by Davis's Technology Acceptance Model (TAM). This model examines participants' perceived ease of use (PEOU), perceived usefulness (PU), and attitudes toward digital technologies, providing valuable insights into the challenges and enablers of digital transformation in the food and beverage industry. PU is assessed through the questions What technological products/services do you use in your business? What are the benefits of this? Moreover, do you think using technological products and services affects the company's business performance, as they explore technology's perceived advantages and impact on operational efficiency? The question: Is it necessary to follow and use technology in the food and beverage industry? Why? Captures both PU and PEOU, measuring whether businesses see technology as a strategic necessity and if they consider its adoption feasible. Finally, do you have difficulty using technological products and services? Directly addresses PEOU by investigating potential barriers to adoption and usability challenges businesses may face.

Data analysis and findings

Quantitative analysis

Quantitative data were analyzed using descriptive and inferential statistics. The TRI scores were calculated to categorize participants into low, medium, or high technological readiness levels. Cronbach's alpha coefficients were computed to ensure reliability, with values above 0.7 indicating adequate internal consistency (Cronbach, 1951).

In the first part of the questionnaire, seven questions were formed to determine the gender, age, industry experience (years), experience in the industry (years), experience in the current business (years), education level, department, and position (whether there was a managerial role) of the participants. In the second part of the questionnaire; online food and beverage ordering (Alagoz & Hekimoglu, 2012), tablet, kiosk, mobile ordering systems, restaurant automation programs (Mozeik et al., 2009), cardless secure payment systems (Cobanoglu et al., 2015), robotic kitchen equipment, robot personnel (waiters, cooks, cashiers, greeters) (Özgüneş et al., 2020), kitchen equipment that can interact with each other, face recognition systems (Cavusoglu, 2019), remote control of kitchen equipment (Taş & Olum, 2020), innovative food delivery models (Kaur et al., 2024), cardless secure payment systems (Cobanoglu et al., 2015), food vending machines (Davutoğlu & Yıldız, 2020), 3D food printers (Sun et al., 2015), virtual reality, augmented reality and hologram technologies (Hazarhun & Yilmaz, 2020), smart

restaurants and Uber eat, deliveroo, food cart (Uçuk et al., 2021) were compiled to measure the awareness levels of employees regarding fifteen technological developments in the industry. In the third part of the questionnaire, the technological readiness levels of the employees of the century-old enterprises in the food and beverage industry were determined with the Technological Readiness Index, which is a four variables and 16 indicators version of TRI 2.0 (The Technology Readiness Index) updated by Parasuraman and Colby (2015) in 2015.

The TRI 2.0 measurement uses a Likert scale, assigning a range of values from very positive to very negative for each item in the assessment. Technological readiness refers to the inclination of individuals to embrace and implement new technologies in their personal or professional lives, aligning with their intended purposes. Parasuraman (2000) divided attitudes toward technology into four sections: optimism, innovativeness, discomfort, and distrust. Optimism reflects a positive view of technology, which is seen as a means to improve control, flexibility, and efficiency in everyday tasks. Innovativeness represents the tendency to embrace new technologies early and lead in adopting emerging digital trends.

In contrast, discomfort indicates feeling overwhelmed or lacking control when using technology, which can hinder adoption. Similarly, insecurity involves distrust in technology due to concerns about its reliability, security, or potential negative consequences. These factors shape how comfortable and motivated individuals or organizations are in pursuing digital transformation. Optimism and innovativeness are considered the driving forces of technological readiness, whereas discomfort and insecurity are considered slowing factors. The Technology Readiness Index (TRI) model version 2.0 includes four key dimensions, outlined below, with three distinct categories for applying the results shown in Table 1.

Quantitative study findings

After the personal communication with the enterprises, it was determined that there were 450 employees in 27 enterprises constituting the universe, and the number of samples in the quantitative part of the research was determined as 208 people with a 95% reliability level and a 5% margin of error. Considering that the determined number of 208 samples (employees) should be reached in the centuries-old enterprises with digital identity, which are considered a stratum in the research, it is aimed to exceed 208 questionnaires by taking into account the margin of error, reliability level, and incomplete filling or non-returned questionnaires. In this direction, 250 questionnaire forms were distributed by hand and digitally, and 226 forms were subjected to the research after removing 24 invalid questionnaires.

