

RESEARCH ARTICLE

Human-Centric Digital Transformation in Industry 5.0: A Phenomenological Study of Family-Owned SME in Sri Lanka

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ABSTRACT

This phenomenological study explores human-centric digital transformation within Industry 5.0, specifically focusing on family-owned SMEs in Sri Lanka. Despite their crucial economic role, these businesses encounter distinct challenges, such as succession transformation and the preservation of traditional values amid technological advancements. This study addresses the significant gap in literature regarding Industry 5.0 digital transformation in family-owned SMEs, particularly in developing economies like Sri Lanka. By exploring the lived experiences of a third-generation family-owned business, the study provides novel insights into balancing technological progress with the preservation of traditional values, contributing to a deeper understanding of digital transformation in culturally embedded SMEs. Using Interpretative Phenomenological Analysis (IPA), the research explores the lived experiences of 'Aaseer Mixture', a third-generation family-owned food and snacks manufacturing SME located in Northern Sri Lanka. Key themes identified through detailed interviews with family members include ownership insights on digital integration, empowering family-centric digital evolution and digital integration for business strategies. The study reveals how family dynamics and intergenerational differences impact decision-making processes related to digital transformation. Emphasizing the need for inclusive strategies that consider the intersecting circles of ownership, family, and business, the study develops a new human-centric digital transformation model tailored for family-owned SMEs. This model balances technological progress with the preservation of core family values and traditions, offering valuable insights for navigating digital integration. By highlighting the necessity of embracing digital technologies to maintain relevance and attractiveness to future generations, the study contributes to the literature on digital transformation in family-owned SMEs, especially within developing economies.

1 | Introduction

Human-centered digital transformation in Industry 5.0 puts humans at the center of technological advancements, improving skills, well-being and quality of life (Zhang et al. 2023). Family-owned and managed businesses have been and remain the predominant form of business type globally, playing a crucial role in economies (Tagiuri and Davis 1996). Family businesses, owned or controlled by family members, hold significant potential for family involvement in business decisions. This familial

influence often presents unique and complex challenges for these businesses (Davis and Harveston 1998). Indeed, family-owned SMEs often have short lifespans despite their positive economic impact, primarily due to inadequate succession planning (Kellermanns and Eddleston 2006).

In Asia, family-owned businesses are vital in addressing diverse social challenges. A study examines the connection between the organizational virtuousness of these businesses and their strategic motives behind Corporate Social Responsibility (CSR) in Sri

Lanka. It highlights that integrating CSR initiatives into business strategies significantly impacts social development and enhances the sustainability and reputation of these businesses (Fernando and Almeida 2012). Presently, the Industry 5.0 manufacturing strategy aims to continuously enhance business competitiveness by focusing on resilience, sustainability, and human-centric aspects, ensuring that technological advancements not only improve efficiency but also benefit society and the environment (van Erp et al. 2024). Research on Brazilian family MSMEs demonstrates that digitalization strategies significantly improve business performance when mediated by organizational innovation, underscoring the importance of aligning digital transformation with strategic innovation efforts in family enterprises (Oro et al. 2024).

With the rapid pace of industrial revolutions and technological advancements, businesses must establish clear visions, goals, and a proactive mindset to effectively navigate and adapt to transformation (Lachvajderová and Kádárová 2022). For family-owned SMEs, human-centered digital transformation approach means fostering seamless collaboration between humans and advanced technologies, enhancing decision-making, creativity and productivity while preserving essential human skills and judgment (Ano and Bent 2022). It emphasizes personalized experiences and products by leveraging automation technology to meet individual needs and preferences. Ethical and responsible technology use that addresses data privacy and security is critical to ensuring social benefits from automation. A focus on employee well-being and job satisfaction includes creating work environments that reduce stress, improve work-life balance, and encourage continuous learning. Inclusion and accessibility ensure the benefits of digital transformation for all, including marginalized populations. Additionally, sustainability is integral with Industry 5.0 promoting green technologies and practices to reduce carbon footprints and improve resource efficiency (van Erp et al. 2024). By prioritizing human needs, values and experiences, the human-centered digital transformation in Industry 5.0 aims to create a more balanced and equitable technological future, especially for family-owned SMEs.

