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## Digital innovation in family businesses in the post-pandemic period: A case study

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**Abstract.** Businesses must develop appropriate organizational structures and working models to reduce costs and increase profitability. Under the conditions of rapid change, innovation and creativity are critical for business success. Traditional hierarchical and rigid organizational structures are unsuitable for the flexible working conditions of the post-pandemic period and need to be revised to adapt to newly created requirements. This study aims to answer the fundamental question of the importance of digital innovation for businesses in the post-pandemic period. A qualitative research method was the basis for this case study. Data were collected from 15 family business managers operating in Sakarya (Turkey) through semi-structured interviews. The collected data were analyzed using the qualitative content analysis technique in the MAXQDA program.

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According to research findings, developing new organizational structures and business models based on digital innovation is necessary to ensure sustainability and cope with uncertainty in family businesses. This also supports the notion that organizational structures should adhere to organic and flexible arrangements and move away from rigid and mechanical systems.

**Keywords:** digital innovation, family businesses, post-pandemic, COVID-19.

**JEL Classification:** O30, O36

## 1. INTRODUCTION

Since the most recent pandemic, organizational innovation and digital innovation, in particular, have continued to transform organizations' formal structures and models. The same applies to family businesses that operate with new organizational structures and business models. (Whalen & Whalen, 2020; Aspara et al., 2021; Ilie, 2014). Currently, the predominant economic models are the digital, virtual, network, intermediary, and innovation-based economies. They predetermine today's organizational structures and processes. In these new working conditions, producer and consumer patterns differ, and production models rapidly vary (Healy, 2002). In the new global economy, businesses must move away from traditional organizational approaches to network organizational structures (Nijkamp, 2003; Cossin & Schellhorn, 2007). The new economy also requires digital innovation and corporate creation. Digital innovation is essential for transforming new ideas into outputs that create value for production (Nambisan et al., 2017). The emergence of new and creative ideas, commercialization, and transformation into value-added products have increased in importance.

With the COVID-19 pandemic, innovation has become a critical competitive and success factor in sustainability, and organizational innovation continues in the post-pandemic period. According to a study of 3,500 employees from different sectors in Turkey, 53% stated that working online was productive. In addition to employees, businesses are turning to virtual and network organizational structures to increase efficiency by changing their traditional systems to avoid the problems they face during the pandemic. This process has caused an innovative transformation, especially in post-pandemic family businesses (Ayanoglu, 2021; Bergenholtz & Waldstrøm, 2011; Lu et al., 2015; Duong et al., 2023). Innovative network structures have been developed to adapt to changes and transform organizational structures based on network systems formed by members with defined roles and responsibilities. Network organizational structures that develop with digital innovations create the infrastructure of information and communication technologies, providing significant advantages in terms of accessibility and mobility (Hallquist & Hillary, 2018). Although there are some studies on digitalization and its impact on organizational structures, the inadequacy of traditional designs and models to cope with the uncertainty created by the COVID-19 pandemic has caused a gap in the literature. It can be argued that determining how digital innovations started during the pandemic and continued to transform organizational structures will significantly contribute to the literature.

Environmental factors affect the mode and level of production, market structure, organizational structures, and production models. Market structure is affected by factors such as the degree of monopolization, degree of product differentiation in the market, factors that prevent entry to the market, barriers to withdrawal from the market, vertical merger rate, and conglomeration. The management structure of companies includes price, product, advertising, investment, R&D, and strategy-setting processes (Windeler & Sydow, 2002). All of these areas require a new organizational structure and model, especially after the pandemic. This research will make an up-to-date and functional contribution by drawing attention

to this need. This research, conducted to determine managers' views on digital innovation in a family business, focuses on the kind of digital innovation that should be done to provide a competitive advantage (Ozdoğan et al., 2017). The primary purpose of this study is "What is the importance of digital innovations in the family business?" to answer the question. Depending on the central question of the research, answers to the following sub-questions were sought.

1. Why did you require digital innovation in family businesses during the post-pandemic period?
2. What has been the impact of business innovation on employees during the post-pandemic period?
3. What innovations have you made in family companies' organizational structures and business models in the post-pandemic period?

## 1. LITERATURE REVIEW

### 1.1. Digital innovation in the family business

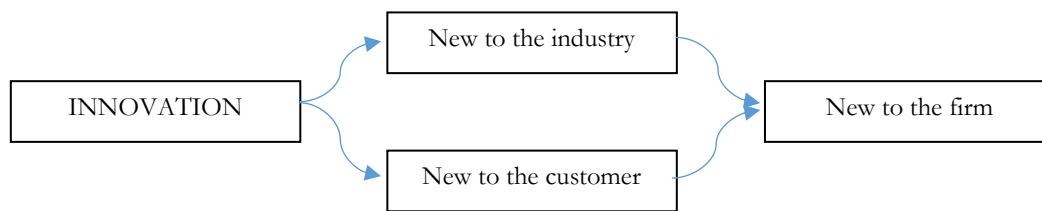
The word innovation means "to create something new" in Latin. Innovation (innovation-innovation) refers to both renewing a process and a result, namely innovation (Peters & Pikkemaat, 2006). However, innovation does not refer to invention. They improve the features of products or services. The important aspect at this stage is that the changes and new features have been commercialized. The use of digital technologies in the innovation process is called "digital innovation." Digital innovation requires digital techniques and technologies, infrastructure suitable for digitalization, and appropriate dissemination of digital experiences (Nambisan et al., 2017). In this regard, the level of digital skills and readiness to interact in the digital environment, including interactions with authorities and customers, play an essential role in business development (Bilan et al., 2023; Orlova & Ovander, 2019; Nurliza & Oktoriana, 2021; Rustiarini et al., 2023). In the process of rapid unplanned developments, such as the pandemic, organizations need to innovate new management understanding and business models. They have adopted a flexible structure to adapt to changes and differences. To cope with uncertainty, businesses must rearrange their organizational designs, technologies, human resources, and working styles according to the pandemic conditions. Adaptation to these new conditions requires innovation, especially digital innovation. It is used here to refer to new methods and models of innovation management functions (Endres et al., 2022). From these definitions, it is understood that the primary purpose of innovation is to develop new products, find new markets, find new solutions in terms of production inputs, develop new production models and methods, and establish new organizational structures.