When the demographic information of the participants of century-old food and beverage establishments is analyzed, it is seen that the majority

Table 1. Technology readiness index (TRI) categories.

Low TRI	If the TRI value ≤ 2.89
Medium TRI	If the TRI value is between 2.90 and 3.51
High TRI	If the TRI value > 3.51

of the participants are male (71.2%) according to gender, 43 years of age and above (26.1%) according to age group, 6 years or more of experience in the industry (65.9%) but 0–4 years of experience in the current business (39.4%). According to the education level of the participants, high school graduates (46%) are the majority. Within the scope of the research, personnel working in the service (53.6%), kitchen (32.1%), cash register (8.5%), and reception (5.8%) units were assessed. In these units, 76.1% of employees, 15.9% of chefs, and 8% of managers work at the manager level. Another quantitative finding of the study is the participants' level of awareness of digital developments in the food and beverage industry. The findings are presented in Table 2. According to Table 2, the digital developments in the industry that employees are most knowledgeable about are Online food and beverage orders, Tablets, kiosks, mobile ordering systems, and Restaurant automation programs. The rate of those who stated that they have information about Online food and beverage orders is 89% ($n = 202$), while the rate of those who stated that they do not have information is 11%. ($n = 24$) To finalize the reliability analysis of the Technological Readiness Level Scale used to collect the quantitative data of the study, Cronbach's Alpha coefficient was calculated. A Cronbach's Alpha coefficient of 0.60 and above supports the scale's reliability (Cronbach, 1951). The alpha coefficients of the technological readiness level scale are presented in Table 3.

According to Table 3, the Technological Readiness Level and its subdimensions are within the range of adequate reliability. TRI model analysis was carried out to determine the user's level of readiness by grouping data according to research variables. This study aims to obtain the overall TRI value as the mean value. The results of the TRI value are presented in Table 4 below.

According to Table 4, the technological readiness level of the industry employees in the research group is 2.9 out of 5. While 1 represents the lowest technological readiness level, 5 represents the highest. According to the Technology Readiness Index (TRI), if the TRI value is between 2.90 and 3.51, it is defined as a Medium Technology Readiness Level. At this level, individuals or organizations have some openness to technology but may also experience certain hesitations or lack complete confidence in their technological abilities. This level is crucial for organizations or policymakers to understand, as those in the medium readiness group are often receptive to technology with the proper support and gradual exposure.

Table 2. Frequency table of participants' awareness of digital developments in the F&B industry.

Digital developments in the food and beverage industry	Y	N	%
I know virtual reality, augmented reality, and hologram technologies.	Yes	69	31
	No.	156	69
I know 3D food printers	Yes	44	20
	No.	181	80
I know robotic kitchen equipment	Yes	99	44
	No.	124	56
I know the robot staff (waiter, cook, cashier, receptionist)	Yes	114	50
	No.	112	50
I know smart restaurants	Yes	54	24
	No.	171	76
I know food and beverage service with a drone	Yes	47	21
	No.	178	79
I know face recognition systems	Yes	122	54
	No.	103	46
I know Uber Eats, Deliveroo, and food carts.	Yes	112	50
	No.	114	50
I know food vending machines.	Yes	87	39
	No.	139	62
I know online food and beverage orders	Yes	202	89
	No.	24	11
I know the remote control of kitchen equipment	Yes	88	39
	No.	137	61
I know secure cardless payment systems	Yes	118	52
	No.	107	48
I know about restaurant automation programs	Yes	133	59
	No.	92	41
I know tablets, kiosks, and mobile ordering systems.	Yes	174	78
	No.	50	22
I know about kitchen equipment that can interact with each other.	Yes	65	29
	No.	160	71

Table 3. Alpha coefficients of the technological readiness level scale.

Factor	Cronbach's alpha (α)	Number of items
Optimism	0.808	4
Innovative	0.845	4
Discomfort	0.706	4
Insecurity	0.786	4
Total	0.651	16

Table 4. The result of the TRI value.

Variable	Dimensions
Optimism	3.25
Innovation	2.74
Discomfort	3.02
Insecurity	3.34
Total Score TRI	2.9

Qualitative analysis

Qualitative data were analyzed thematically, and codes were identified and grouped into themes corresponding to the businesses' digital transformation stages. This analysis provided insights into the contextual factors influencing technology adoption and integration. Considering features of digital businesses, it was examined whether century-old food and beverage businesses

have websites and social media accounts (Instagram and/or Facebook and/or YouTube) within the scope of interacting with their stakeholders and customers and whether they have e-commerce services (website and/or yemeksepeti and/or Zomato sales) in order to understand customer needs better and make more sales. Website, e-commerce, and social media usage of 15 businesses in line with their digital identities are presented in Table 5.