Previous authors, such as Davis and Harveston (1998), developed a process model of succession in family businesses, outlining steps to prepare these businesses for succession by examining multiple spheres of influence, including individual, group (family), organizational, and critical resource providers, while also investigating the moderating effects of generational differences. Recently, Ratnayake and Sridharan (2024) explored succession planning in Sri Lankan family-owned SMEs, identifying trust, loyalty, respect, and obligation as crucial for success. Using interviews with ten logistics sector owners and the Leader-Member Exchange (LMX) theory, they found failures were due to lack of discipline, practical knowledge, self-awareness, mental strength, and commitment. Recommendations include mentorship, clear communication, freedom to pursue passions, and practical experience for the next generation.

Despite this groundwork, the study of family business and digital transformation remains relatively underexplored, particularly in developing countries like Sri Lanka, where there is a significant need for in-depth research on how digital transformation impacts the competitiveness of family businesses. Gupta and Rana (2025) highlight that despite the availability of digital tools

like social media and data analytics, family firms face adoption barriers including financial constraints, employee resistance, and challenges integrating innovation with the traditional organizational setting. After reviewing the recent literature on digitalization in family-owned SMEs, a significant research gap emerges, particularly concerning the nuanced human-centered digital transformation in Industry 5.0 that puts humans at the center of technological advancement.

According to Schwertner (2017), digital business transformation involves integrating new digital technologies across all business areas, fundamentally changing operations. In contrast, digital integration enhances specific processes with digital tools without reshaping the entire business model. Successful transformation requires balancing organizational change, technology, and data integration, rather than just focusing on technology. In the industrial revolutions, Internet of Things (IoT) illustrates this by integrating the physical world with computer systems to improve efficiency, while mobile technologies optimize business processes.

In the context of developing economies like Sri Lanka, family-owned SMEs face a unique set of challenges when it comes to digital transformation. While SMEs are vital to the country's economy, contributing significantly to employment and community well-being, they often struggle with integrating digital tools into their operations (Ratnayake and Sridharan 2024). These struggles are often compounded by financial limitations, generational resistance, and a deep commitment to preserving family traditions and personal customer relationships. Similar challenges are seen in other developing regions; for instance, Bok and Tolmay (2025) highlight that South African SMEs face barriers to adopting green technologies due to limited funds, low awareness, and technical gaps reflecting broader systemic issues hindering digital transformation. Moreover, the literature on digital transformation has primarily focused on large corporations or SMEs in developed economies, leaving a critical gap in understanding how family-owned SMEs in Sri Lanka navigate these challenges (Marino-Romero and Folgado-Fernández 2024; Petropoulou et al. 2024). This study seeks to fill this gap by investigating how family-owned SMEs in Sri Lanka, particularly those in the food manufacturing sector, perceive and implement digital transformation. It explores how these businesses balance technological advancement with the preservation of traditional practices and cultural values, offering a unique contribution to the literature on Industry 5.0 digitalization in family-owned SMEs.

In Industry 5.0, the emphasis is on human-centric transformation, which involves humans working collaboratively with advanced technologies. While many family-owned SMEs are integrating digital tools incrementally (e.g., digital marketing tools, automation of certain production processes), the human element such as family traditions, personal touch in customer interactions, and intergenerational decision-making remains central to their operations. Therefore, digital integration is viewed as the first step toward digital transformation, in which SMEs begin incorporating digital technologies while retaining human-centric values that are crucial for maintaining family traditions, customer relationships, and product authenticity. For family businesses in traditional sectors, such as food manufacturing, integration usually starts with less disruptive technologies. These initial efforts focus on improving existing processes

(e.g., introducing digital inventory management or digital payment systems) to boost efficiency, enhance competitiveness, and ensure sustainability. However, these incremental changes ultimately lay the groundwork for a broader digital transformation, which encompasses not only technological upgrades but also cultural shifts, new value creation strategies, and business model innovations that are essential for thriving in Industry 5.0.