According to the Oslo Manual (OECD, 2005) prepared jointly by the OECD and Eurostat, innovation is applying a new or significantly improved product or process, a new marketing method, or a new organizational method in doing business, workplace organization, or external relations. Innovation transforms new ideas into value-creating outputs (Křibíková et al., 2018). This process involves the emergence of new and creative ideas and the commercialization of innovative ideas, transforming them into value-added products, methods, or services. The primary purpose of innovation is to maintain the enterprise's existence, increase its competitiveness, and increase its profitability and efficiency. Businesses are developing new business models in the COVID-19 process to realize these features through digital innovation. They use digital innovation as a tool for coping with pandemic conditions. Digital innovations are being made through online video meetings, interactive activities with cloud technology, collecting requests, taking orders, stock control, and irrigation systems.

To cope with excessive competition, businesses are developing new business models, which Schumpeter calls "creative destruction." With digitalization, companies can produce regardless of time and place (Fikirli & Çetin, 2017). Innovation requires the ability to respond quickly to change and to take risks

and costs. In the past, testing prototypes in production required high cost. Owing to digitalization and digital technologies, new product trials can be performed easily and quickly (Rogers, 2016). In the service sector, innovation provides convenience regarding accessibility to digital technology. Digital technologies facilitate and shorten the design process and accelerate innovation. Digitalization shortens product lifecycles, and consumer and market expectations change rapidly. Digital innovation is essential for managing this change.

The image shows a diagram that describes different types of innovation. The central concept is "innovation", which is connected to three other categories: "New to the industry", "New to the customer", and "New to the firm". These categories represent different levels or types of innovation that a company can pursue.



**Figure 1. Innovation rationales**

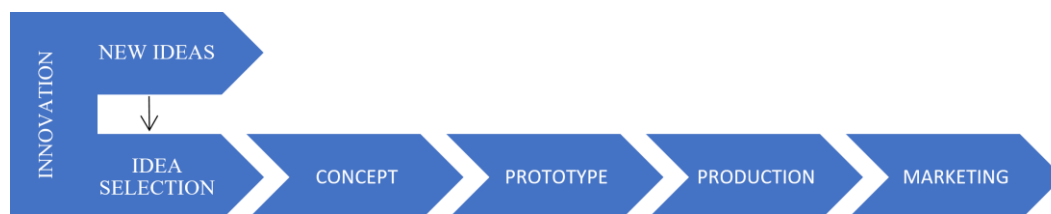
*Source:* own compilation

The most critical point in innovation is the discovery of innovation that can turn into economic value. If innovation cannot be converted into significant monetary value, it is not considered an innovation. Innovation refers to innovation in management functions (planning, organizing, directing, and controlling) and business functions (production, marketing, accounting, financing, and human resources) for companies (Chiffolleau & Loconto, 2018). For this reason, innovation can develop new production methods and products, creating new markets and raw materials or resources. The primary purpose of innovation is to transform technology and science into an economic benefit. Innovation capacity is the most important factor in today's turbulent business ecosystem, as it provides businesses with a competitive advantage. Firms develop innovative strategies to increase their market share, reduce costs, and increase efficiency (Endres et al., 2022). Companies are trying to be more efficient in changing environmental conditions by developing innovative strategies, methods, and products. To achieve this, family businesses must innovate in the value-creation process to create new products, procedures, systems, or tools.

Businesses innovate in different ways, including both external and internal innovation. Shallow innovation areas include coping with unexpected situations, uncertainties, and process needs and innovating to adapt to market and industry structure changes. Internal innovation changes demographic structure, management understanding, creative thinking, and new information production for business processes (Materia et al., 2017). This study investigates digital innovations in family businesses and their effects on organizational structure and functioning. Firm-level innovations aim to increase productivity, product variety, quality, and profitability at low cost to create competition in the goods and services they offer, production, management, marketing, and organizational processes and structures. Innovation output makes a significant difference and creates added value. Cooperation significantly impacts innovation and entrepreneurship in family businesses (Andersson & Karlsson, 2004). Today, digital innovation plays an essential role in collaboration. Cooperation in family businesses includes using new technologies and developing advanced technologies.

As shown in Figure 2, a "new idea" is required to initiate the innovation process. For this, a need must arise that causes innovation. The inability of the existing product or service to meet customer needs and

demands, the company's desire to have a competitive advantage in the market, and technological developments are necessary inputs to start this process. "Concept" is the most essential part of the innovation process. Work at the conceptual stage is vital for the process to be concluded. The innovative ideas were passed through different filters. Elimination occurred until only one remained. Financial and technical feasibility studies were conducted at this stage. In the "prototype" stage, a product prototype can easily be made to make the product's production stage easier. The projected ideas are made concretely in the paper. At this stage, production plans are created in detail. Another stage of innovation is "production." Creating a product prototype does not mean it can be produced technically and financially. Although many innovative ideas are booming at the prototype stage, they may need to be more technically viable for mass production. Commercial commercialization tests are carried out during the production phase, and those that pass the test are put into mass production. The final stage of the innovation process is "bringing to market." Strategies and a plan have been developed to bring a product to the market (Ungerma et al., 2018). The innovation process is completed by bringing the product to the market at the right time, price, and place. The image presents an "Innovation Process" model consisting of several sequential steps: New Ideas, Idea Selection, Concept, Prototype, Production, Marketing. The process is depicted as a linear flow, with each step leading to the next one in the sequence. This illustrates the typical stages involved in developing a new idea and introducing it into the final market.