Since these businesses are century-old, they have attracted the attention of many bloggers, gourmets, writers, travelers, and TV programmers. Most television channels have featured these businesses in their main news bulletins by making news. It is possible to access videos promoting century-old food and beverage businesses from digital channels, especially on YouTube. It has been observed that most of this content is created by bloggers, gourmets, TV producers, and customers, and contributes to promoting the businesses in the digital environment. It has been determined that there are 15 digital businesses whose digital identities are supported by the management of the businesses and their stakeholders. When the identities of digital businesses are examined, it is seen that the vast majority (66%) have their websites, 26% provide e-commerce services, and 93% have their own social media accounts. Since these businesses have existed for centuries, they have attracted the attention of many bloggers, gourmets, writers, travelers, and TV presenters. Many TV channels have featured these businesses in their main news bulletins. For example, Business B, which opened in 2013 and has 2.12 thousand YouTube followers as of 17.03.2025, has watched its videos 92,182 times. Business N includes a menu on its website with three language options, and it also offers a survey to measure customer satisfaction. Business I accepts the satisfaction and feedback of customers in the restaurant, and customers receiving takeaway service via the WhatsApp line have created. Businesses with websites share history, menu, contact, and location information on their pages. Businesses that go further than this add language options to the site and offer services such as online sales and reservations. Some businesses have adapted to the digital world, as well as businesses that have not yet taken the initiative in this regard. Although F Business has been standing for 143 years with a single type of food and does not have a website

Table 5. Digital identities of century-old businesses.

Digital identity component	Businesses adopting (%)	Key insight
Website	66	Most businesses have a website, but 1/3 lack online presence.
E-commerce	26	Very few businesses engage in online sales, indicating slow e-commerce adoption.
Social media	93	Nearly all businesses are active on social media, suggesting a focus on customer engagement over direct sales.

or social media account, it is possible to access videos shot by other people on YouTube. H Business offers online sales to all of Turkey through franchise branches. It offers a customer platform where order tracking, campaigns, and promotions can be learned through membership via its website. It prefers to stay away from technology in its historic restaurant. The brand, which uses digital products and services in its other businesses, prefers to avoid technology by preserving its traditional structure in its historical restaurant.

Qualitative study findings

The findings obtained from the interviews with business managers/owners, which are the qualitative data of the research, are examined in this section. Since the participating enterprises were located in different cities, the interviews were conducted face-to-face, over the phone, and online. The interviews lasted an average of 35 minutes and were recorded with the consent of the participants. The interviews started with the participant introducing himself and telling the story of establishing his business. All but one of the businesses interviewed is run by the founding family. It was determined that family members manage the businesses whose management is in the founding family. The people who manage the business as founding family members consist of the newest 3rd generation and the oldest 5th generation representatives. At the end of the interviews with 15 business managers/owners, it was observed that the previously obtained information was repeated and no new themes or significant differences emerged. This shows that data saturation was achieved. In qualitative research, researchers can reach data saturation in the first 12 interviews (Boddy, 2016; Guest et al., 2006). A total of 15 interviews were conducted across six cities in Turkey, with Istanbul (6), Bursa (2), and Afyon (2) being the most represented locations. Interviews were conducted using three methods, face-to-face (47%), telephone (33%), and online (20%), based on accessibility and participant availability. Interview durations varied between 20 minutes and 1 hour 45 minutes, with an average of approximately 36 minutes. More extended interviews were recorded in Bursa, while shorter ones occurred in Isparta. Face-to-face interviews were primarily conducted in Istanbul and Bursa, while telephone and online methods were used for more distant locations.

While some businesses take the first step toward expanding their business network and branching out with social media, others see technology and social media as a compelling element in their survival stories. Businesses that see technology as a compelling element evaluate social media as a platform where misleading and advertising content is marketed, and sometimes the untrue is highlighted. Businesses that evaluate technology as a supportive element have stated that they have expanded their customer portfolio by announcing their

products and services to a broad audience. It has been stated that teams have difficulty transitioning to credit card payment and mobile bill tracking systems, and do not want to use them. While some businesses have problems in the adaptation and adoption phase of technology, business managers and teams with a natural interest in technology and experience in innovations have also taken part in the research group of this study.

