## Digitalization and its disruptive transformation for family businesses – from Industry 3.0 to Industry 4.0 towards Industry 5.0: A Perspective Article

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#### Abstract

**Purpose** – Family businesses are required to address the digitalization megatrend that may disrupt their businesses across sectors globally. This article intends to uncover the digitalization and its disruptive transformation for family businesses.

**Design/methodology/approach** – This article is grounded on systematic research.

**Findings** – Digitalization enhances the efficiency, competitiveness, and overall sustainability of family businesses. Industry 4.0 (2011-ongoing) and Industry 5.0 is driven by an array of disruptive technologies. Embracing these technologies bring disruptive transformations to family businesses, reshaping their operational models, market strategies, and customer interactions. It represents a paradigm shift in manufacturing and production, with a focus on automation, data-driven decision making, and interconnected systems.

**Originality/value** – The paper synthesizes advances in digital technologies during past 100 years for family businesses and proposes a future perspective for next 100 years.

**Keywords:** Family businesses, Disruptive transformation, Digitalization, Industry 4.0, Industry 5.0

### Introduction

In the worldwide economy and society, family businesses play a major role in economic prosperity and growth (Fitz-Koch & Nordqvist, 2017).Bringing digitalization into the family business will have a profound impact on many family businesses around the world, as they are already impacted. As consumers increasingly use digital platforms and e-commerce activities increase, family businesses are leveraging new technology to gain a competitive edge and meet customer needs. In the current generation of family businesses (FBs), the ability to adapt to technological disruptions is critical to their survival (Alonso et al., 2019).

# Past perspective in the past 100 years of developments (1924-2024)

The third industrial revolution, Industry 3.0, was characterized by the rise of electronics, particularly the microchip, and the manufacturing advancements facilitated by computer technology in the late 1960s. This era saw the widespread adoption of automation, fundamentally transforming the global workforce. Electronics played a pivotal role, reshaping industries, and telecommunications, and expanding the possibilities of computer technology. In the 1980s, personal computers became widely accessible, with the PC Clone becoming the preferred choice for consumers. This marked a substantial change from IBM's expensive, proprietary devices. The proliferation of computers in households and workplaces resulted in increased productivity and the widespread embrace of the internet. Family businesses began leveraging technological advancements to maintain their competitive edge and navigate economic downturns (Gudmundson et al., 1999). Information technology (IT) is a complex and swiftly evolving component of modern society, with profound consequences spanning generations, industries, communication channels, and social communities (Loges&Jung, 2001; Weber et al., 2003).IT serves as an essential foundation for harnessing innovation and resources, leading to positive outcomes for business and family output (De Long et al., 2002). IT also facilitates electronic interaction and the exchange of resources among these enterprises, their customers, and other stakeholders. In the 1990s, the mail order industry experienced another significant innovation. Family businesses that utilized email to reach potential customers, focused on difficult markets, and integrated online features like product demonstrationsand order tracking gained a significant competitive edge (Levenburg et al., 2006).

During the Internet networking era from 1990 to 2005, family businesses established their presence in Web 1.0 using websites and ecommerce (Qi et al., 2008; Law et al., 2010). The advent of blogs and various social media platforms ushered in the Web 2.0 era from 2005 to 2015, allowing interaction among all users and enhancing customer engagement (Buhalis & Law, 2008; Egger &

Buhalis, 2011). In most family businesses (2015 -) ERP or BI systems are used to analyze financial data, budgets, reports, risk analyses, or dashboards. Additionally, businesses are adopting digital technology in the forms of customer portals, mobile computing, cloud-based technologies, CRM systems, online business presence, and social media. Cloud-based digital technologies have significantly reduced the cost of professional software solutions, benefiting small businesses, including many family firms (Strauss et al., 2014; Memili et al., 2015). A contemporary and robust ERP system, which is opensource and cloud-based, can be tailored precisely to a business's needs. This solution empowers businesses to manage a wide range of data, including inventory details, pricing information, transactions, supply chain data, product specifications, category information etc.