**Figure 2. Innovation Process**

*Source:* own compilation, based on Ungerma et al., 2018

## 1.2. Digital innovation areas in the family business

Family businesses are innovating to respond better to social needs and increase the efficiency and sustainability of enterprises. Companies have developed different types of innovation to increase their competitiveness, economic growth, and employment opportunities. The Oslo Manual draws attention to four main types of invention (OECD, 2005). These are process, product, marketing, and organizational innovation. These innovation types can be examined in terms of family business, as follows:

**Product innovation.** Product innovation involves developing a new product idea and performing financial and commercial analysis to develop the product, complete with market testing and product launch. According to OECD guidelines, product innovation is a significant product improvement based on its uses or properties. For this purpose, a new product or service was created. Product innovation significantly improves components and materials, specifications, user convenience, and other functional features (OECD, 2005). Product innovations may benefit from new information or technologies or are based on new uses and combinations of existing knowledge and technologies. Important features of current product innovations and demand for new products and services are linked with AI-based technologies (Bencsik, 2021; Dias et al., 2023; Kolková & Ključnikov, 2022).

**Process innovation.** Digital innovations in the operation of businesses are capabilities that can affect a firm's ability to do business. The use of digital technologies in management processes and the development of this technology are process-oriented innovations (Aliasghar et al., 2019). Process innovation is a series of

activities that provide output to consumers by creating value after input. Process innovation encompasses technological innovations that will create a significantly improved and new delivery method or production, producing products faster and at a lower cost (OECD, 2005). Process innovation aims to increase quality, reduce production and marketing costs, and improve products significantly.

**Marketing innovation.** Value-creating innovations in products, price, distribution, and promotion. With marketing innovation, new and effective ways to reach consumers have been discovered. Marketing innovation includes significant innovations in product placement, promotion or pricing, design, and packaging (Ungermaier et al., 2018). An innovative method is developed by interacting with customers during the marketing innovation-purchasing phase. Digitalization is now used not only in product structures but also in business processes in competitive market strategies. Digital technology is central to innovative product/service design (Brynjolfsson & McAfee, 2014). Computer-aided production and design can provide great convenience for producing innovative products.

**Organizational Innovation.** They are developing new and effective organizational structures and business models. It implements an effective and new organizational method in businesses' commercial practices and external relations (OECD, 2005). Corporate innovation involves developing e-business systems of structures and models that the firm has yet to implement (OECD, 2005). The fact that digital technologies are suitable for developing new business models today requires innovation in organizational structures in terms of competitiveness. Digital innovations related to organizational structure and operations aim to create value for the target groups of companies and transform these values into income (Teece, 2010). This leads to growing influence of organizational innovations in achieving competitive advantages (Kollmann, & Dobrovič, 2022).

The success of businesses in using information technologies in all their processes leads to digital innovation in their new products and services (Yoo et al., 2010; Oliinyk et al., 2021). Digital innovation provides a competitive advantage to businesses by causing significant changes in their products, processes, and cooperation models (Yoo et al., 2010; Lucas & Goh, 2009). With the information technologies integrated into digital-based products, the profitability level of the activities increases thanks to the technologies that can be programmed, addressed, sensitive, smart, communicative, monitored, and integrated with other systems. Each day, changing customer and market structures force businesses to design new products/services by considering customer expectations. Therefore, it is necessary to transform these materials into faster and more flexible structures. For businesses to succeed in digital innovation, their competence in using digital technology in the product/service process provides a competitive advantage (Lucas & Goh, 2009). Businesses must integrate digital technological innovation into their business processes. The market acceptance risks of the products/services of the enterprises, the digital environmental structures of the enterprise itself and in other sectors, and the competencies of the enterprises in meeting market demands reveal the importance of digital innovation (Khin & Ho, 2019).

## **2. METHODOLOGICAL APPROACH**

### **2.1. Research design**

This research was designed as qualitative research to understand managers' views on digital innovation in family businesses. For this purpose, a case study was conducted with 15 family business managers in Sakarya Province (Turkey). The case study design was preferred in the research because it is suitable for examining current situations based on people with in-depth knowledge. In addition, the case study design was chosen because it is more convenient to reveal the essence of the research subject and reflect the event as it is (Storey, 2007; Ozdemir, 2010; Hancock & Algozzine, 2006). In the case of studies, the information

hidden or implied in the examined situation was revealed. In addition, the current situation, lack of researcher control, and the fact that the examined phenomenon is not manipulated are other reasons for choosing a case study design (Yin, 2014; Merriam, 1998; Tutar & Erdem, 2020).

## 2.2. Participants and sampling

Qualitative research was conducted with people with deep knowledge of the research topic. This study was conducted with 15 senior family business managers, following the primary purpose of the investigation. The study sample was determined according to the purposive sampling technique preferred in qualitative research. A sampling technique requires a deep knowledge of the subject to be included in purposive sampling. Data were collected through face-to-face interviews with a sample determined according to the purposeful sampling technique (Tutar & Erdem, 2020; Tarhan, 2015).