Thematic analysis of semi-structured interviews with managers and business owners revealed four distinct stages of digital transformation among century-old SME. These stages reflect varying levels of technology adoption, influenced by intrinsic motivations, external pressures, and organizational characteristics. Table 6 presents the characteristic features of these stages.

According to Table 6, businesses with low TRI scores exhibit characteristics similar to Vial's (2021). These are pre-digital organizations, where firms resist change and rely on traditional operations. These businesses only integrate digital technologies due to external pressures (e.g., government regulations).

Example from findings: One interviewee (H) stated, *"If the law did not require digital invoices, we would not have switched."* This mirrors findings from E. M. Rogers (2003) Diffusion of Innovation Theory, where laggards only adopt technology when necessary. Westerman et al. (2014) describe such firms as Digital Beginners, operating without a structured digital strategy. Vial (2021)emphasizes that these firms need external enablers (e.g., policy incentives) to progress in digital maturity.

Integration of data

Davis (1989) explains the relationship between perceived ease of use, perceived benefit, users' attitudes, intentions, and actual behaviors in line with the technology acceptance model. When the qualitative data obtained from the managers were evaluated in line with the model, the digital stages the businesses were in and the characteristic features of this period were tried to be defined. The technologies used by the businesses were examined to ensure they were in line with the business functions. The digital stages of the businesses are presented in Table 7.

However, while personal interest in technology may contribute to an individual's openness to innovation, it alone cannot fully explain the extent to which their business adopts digital solutions. This is exemplified by a 135-year-old business owner who, despite his lifelong passion for technology, acknowledges that external factors play a significant role. Pathak et al. (2025) support this view, emphasizing that technology adoption is not just a business decision but is also shaped by government policies, financial support mechanisms, and infrastructure investments. Participant B stated that their interest in technology dated back to childhood, expressing this by saying, "*I started experimenting with radio and wireless communication when I was*

Table 6. Key characteristics of digital transformation stages.

	Key characteristics	Details
Technology avoidant	Rationale for resistance	Financial constraints, lack of technical knowledge, and skepticism about the benefits of digital tools.
	Dependence on tradition	Traditional practices are essential to maintaining their heritage and customer base.
	Minimal digital engagement	Limited digital presence.
		External parties often manage passive use of digital tools, such as inconsistent social media profiles.
	Direct quotes	*. . . You go somewhere, take photos and share them, and people flock there, but no one cares much about whether the products are delicious or not. They go for the show, and we do not need that. (J)*
		We have a security camera, we do not have social media, we do not have a website, and I stay away as much as possible. Recently, I have wanted to stay away from an environment where there are influencers who act only with negative emotions. There are different ones among them, but there are also influencers for advertising and interest. We have rules from our grandfathers, when we enter a place, greetings are given, eye contact is established, for example, I say this is good manners, for example, they wrote in the comments on the internet, for example, they wrote that I am a customer, you will greet me, you will welcome me. I say very ridiculous comments written in the mood of the moment. (F)
	Practical implications	A 185-year-old restaurant still uses paper menus and cash payments, despite customer preferences for digital solutions. Although the owner has social media accounts, his business does not have any.
Passive acceptance	External drivers	Adoption is primarily influenced by customer demand (e.g., the need for credit card payment systems) or regulatory requirements.
	Limited scope	Technology usage is confined to essential functions such as accounting, payment processing, and online food ordering systems.
	Resistance to broader integration	Participants expressed a lack of motivation to expand digital adoption beyond what is mandatory.
	Direct quotes	*. . . Before the pandemic, we were doing hot sales, but with the pandemic, we just started the online sales and takeaway business. Food was eaten fresh in our business; we did not sell frozen products. We did not look at the takeaway service. We were forced to do this during the pandemic. If you ask if you are satisfied, I am not. Today, you cannot be a McDonald's or Burger King; they sell frozen products. We do not do that. We sell daily products; a takeaway service is the last resort here. (D)*
		. . . If the law did not require digital invoices, we would not have switched. . . (H)
	Practical implications	External pressures (e.g., COVID-19) can force digital adoption, but businesses may resist full integration. The 174-year-old business started online sales and takeaway service during the pandemic. However, not satisfied with this obligation.
Technology adaptation	Targeted investment	Adoption focuses on marketing (e.g., social media campaigns), inventory management, and supplier coordination.
	Operational benefits	Improvements in cost control, inventory accuracy, and customer feedback collection.
	Challenges	Difficulties in training staff and aligning digital initiatives with long-term strategies.
	Direct quotes	*We use digital platforms to market our services and attract more customers, but we are still learning . . . (B)*

(*Continued*)

Table 6. (Continued).