To address these above-mentioned facts, this study develops three research questions:

RQ1. *How do family-owned manufacturing SMEs perceive the impact of digital integration on maintaining their traditional product quality and authenticity?*

RQ2. *What are the primary constraints and knowledge gaps hindering the integration of digital tools and machines in family-owned manufacturing SMEs?*

RQ3. *How do digital integration dynamics influence the overall digital transformation process in family-owned manufacturing SMEs?*

To address the research questions, this study used a phenomenological study using interpretive phenomenological analysis (IPA) and developed the model presented in the findings. Researchers believe that this approach significantly contributes to the academic literature on digital transformation in SMEs, particularly in the context of family-owned businesses, and offers practical insights for supporting SMEs' growth and modernization in developing economies. The rest of the article is structured as follows: the immediate next section reviews the literature on the three-circle model of family business organization, Industry 5.0 and digitization in family-owned SMEs, the third section describes the phenomenological qualitative methodology, the fourth section presents the findings, and the final section includes discussion and implications, concluding the study.

2 | Literature Review

2.1 | Industry 5.0

The transition to Industry 5.0, following the introduction of Industry 4.0 a decade ago, is now essential for achieving sustainable competitive advantages in modern business. Despite its significance, the critical success factors (CSFs) for moving from Industry 4.0 to Industry 5.0 remain underexplored in existing literature (Sarkar et al. 2024). While Industry 4.0 (I4.0) is technology-driven, Industry 5.0 (I5.0) is value-driven, emphasizing resilience in value creation, human well-being, and a sustainable society. Industry 5.0 is not a replacement but offers a distinct perspective, underscoring the need for research on sustainable manufacturing (SM) within Triple-Bottom-Line (TBL) sustainability boundaries. This approach aims for economic, social, and environmental sustainability while achieving high productivity (Narkhede et al. 2024).

Industry 5.0 marks a shift in automation by enhancing human workers' ability to personalize products to a higher degree. Future focus should be on developing necessary skills, establishing

guidelines for human-machine interactions (Lachvajderová and Kádárová 2022). It evolves beyond Industry 4.0 by emphasizing human-machine collaboration, human creativity, intelligence and problem solving with advanced technologies. Unlike Industry 4.0's focus on automation, smart technologies and IoT, Industry 5.0 prioritizes enhanced human-robot interaction, mass customization, and customized products to meet individual preferences. It emphasizes sustainability, promotes environmentally friendly practices and the circular economy, and aims to develop resilient, adaptive production systems. Also, it considers ethical implications to ensure that technological advances benefit society. Ultimately, Industry 5.0 technology aims to create an integrated environment that enhances human capabilities, leading to more innovative, efficient and socially responsible manufacturing and production processes. (Leng et al. 2022; van Erp et al. 2024).

In the realm of Industry 5.0, scholars have examined whether existing maturity models (MMs) for Industry 4.0 effectively support the digital transformation of SMEs, particularly from a human-centered perspective. Their findings indicate that current models focus primarily on technical aspects and overlook human-centered elements. The research calls for enhancing these models to include considerations such as employee needs and participatory elements, aligning them with the broader requirements of Industry 5.0. Additionally, it suggests that future research should involve collaboration with manufacturing industry partners to refine these models and assess their practical implications through stakeholder interviews. The goal is to develop comprehensive MMs that integrate both technical and human factors for successful digital transformation (Hein-Pensel et al. 2023).

Industry 5.0 marks a significant shift in manufacturing and business practices, moving beyond Industry 4.0's focus solely on technological advancement and efficiency to prioritize human well-being, sustainability, and resilience. Unlike its predecessor, Industry 5.0 emphasizes human-machine collaboration and human-centric values, aiming to enhance productivity, improve quality of life, foster creativity, and sustain production processes (Atsushi et al. 2020). These values are particularly pertinent for family-owned SMEs in countries like Sri Lanka, where cultural and social factors heavily influence business operations. Key themes include placing humans at the core of digital transformation to augment creativity and problem-solving, embracing sustainability through green technologies, fostering resilience with adaptable systems, improving employee well-being through automation, and promoting social equity by ensuring inclusivity in digital adoption across generations.