Table 1

Indicators for sampling

Participants	Company	Experience	Education	Position
P1	Sole proprietorship	11	License	Production manager
P2	Limited company	12	License	General manager
P3	Limited company	7	Postgraduate	Production manager
P4	Joint Stock Company	8	Licenses	General Manager
P5	Sole proprietorship	7	Postgraduate	Production manager
P6	Joint-stock company	16	License	General manager
P7	Limited company	15	PhD	Marketing Manager
P8	Joint-stock company	9	License	Marketing Manager
P9	Limited company	13	Postgraduate	General manager
P10	Sole proprietorship	12	Postgraduate	General manager
P11	Limited company	13	License	General manager
P12	Limited company	9	Postgraduate	Production manager
P13	Joint Stock Company	11	Postgraduate	General Manager
P14	Sole proprietorship	13	Postgraduate	Production manager
P15	Joint-stock company	11	License	Production manager

Source: own compilation

Qualitative research collected data through observations, interviews, and documentary funding. This study's interview method was preferred because of its suitability for the research questions and general problems. Research data were collected with the help of a semi-structured interview form. (Creswell & Poth, 2014; Tutar & Erdem, 2020). The sample for this study was limited to 15 senior family business managers.

## 2.3. Data collection and analysis

The questions determined following the primary purpose and sub-questions of the research were asked through face-to-face interviews with managers. During the interview process, discussions were deepened using various probes. A semi-structured interview form was used in an orderly manner. The data collected in this study were analyzed using inductive qualitative content analysis. MAXQDA qualitative analysis program was used to analyze and visualize the qualitative data. The analysis framework was created, and the data were processed according to the thematic framework. The analysis was completed by defining and interpreting the findings. After giving the repetition frequency of descriptive expressions in the study, codes,

sub-themes, and central themes were obtained from participants' expressions (Denzin & Lincoln, 2000). The reliability and credibility of the research were ensured by directly reflecting the participants' views in the analysis (Tutar & Erdem, 2020; Özdemir, 2010). Subsequently, the analysis findings were interpreted, and various suggestions were made.

### 3. CONDUCTING RESEARCH AND RESULTS

#### 3.1. The necessity of digital innovation in a and its companies in the post-pandemic period

The findings obtained from the analysis of the answers given by the managers to the fundamental question, "Why did you need digital innovation in family businesses in the post-pandemic period?" were gathered under the central theme "sustainability and customer satisfaction." "What is the role of innovations in product and service quality?" "Have you reduced production costs thanks to innovations?" "Did the response time to the requests and needs of customers and suppliers become shorter?" The questions were asked, "Has product-process flexibility increased thanks to innovations?" and "Did innovation contribute to sustainability?" Figure 3 shows the code system, including subcategories and codes belonging to the sustainability and customer satisfaction themes that emerged from participants' views. The participants marked P1, P2, P3,...Pn in the code system.

Code System	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	SUM
▼ Sustainability and customer satisfact																0
▼ Improvement in quality and cost																0
Production cost		●		●	●			●	●	●	●		●	●	●	10
Product and service quality	●	●			●		●	●		●	●		●			8
▼ Customer expectations																0
Process flexibility	●	●		●		●		●	●	●		●		●		9
Service delivery time	●	●		●	●		●			●	●					8
▼ Innovation in company activities																0
Digital technologies	●	●	●	●	●		●		●		●	●			●	10
Sustainability	●	●		●	●	●		●			●	●		●		8
Σ SUM	5	7	1	5	5	2	3	4	3	4	4	3	2	3	2	53