# Future perspective over the next 100 years (2024-2124)

Various technologies under the umbrella of Industry 4.0 (2011 - present), such as AI, Robotics, Cashless Payments, Big Data, IoT, and blockchain, are already being utilized to different extents across diverse industries and global regions, leading to significant transformative shifts. The strategic use of large datasets will be essential for integrating upcoming technologies such as Artificial Intelligence (AI), machine learning, and the Internet of Things (IoT). Improved handling of extensive data sets can enable family businesses to identify concealed patterns, correlations, and insights in the age of digitalization (Labaki & Haddad, 2019). Utilizing data analytics tools such as predictive analytics and cognitive analytics can prove highly beneficial for small family businesses, fostering business expansion and enhancing customer interaction. In the realm of small family businesses, artificial intelligence (AI) integrated with CRM technologies is becoming more prevalent on e-commerce websites. This integration caters to the customer journey and enhances the businesses' capacity to achieve sustainability (Chaudhuri et al., 2022). Many family office platforms have advanced to incorporate AI alongside robotic process automation and machine learning. These

innovations not only save time but also facilitate efficient decision-making processes.

Family offices are actively adopting blockchain technology, using it for tasks like investing in blockchain startups, portfolio management, and wealth management. They are leveraging this transformative technology to improve their offerings and develop innovative business models. Additionally, family offices are showing a growing interest in Decentralized Finance (DeFi), an emerging trend within the blockchain sphere that introduces fresh approaches to wealth management and investment. Advanced technologies, especially in additive manufacturing (3D printing), robotics, and the industrial Internet of Things (IoT), will significantly influence the future direction of manufacturing. These innovations will fuel the growth of the manufacturing sector. Sophisticated robotics use improved sensory abilities, agility, and intelligence to automate tasks and work alongside humans. The industrial Internet of Things allows businesses to access real-time data on their plant equipment, minimizing operational interruptions and boosting productivity. The IoT has the capacity to revolutionize sectors and improve daily experiences by enhancing efficiency and convenience, offering advantages to a range of small and medium-sized family enterprises. (Abomhara & Koien, 2020).

The fifth industrial revolution is upon us, emphasizing a collaboration between humans and machines. Industry 5.0 marks a transition from emphasizing economic value to prioritizing societal value, and from a focus on welfare to a focus on wellbeing as presented in Figure 1. Industry 5.0 rests on three fundamental principles: human-centricity, resilience, and sustainability. All three principals have substantial implications for business strategy. In the current era of digitalization within a business context, these technologies serve to enhance and augment existing services and products, opening the door to innovative business models (Legner et al., 2017). These novel business models emerge when technology addresses previously unfulfilled needs, eliminates intermediaries, minimizes transaction barriers, or reduces regulatory constraints in specific industries. In the realm of strategy and management literature, technological innovation thereby has been recognized as a pivotal concept (Ano & Bent, 2022; Park et al., 2019) with its significance particularly pronounced in the context of family businesses, as it plays a crucial role in ensuring the ongoing creation of wealth across generations (Kammerlander & Ganter, 2015).

### Conclusion

The swiftly advancing digital economy, technological shifts, and the impact of globalization are poised to significantly influence the business models of conventional family enterprises. The process of digitizing family businesses holds importance for stakeholders because it enhances efficiency, refines decision-making, stimulates innovation, and plays a vital role in the overall expansion and endurance of the business as well as the communities it serves. The desire for digital transformation among the upcoming generation will drive agile businesses to embrace necessary technologies to stay competitive. These advancing technologies are already causing substantial disruptions, altering business practices, and collectively leading the way into the fourth industrial revolution, commonly known as Industry 4.0. While Industry 5.0 is in its initial phases, many businesses are presently concentrating on Industry 4.0. Nevertheless, this is anticipated to shift as more companies start aligning with the objectives of Industry 5.0. Yet, the digitalization journey also presents a set of challenges for family-owned enterprises, including resistance to change, limited resources, concerns about data security and privacy, succession planning, system integration, risk management, and the maintenance of automated customer relationships. To surmount these obstacles, it is essential to engage in meticulous planning, foster transparent communication among family members, demonstrate a readiness to invest in technology and employee training, and at times, seek external expertise to navigate the digital transformation journey. Despite the challenges, family businesses that thoughtfully adopt new technologies can honor their rich traditions while innovatively preparing for the future.



### Figure 1: Digitalization Transition from Industry 3.0 to Industry 4.0 towards Industry 5.0 for Family Businesses

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