2.2 | Three-Circle Model of the Family Business System

Gersick et al. (1997) provided one of the primary comprehensive overviews of family businesses as a distinct organizational form. They explore how these businesses evolve, examining the transition from entrepreneurial start-ups to established firms, changes in the business's significance to the family, and shifts in leadership across generations. Their work, divided into three sections, presents a multidimensional model to analyze different stages in the family business life cycle and derive generalizable lessons for organizational strategies. Despite extensive research on family-owned businesses, there are concerns about the

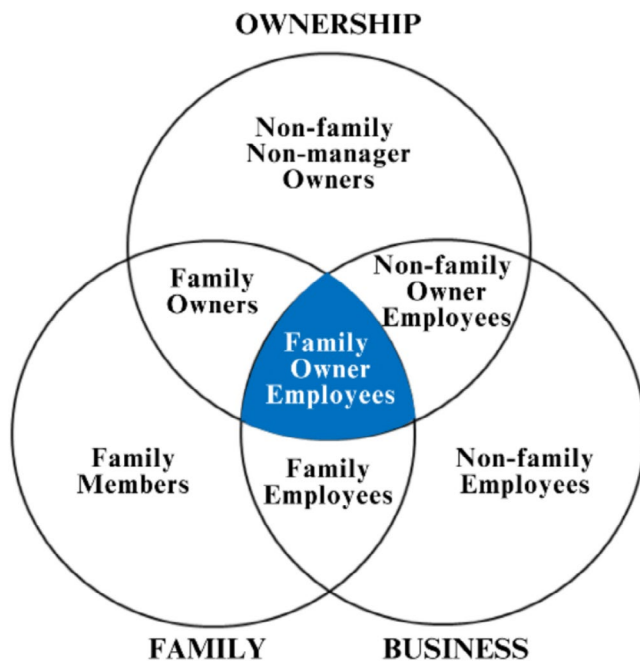


FIGURE 1 | Three-circle model of the family business system.
Source: Tagiuri and Davis (1996).

generalizability of findings, especially regarding digital transformation in developing countries. The cyclical relationship between families and businesses, along with the field's increasing importance, highlights the need for ongoing research.

Davis, a pioneer and leading authority on family enterprise, further developed the three-circle model of the family business system, which encompasses family, ownership, and business. He emphasized the enduring relevance of this model and suggested that future advances in understanding family business systems would occur within this three-dimensional framework, without adding new elements to the existing model (Davis 2018). This builds a research gap in exploring the evolving complexities of family businesses within the established three-circle model, particularly in the context of family-owned SMEs and human-centered digital transformation in Industry 5.0.

The three-circle model of the family business system is well suited for this study because it represents the overlapping and competing interests of the family, ownership, and business circles. In Industry 5.0, digital transformation must consider human values (Sarkar et al. 2024). Through this model, we need to assess how family members balance the digital transformation efforts with traditional values. It provides a framework for analyzing intergenerational conflict and collaboration in the integration of digital technologies in family-owned SMEs, especially in developing economies like Sri Lanka (Figure 1).

2.3 | Digitalization in Family-Owned SMEs

In search of literature review, Sharma (2004) provided an overview of the field of family business studies, discussing its current status and future directions. He argued that reviewers should uphold high standards by promoting research with strong

theoretical foundations and sound methodologies, emphasizing quality and developmental support.

Table 1 presents key studies on the digitalization of family-owned SMEs, focusing on themes like incremental versus radical digitalization, the impact of family control on IT investment, AI's role, and COVID-19 challenges. These studies reveal how family dynamics, ownership, and leadership influence digital adoption, offering insights into how traditional family businesses adapt to technological advancements while maintaining core values. They also identify research gaps for future exploration of family business systems and digital innovation.

The literature on family-owned businesses, particularly SMEs (Soluk and Kammerlander 2021), offers significant insights into how digital transformation is perceived and implemented across various industries (Basly and Hammouda 2020; Mand et al. 2022; Niehm et al. 2010). This review explores foundational models such as the three-circle model of family business system. This model is particularly relevant in understanding how family dynamics influence business decision-making, particularly in the context of digital transformation in family-owned SMEs (Löhde et al. 2020). However, much of the prior research on digitalization in family-owned SMEs focuses on general technological adoption without delving into the unique challenges these businesses face in integrating digital tools while maintaining their traditional practices (Chrisman et al. 2015).