Figure 3. Sustainability and customer satisfaction theme code system

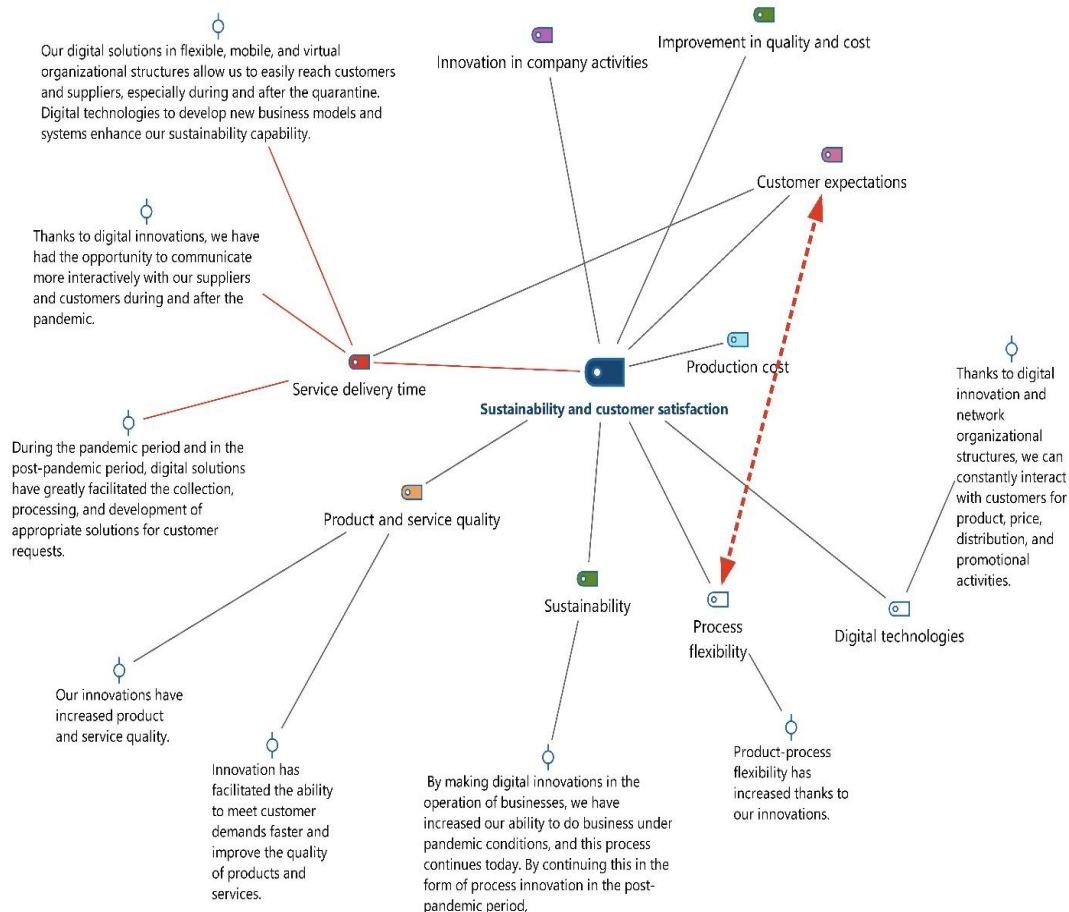
Source: own calculation

In Figure 3, from the analysis of the descriptive expressions, the managers' opinions were gathered under the central theme of "sustainability and customer satisfaction, sub-themes of improvement in quality and cost," "customer expectations," and innovation in company activities. In addition, the relationships between the codes within the central theme of sustainability and customer satisfaction, co-occurrence of the principles, and sample expressions of the related codes are shown in Figure 4. When the co-occurrence of regulations under the central theme of "sustainability and customer satisfaction" is analyzed, an intense relationship between process flexibility and service delivery time through the sub-theme of customer expectations stands out.

The image shows a table or matrix representing a "Sustainability and customer satisfaction theme code system." The rows correspond to different elements or criteria, such as "Production cost," "Product and service quality," "Process flexibility," "Digital technologies," and "Sustainability." The columns represent different phases or stages, labeled P1 through P15.



Within the table, there are various symbols (circles) indicating the presence or level of each element across the different phases. The "SUM" column on the right shows the total score or points accumulated for each row. This system appears to be a framework or tool for evaluating and tracking sustainability and customer satisfaction factors throughout the innovation or product development process.



**Figure 4. Sustainability and customer satisfaction theme code-subcodes-segments model**

*Source: own research*

The image presents a "Sustainability and customer satisfaction theme code-subcodes-segments model". It depicts various elements related to sustainability and customer satisfaction and how they are interconnected. The central concept is "Sustainability and customer satisfaction", which is connected to several subcodes or themes, such as "Improvement in quality and cost", "Customer expectations", "Production cost", "Product and service quality", "Sustainability", "Process flexibility", "Digital technologies", and "Service delivery time". The model also includes explanatory text that provides context and details about how these elements are relevant in the context of the COVID-19 pandemic and digital innovations. For example, it mentions how digital solutions and organizational structures have enabled better communication and interaction with customers and suppliers during the pandemic. Overall, the model illustrates the various factors and their relationships that contribute to sustainability and customer satisfaction within an organization, particularly in the context of digital transformation and pandemic-related challenges.

From the participants' statements, it is understood that thanks to digital innovation during the pandemic and post-pandemic period, it is possible to work remotely, meet customer demands, and establish

uninterrupted communication with customers and suppliers. Owing to innovation, participants are also understood to continue their work uninterrupted in the digital environment during and after quarantine days. Thanks to the remote working opportunities provided by digital innovation, they can meet customer requests and expectations and constantly interact with suppliers. Owing to digital innovation, it is understood that uninterrupted interaction between customers and employees and the possibility of remote work continue in the post-pandemic period, leading to the birth of a new organization and working model. These statements show that it is essential for sustainability to produce alternatives that can cope with uncertainty in management in general and in family companies in particular.

### 3.2. The impact of digital innovation on employees

The code system of the Organizational Effectiveness and Efficiency theme, which emerged according to the participants' answers to the question "What was the impact of your business innovation on employees in the post-pandemic period?" is given in Figure 5. The Effectiveness and Efficiency theme consists of sub-themes emphasizing efficiency and effective organizational communication. Participants stated that digital innovation is not preferred but is necessary for modern business today. Within the framework of this core question, participants were also asked about digital innovation in areas such as employee satisfaction, organizational commitment, job stability, organizational sustainability, and organizational trust. The descriptive statements, codes, subthemes, and central themes reflecting the views of the participants are shown in Figure 6.