	Key characteristics	Details
		There are such beautiful, smart ovens now. Some ovens can cook the food you want, at the temperature you want, and when you want. In order to prevent product loss, chili machines have been developed; for example, you can preserve leftover food by cooling it immediately. Likewise, in customer service, from the advertisement to the order at the table, the order can be sent directly to the kitchen when the customer orders through the menu. In the past, the waiter used to take orders and pass them to the kitchen. Now we can see which numbered table was ordered. Likewise, everything from hologram menus to menus showing how the food is made is available in our industry. On the other hand, cash control, stock control, cost control, and follow-up have become easier thanks to technology. Technologies are available as much as possible after learning how to use them, but it is possible to achieve efficiency when appropriate human resources exist. (A)
	Practical implications	The company has installed digital applications in its existing ovens and saved labor using the self-cleaning system. With this system, they provide remote control of kitchen devices. In addition, this enterprise, which can be monitored simultaneously by remotely connecting to business cameras and cash register systems, monitors stocks from mobile devices. It can see instant sales and how many sales each cash register has made by connecting remotely.
Researcher/ Pioneer	Comprehensive integration	Use of digital tools in all functions, including customer relationship management, human resources, and production processes
	Strategic vision	Managers demonstrate a proactive approach, leveraging data for decision-making, customer segmentation, and identifying new market opportunities.
	Innovation-oriented culture	These businesses embrace change and foster a culture of continuous improvement and experimentation with new technologies.
	Direct quotes	*We analyze social media and sales data to decide where to open our next branch . . . (E)* *On digitalization, we first bought our web page in 1999, then, with the introduction of social media into our lives, we decided to take part in Facebook and Google. We saw traffic on our Facebook page; nowadays, the Y generation remains on Facebook. We first saw the demographics of our customers on Facebook. We say that our customers are everyone, but when we analyzed the Facebook traffic, we saw that 75% of them were male, their income was above the middle white collar, and they were usually bankers. That is when we decided to load Google Maps. For example, I use the link to find personnel for the accounting unit. I can recruit more professionally. We use technology and software to integrate cash registers, manage tickets, track sales, and manage kitchen orders. Kitchen production occurs before the order receipt is transmitted, the stocks are worked, and we see the warehouse. (M)*
	Practical implications	Leverage customer data from digital platforms to refine marketing and service strategies. Use digital recruitment tools for more professional hiring. Adopt POS and inventory tracking systems to improve operational efficiency. Enhance online visibility with Google Maps and social media.

Table 7. Digital stages of SME businesses.

Stages	Motive	Technology acceptance	Technology use area
Technology avoidance	Intrinsic motivation	Being closed to technology	Traditional business models and not using technology
Passive acceptance	External driving forces	Minimal use, and digitalization in matters of legal obligation	Digitalization in accounting
Technology adaptation	External driving forces	Priority areas of digitalization are needed for operational profitability and customer satisfaction.	Digitalization in accounting and finance, marketing, and procurement processes
Researcher/ pioneer	Intrinsic motivation	Data analysis and advanced reporting to be used in strategic planning, customer segmentation, branching, etc.	Digitalization in management, marketing, public relations, purchasing, accounting and finance, human resources, and production processes

only 13. I was always interested in technology. I used to repair Nacar wristwatches, and when electricity first came to our village, I installed temporary electrical circuits in houses while others were scared." Being introduced to technology early on suggests a proactive and experimental mind-set that can foster a positive outlook toward digital transformation. However, the same business only uses technology in social media management for new customer acquisition. However, the study findings reveal that personal technological enthusiasm does not necessarily translate into enterprise-wide digital adoption, as external factors such as corporate culture, cost concerns, workforce resistance, and industry-specific constraints also play an important role in shaping a company's technological trajectory.