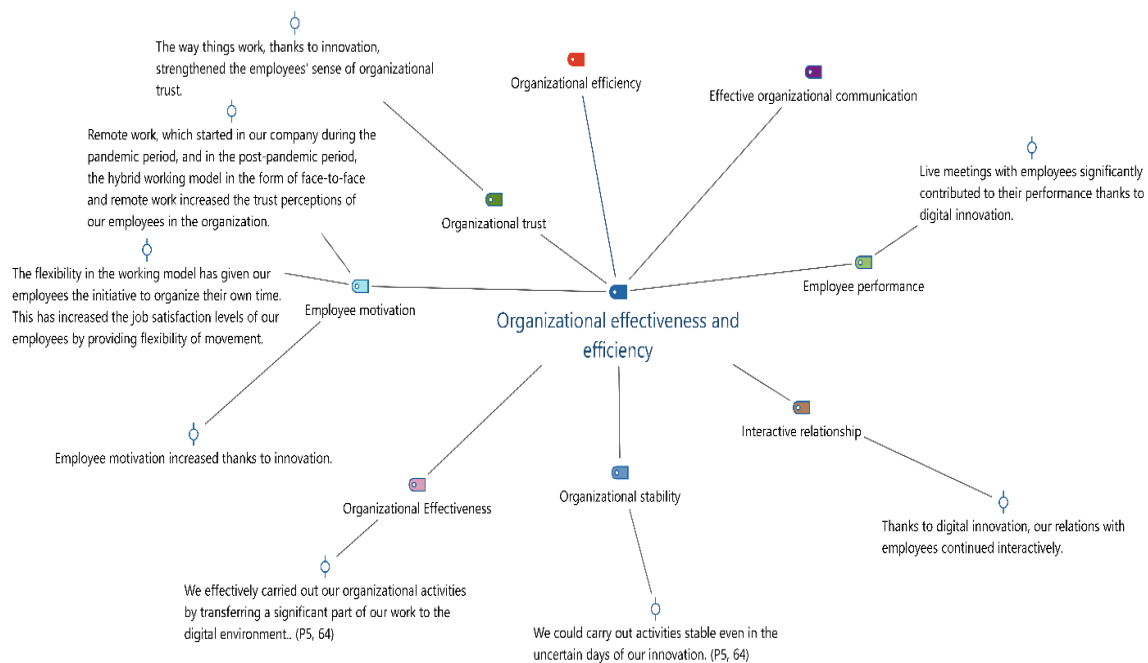
Code System	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	SUM
Organizational effectiveness and efficiency																0
Effective organizational communication																0
Interactive relationship	•	•	•		•		•		•	•	•	•	•			10
Organizational stability	•	•		•	•	•		•	•	•		•	•			10
Employee motivation	•	•		•			•		•	•	•	•	•	•		9
Organizational efficiency																0
Organizational trust	•	•	•	•	•		•		•	•	•	•	•			9
Employee performance			•	•	•	•	•	•	•	•	•	•	•	•		10
Organizational Effectiveness	•	•		•	•		•	•	•	•	•	•	•	•	•	10
<b>SUM</b>	<b>5</b>	<b>5</b>	<b>3</b>	<b>4</b>	<b>4</b>	<b>2</b>	<b>5</b>	<b>2</b>	<b>5</b>	<b>6</b>	<b>4</b>	<b>5</b>	<b>5</b>	<b>2</b>	<b>1</b>	<b>58</b>

Figure 5. Organizational effectiveness and efficiency Theme code system

Source: own calculation

The image shows an "Organizational effectiveness and efficiency Theme code system" matrix. It contains several rows representing different elements or subcodes, such as "Interactive relationship," "Organizational stability," "Employee motivation," "Organizational trust," "Employee performance," and "Organizational Effectiveness." The columns represent different phases or stages, labeled P1 through P15, and there are various symbols (circles) indicating the presence or level of each element across these phases. The "SUM" column on the right shows the total score or points accumulated for each row, providing an overall assessment of the different organizational factors. This type of matrix or framework appears to be a tool used to systematically evaluate and track various aspects of organizational effectiveness and efficiency throughout a product development or innovation process.

When the codes that make up organizational effectiveness and efficiency theme (interactive relationship, organizational stability, employee motivation, organizational trust, employee performance, organizational effectiveness) are examined, the mobility, vitality, and confidence brought by innovation are gathered under the sub-theme of "effective organizational communication" and "organizational productivity." It is understood that sub-themes and the central theme are essential for organizational efficiency and employee performance, making organizations suitable for all conditions and developing alternative plans



**Figure 6. Organizational effectiveness and efficiency theme code-subcodes-segments model**

*Source:* own research

When Figure 6 and the participants' statements are examined, it is understood that companies should always prepare themselves for the worst conditions during the pandemic or post-pandemic period. This situation shows that alternative plans for crisis periods should always be prepared in the ordinary annual plans of the enterprises. As a new working model, it is understood from managers' statements that network organizational structures are essential for customers and employees in the post-pandemic period. In any case, the maintenance of interactive relationships with employees is of great importance for the conduct of the company's activities. In terms of efficiency and effectiveness, seeing that the company continues to operate even in times of crisis is of great importance in terms of organizational efficiency, employee motivation, and trusting the organization and its management.

### 3.3. Innovation in organizational structure and business models in the post-pandemic period

In the post-pandemic period, the answers given by the managers to the question of what kind of innovations have been made in the organizational structure and business models of family companies, flexible production, process innovation, marketing innovation, and corporate innovation are gathered under the sub-themes and the central theme of "process management and innovation." The code system for this theme is shown in Figure 7.

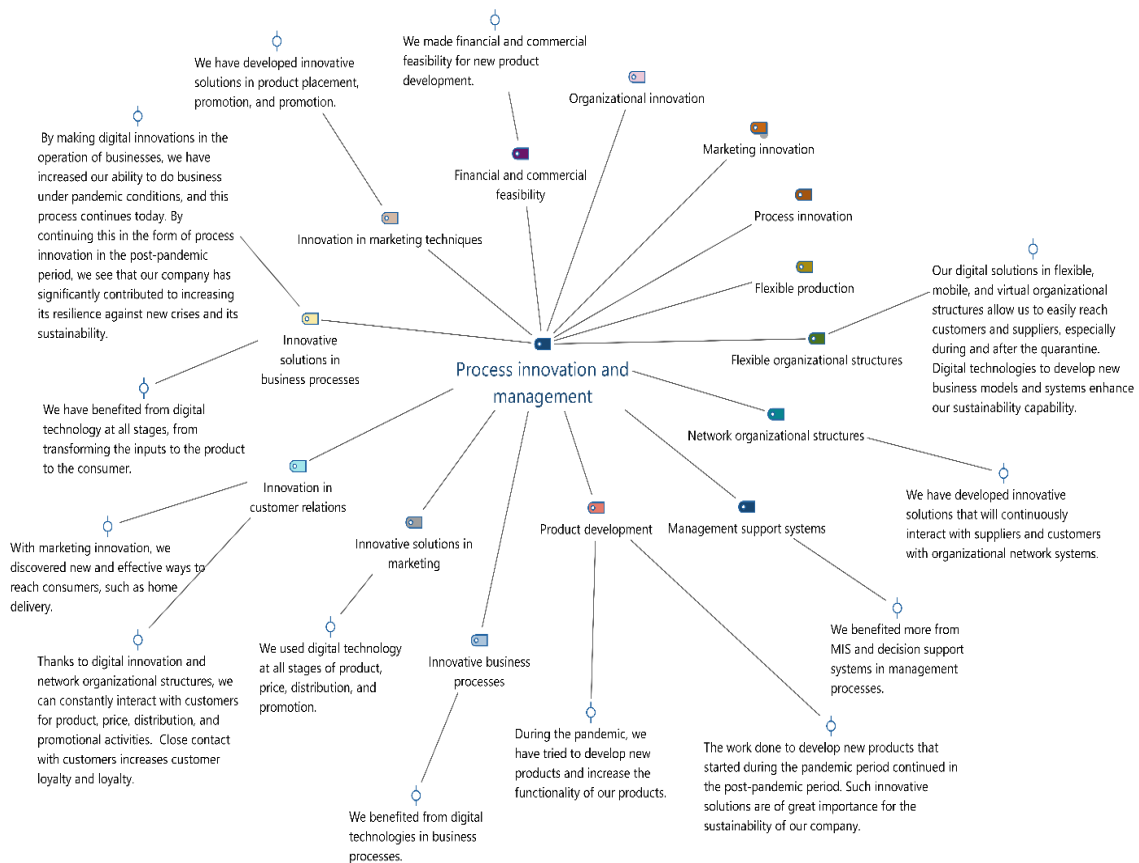
Code System	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	SUM
Process innovation and management																0
Flexible production																0
Product development	•	•		•			•	•	•	•	•		•	•		10
Financial and commercial feasibility		•		•		•			•	•		•	•		•	8
Process innovation																0
Innovative solutions in business processes	•	•	•			•	•	•			•		•			8
Management support systems	•	•		•	•				•	•	•		•	•	•	10
Innovative business processes		•	•	•		•	•		•	•	•		•	•		10
Organizational innovation																0
Flexible organizational structures	•	•	•	•		•		•		•	•	•	•		•	11
Network organizational structures		•	•	•			•	•	•	•	•	•	•	•		11
Marketing innovation																0
Innovative solutions in marketing	•	•		•		•	•		•	•	•	•	•		•	10
Innovation in customer relations		•	•		•	•	•	•		•		•	•	•		9
Innovation in marketing techniques			•		•		•	•	•	•	•		•	•	•	8
<b>SUM</b>	<b>5</b>	<b>9</b>	<b>6</b>	<b>7</b>	<b>3</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>8</b>	<b>5</b>	<b>9</b>	<b>5</b>	<b>5</b>	<b>95</b>

Figure 7. Process management and innovation theme code system

Source: own calculation

This image presents a "Process management and innovation theme code system" matrix. It contains several rows representing different elements or subcodes, such as "Flexible production", "Product development", "Financial and commercial feasibility", "Innovative solutions in business processes", "Management support systems", "Innovative business processes", "Flexible organizational structures", "Network organizational structures", "Innovative solutions in marketing", "Innovation in customer relations", and "Innovation in marketing techniques". The columns represent different phases or stages, labeled P1 through P15, and there are various symbols (circles) indicating the presence or level of each element across these phases. The "SUM" column on the right shows the total score or points accumulated for each row, providing an overall assessment of the different process management and innovation factors. This matrix appears to be a comprehensive framework used to systematically evaluate and track various aspects of process innovation and management throughout a product development or business innovation process.

Participant views on innovation types are gathered under the central theme of "process management and innovation." The sub-themes comprise the following: product, process, marketing, and organizational innovation. The codes that comprise product innovation from the data analysis are product development, financial and commercial feasibility, and innovative service delivery codes. Process innovation consists of the principles of creative business processes, management support systems, and innovative solutions in business processes. Marketing innovation consists of innovative solutions, customer relations, and innovation codes in marketing techniques. Organizational innovation includes flexible organizational structure, decentralization, and network organizational structure codes. Figure 8 shows the principles that constitute the theme and the coded sections, showing the participant statements on coding.



**Figure 8. Process management and innovation theme code-subcodes-segments model**

*Source: own research*

The image presents a "Process management and innovation theme code-subcodes-segments model". It is a visual representation of various elements related to process innovation and management within an organization. The central concept is "Process innovation and management," which is connected to several subcodes or themes, such as "Innovative solutions in business processes," "Innovation in customer relations," "Innovative solutions in marketing," "Innovative business processes," "Product development," "Flexible organizational structures," "Network organizational structures," "Management support systems," and more. The model also includes explanatory text that provides context and details about how these elements are relevant and interconnected. For example, it mentions how digital innovations and network organizational structures have enabled better interaction with customers and suppliers during the pandemic and how the company has developed innovative solutions that continuously interact with organizational network systems. Overall, this model appears to be a comprehensive framework used to understand and analyze the organization's different aspects of process innovation and management, including the impact of digital technologies, customer interactions, and innovative business processes.