Discussion and implications

This study provides a comprehensive examination of digital transformation among SMEs operating in the food and beverage industry, with a particular focus on the role of the Technology Readiness Index (TRI 2.0) in shaping digital adoption behaviors. The empirical findings confirm that SMEs progress through distinct stages of digital maturity ranging from technology avoidance to full digital integration each of which aligns with established theoretical frameworks, including Vial's (2021) Digital Transformation Framework, Westerman et al. (2014) Digital Mastery Model, and E. M. Rogers (2003) Diffusion of Innovation Theory. The study underscores the need for customized, stage-specific strategies to support effective and sustainable digital transformation pathways by identifying the specific characteristics, barriers, and enabling factors associated with each TRI-based SME category. Furthermore, the study highlights the critical role of internal organizational factors, particularly leadership and culture, and external support mechanisms such as policy interventions and ecosystem partnerships in overcoming technological resistance and enhancing long-term competitiveness. These findings enrich the theoretical discourse by demonstrating that digital transformation

in SMEs is not solely a technological endeavor but also a socio-organizational process shaped by readiness, perception, and context.

In contrast to the holistic and sector-independent maturity model developed by Aras and Büyüközkan (2023), which is grounded in a systematic literature review and emphasizes macro-level, structural dimensions such as strategy, governance, and technology, this study adopts a context-specific and behaviorally informed approach. By integrating TRI 2.0 into the digital transformation framework, the research offers a micro-level perspective that classifies SMEs according to their technological readiness and proposes targeted strategies for each maturity stage. Moreover, the study advances theoretical integration by mapping TRI-based categorizations onto broader maturity models and innovation diffusion theories (E. M. Rogers, 2003; Vial, 2021; Westerman et al., 2014), bridging organizational behavior with established digital transformation paradigms. Beyond its theoretical contributions, the study provides practical value by offering actionable recommendations spanning policy, leadership, and technology for SMEs at varying digital readiness levels. It moves beyond generalized models to deliver a nuanced and implementation-oriented framework tailored to the real-world complexities of SME digitalization in a specific industry context. The study also aligns with Hartl and Hess (2017), who observed that risk-averse firms tend to delay digital initiatives. In contrast, SMEs with adaptive leadership and flexible organizational cultures are more likely to embrace digital transformation successfully, echoing the findings of Tuukkanen et al. (2022). Additionally, the acceleration of digitalization during crises, such as the COVID-19 pandemic, is consistent with Hanelt et al. (2021), reinforcing the need for organizational resilience and technological agility.

The initial stage identified in the digital transformation journey of SMEs is the Technology Avoidant phase, characterized by low levels of technological readiness and a strong reliance on traditional business practices. These firms align with Vial's (2021) Pre-Digital organizations, where businesses primarily rely on traditional operations and adopt technology only when mandated by external pressures such as customer demands or regulations. Westerman et al. (2014) describe such firms as Digital Beginners, lacking a systematic approach to digital transformation. Similarly, E. M. Rogers (2003) classifies them as laggards, adopting technology only out of necessity. Canhoto et al. (2021) highlight that SMEs in this category often do not view digital transformation as a strategic priority and suffer from limited digital skills and leadership engagement. Supporting this view, Aslam et al. (2025) found that users are similarly resistant to adopting chatbots, due to perceived inconvenience and a strong preference for traditional methods. This parallel supports the notion that resistance across both individual and organizational levels stems from perceived complexity, cost, and lack of strategic value. The reluctance among these SMEs often stems from

uncertainty about the return on investment, implementation challenges, or fear of change. These findings are consistent with OECD (2020) and Singh, Singh, et al. (2024), who observed that low-TRI SMEs tend to adopt digital tools only in response to compliance requirements or customer expectations. To address these barriers, policy interventions such as financial incentives, digital skills training, and advisory support are crucial in helping SMEs transition toward proactive digital adoption.

Passive Acceptance SMEs represent a middle stage where digital technologies are adopted selectively, for example, for accounting, payment systems, or basic customer interaction without an overarching digital strategy. This corresponds with Vial's (2021) Digitization Phase and Westerman et al. (2014) Digitally Developing classification. According to Canhoto et al. (2021), SMEs in this phase often imitate competitors rather than develop their strategies. Rupeika-Apoga et al. (2022) emphasized the role of the COVID-19 pandemic in accelerating digital awareness among such SMEs, transforming digitalization from a reactive necessity into a strategic imperative. However, in this fragmented adoption stage, firms must prioritize creating structured digital roadmaps and invest in financial literacy specific to technological investment decisions. Integrating cloud-based accounting and payment systems can improve operational efficiency and data security.