From the participants' statements, it is understood that companies have developed various innovative solutions to cope with adverse conditions, such as the pandemic, and have achieved a competitive advantage. They are trying to manage the process effectively with a management approach based on data and knowledge by using management information systems and decision support systems in management functions such as planning, organizing, and directing from digital innovation. Again, it is understood from the participants' statements that they are trying to cope with the pandemic using the innovative solutions they have developed in production, marketing, and human resources. They understand that they try to

overcome uncertainties and continue their activities through product, process, marketing, and organizational innovations. It is understood from their statements that they use product tracking and information systems to manage their work effectively. It is essential to establish a connection between all supply chain links. Digital innovation is conducted in the management of cooperation, especially in production, follow-up, and all management functions.

When the main themes and sub-themes are evaluated together, the use of digital innovations by family businesses as components or platforms in designing and producing products makes it possible to create new constructive structures. Each innovation creates a ground or starting point for another creation. Modular designs can be made in digital product innovation thanks to digital innovations. Various generative techniques are imitated in this process. The primary purpose of digital product innovation is to improve product durability. In digital product innovation, a design is aimed at considering network structures. Thus, it provides the opportunity to work efficiently and quickly and integrate with many systems and structures on an Internet network. All of these factors are important for ensuring sustainability in family businesses.

Digital innovation solutions must be applied in different fields to intensively and effectively manage today's structures. For this purpose, they must use digital solutions, such as risk and oriented integrated management systems, quality management systems, information security management systems, and quality document management systems. Although companies prefer to design new products through digital innovation, they have stated that they benefit from innovative technological solutions to successfully manage cooperation (Ayanoğlu, 2021; Webster et al., 2020; İşçi, 2021). While innovative systems facilitate the management of complex business processes, on the other hand, they can provide a competitive advantage by reducing production costs due to their contribution to speed and quality. With the help of suggestion evaluation systems, customer feedback is evaluated to produce innovative products to be delivered later. In addition, the data and information infrastructure provided by management information and decision support systems are used to make more accurate strategic plans.

#### **4. DISCUSSION AND RECOMMENDATIONS**

The findings obtained from the analysis of the answers to the fundamental question, "What is the importance of digital innovation for businesses?" Productiveness and customer satisfaction, organizational effectiveness, and efficiency, process innovation, and management were grouped under the main themes. These themes indicate that digital innovation is significant for business survival. Regarding the sustainability of enterprises, digital business systems, and new business models are incredibly competent in digital technologies, integration of information and communication technologies, and new management approaches. Therefore, a compact integration is required. From the participants' statements, it is understood that there is a standard view and high awareness of digital innovation. Through digital creation and network organizational structures, collaboration also contributes significantly to business systems (Andersson & Karlsson, 2004; Carnevale & Hatak, 2020). Therefore, it is essential to use new technologies and develop new management models to ensure cooperation among companies.

Evaluation of findings and implications. Digital innovation contributes to the elimination of many business models and the development of new business models. It is understood that the new business models created by digital innovation provide new logic and structuring and remarkable convenience in coping with difficult conditions (O'Reilly & Tushman, 2008; Westergren & Holmström, 2012). Digital innovation is inevitable when coping with new situations in times of turmoil and uncertainty. In times of uncertainty and unrest, traditional organizational mechanical structures and models are inflexible enough to adapt to new conditions. Organizational models are understood to be structures unsuitable for periods of uncertainty. Requirements such as rapid response, mobility, early response, and availability are increasing

the importance of the decentralized organizational model (Ayanoglu, 2021; Aspara et al., 2021). When it becomes clear that traditional, hierarchical, and bureaucratic organizational models are insufficient to overcome uncertainty, digital innovation emerges as a necessity rather than an option.

**Practical implications.** Businesses can gain a competitive advantage through new organizational models and ways of doing business supported by innovative digital technologies. The compatibility of business systems with open innovation significantly contributes to organizational efficiency. Developed thanks to digital technologies in enterprises, new digital organization models such as the centralized digitization model, independent digitization model, hybrid digitalization model, and product development model make a significant contribution to the effectiveness of enterprises. Intelligence, robotics, and other digital technologies provide family businesses with a tremendous competitive advantage (Acosta, 2020).

**Limitations and avenues for future research.** This study is limited to family businesses and the sample from which the data were collected. The study is qualitative, and the results are suitable for analytical inference, not statistical generalization. Researching the subject using different samples will contribute to a better understanding of the situation. In this study, the experiences of the family business in the pandemic process, one of the managers' views, was examined in the context of digital innovation. Including family business employees in the process will contribute to a better understanding of this subject.

## 5. CONCLUSION

Harmonizing the formal structures of enterprises using digital technology will contribute to managing uncertainty processes. The results show that family business managers understand the importance of digital innovation. In particular, the pandemic has increased the need for advanced analytical technologies. In addition, using artificial intelligence modeled in Industry 4.0 in business processes is becoming widespread. Digital innovation plays an essential role in business sustainability. It is understood that digital innovation contributes significantly to the efficiency of enterprises in operational activities. Owing to digital innovations, work and the workplace are now being redefined. This is because of the transformation of organizational structures from physical spaces to network systems.

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### **Conflict of interest declaration**

The author has no conflict of interest with any person or institution. No individual or institution contributed to the study's design, the collection, analysis, or interpretation of the data.

### **Authors' contributions**

All authors contributed equally to the conception and writing of the manuscript. They also critically revised it and approved the final version.

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