Technology Adaptation SMEs actively utilize digital tools across operational domains like marketing, inventory control, and customer engagement, yet lack holistic integration. These SMEs are in Vial's (2021) Digital Transition Phase and align with Aras and Büyüközkan's (2023) Adaptor category. While digital tools are deployed for functional efficiency, transformation is not yet embedded in strategic planning (Canhoto et al., 2021). Singh, Singh, et al. (2024a) point out that digital marketing and automation can improve competitiveness at this stage, despite incomplete integration. To advance further, SMEs must develop digital leadership capabilities and invest in scalable digital infrastructure like ERP and CRM systems. Additionally, AI-based analytics and marketing automation can enhance customer engagement and drive data-informed decision-making. Transitioning to cloud-based platforms will also support operational flexibility and security.

Researcher/Pioneer SMEs represent the most advanced stage of digital maturity. These organizations fully integrate AI, automation, and data analytics across all business functions. They embody Vial's (2021) Digital Maturity phase and Westerman et al. (2014) Digital Maturity, actively driving innovation within their industries. Aras and Büyüközkan (2023) label this as the Transformational stage, where SMEs allocate resources specifically for digital expansion. Canhoto et al. (2021) similarly define this stage as Transformation, where digitalization fuels market leadership. This maturity level requires continuous investment in workforce upskilling, emerging technologies (e.g., blockchain, IoT, metaverse), and advanced analytics. Moreover, partnerships

with tech startups and research institutions can drive further innovation. Strengthening cybersecurity frameworks is essential to ensure data protection and regulatory compliance.

This research provides an industry-specific perspective on digital transformation, highlighting the importance of stage-specific strategies to support SMEs in advancing through various levels of digital maturity. Technology-avoidant SMEs must implement targeted policy interventions, offer digital literacy training, and provide financial incentives to mitigate perceived risks and promote early-stage adoption. Passive Acceptance SMEs should be encouraged to develop structured digital roadmaps, engage in financial training focused on technological investments, and adopt secure, cloud-based systems to enhance operational efficiency. Technology Adaptation SMEs should strengthen digital leadership, foster cross-functional integration through Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) systems, and utilize AI-driven tools to improve performance and decision-making. Finally, Researcher/Pioneer SMEs must prioritize sustained innovation by cultivating a culture of continuous learning, investing in emerging technologies, reinforcing cybersecurity measures, and forming strategic partnerships with technology firms and research institutions. By aligning digital transformation strategies with SMEs' Technology Readiness Index (TRI) levels and organizational characteristics, businesses can achieve sustainable growth, enhance operational resilience, and maintain competitive differentiation in an increasingly digitalized business environment.

Conclusion, limitations and future research

This study offers a comprehensive analysis of digital transformation among SMEs in the food and beverage sector, particularly emphasizing the role of technology readiness in shaping digital adoption behaviors. The research identifies each group's specific characteristics and challenges by categorizing SMEs based on their readiness levels. These insights underline the importance of tailored, stage-specific strategies to ensure effective and sustainable digital transformation. Furthermore, the study emphasizes the critical role of leadership, organizational culture, and external support mechanisms in overcoming resistance to digitalization and fostering long-term competitiveness.

Despite its contributions, the study has several limitations. Its focus on a single industry limits the generalizability of the findings to other sectors, each of which may face distinct digitalization challenges and enablers. The geographic scope is also confined to a national context, which may influence digital behavior due to specific cultural and regulatory environments. Future research should explore digital transformation across various industries to address these limitations and uncover sector-

specific drivers and barriers. Cross-national studies would also provide valuable insights into how economic, regulatory, and cultural factors shape SME digitalization in different contexts. Moreover, incorporating quantitative tools such as digital maturity indices could enhance the objectivity and reliability of future findings. Investigating the role of leadership dynamics and organizational culture further clarifies internal enablers of transformation. Lastly, longitudinal research is needed to track the progression of digital maturity over time and evaluate the long-term impact of transformation strategies. Moreover, future studies can offer a more comprehensive and strategic roadmap for SME digital transformation by expanding research to diverse industries, global contexts, and emerging technologies.

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