For instance, studies on digital adoption barriers often highlight factors such as financial constraints and lack of technical knowledge (Basly and Hammouda 2020), but fail to adequately explore how intergenerational dynamics influence these barriers (Ano and Bent 2022). Moreover, while these studies identify obstacles to digital integration, they do not critically analyze the long-term consequences of failing to adapt digitally, such as lost market competitiveness or difficulties in succession planning (Lannon et al. 2024). Furthermore, research on Industry 4.0 and its transition to Industry 5.0 is often disconnected from the family business context (Chaudhuri et al. 2023). Industry 5.0 emphasizes human-centered innovation and sustainability (Leng et al. 2022), yet few studies address how these principles can be applied to family-owned businesses in developing economies, where traditional methods often conflict with technological advancements (Ullah Khan et al. 2022).

This critical overview highlights the gap in literature regarding the digital transformation of family-owned SMEs, particularly in the context of Industry 5.0. The shift from Industry 4.0 to Industry 5.0 offers opportunities for SMEs to adopt human-centric and sustainable technologies, but studies often overlook the intersection of family values and digital innovation in this context (Appleton and Holt 2024).

3 | Methodology

3.1 | Study Design

Qualitative methods are instrumental in researching experiential processes and addressing gaps in existing knowledge (Monique et al. 2020). The study employs a qualitative phenomenological

approach using Interpretative Phenomenological Analysis (IPA). IPA is idiographic in nature, meaning that the focus is on detailed, individual accounts, rather than aiming for broad generalization (Eatough and Smith 2017). While this limits generalizability, the

findings contribute to theoretical advancements by offering detailed insights that can inform future multi-case studies. This approach is well-suited for exploring lived experiences, as demonstrated in this single case study (Smith 2004).

TABLE 1 | Key studies on digitalization in family-owned SMEs from literature.

Focus of the study	Key findings/themes	Sources
- Examining how digital transformation influences the investment cycle in family enterprises (medium to large family enterprises) - Analyzing the impact of digitalization on investment efficiency - Exploring how agency costs and risk-taking mediate the effects of digital transformation - Investigating the role of information quality and financial constraints in shaping these dynamics	The study finds that digital transformation decreases investment efficiency in family enterprises (medium to large family enterprises), primarily due to higher agency costs and increased risk-taking. These negative effects are more pronounced in firms with better information quality and fewer financial constraints, suggesting that digitalization can create governance and decision-making challenges, even in well-positioned firms. Key themes: Digital transformation, investment efficiency, family enterprises, agency costs, risk-taking, financial constraints, information quality	(Hao et al. 2025)
- Investigating how family management affects digital transformation in family businesses - Examining the mediating roles of technical personnel and internationalization - Exploring the moderating effect of public policies (SRDI policies) on the relationship between family management and digital transformation - Addressing how institutional environments influence digital transformation dynamics in family enterprises	The study finds that family management hinders digital transformation in Chinese SRDI enterprises, mainly by reducing technical personnel and increasing internationalization, which slows digital progress. SRDI government policies exacerbate this effect by increasing support and reducing financing constraints. The study contributes to socio-emotional wealth theory and offers recommendations for managing technology, personnel conflicts, and leveraging policy assistance in digitalization. Key themes: Family management, digital transformation, technical personnel, internationalization, public policy, SRDI enterprises, socio-emotional wealth	(Dai et al. 2025)
- Examining the effect of founder control on the digital transformation of family firms (medium to large enterprises) - Differentiating between substantive and symbolic digital transformation paths - Analyzing the role of risk-taking and founder power in facilitating digital transformation - Investigating how factors like state capital participation, generational involvement, and cultural embeddedness influence the founder effect	The study shows that founder-controlled family firms (medium to large enterprises) drive more substantive digital transformation than non-founder-controlled firms. Founder control boosts risk-taking and decision-making power, leading to real digital change. This advantage is most noticeable in firms without state capital, second-generation leadership, or strong Confucian cultural influences. The study offers insights into how founder influence shapes digital transformation in family firms. Key themes: Founder control, digital transformation, family firms, risk-taking, substantive transformation, symbolic transformation, Confucian culture, generational leadership	(He et al. 2025)
- Investigating the digitalization of family farms in the English agricultural industry - Examining the integration of digital technologies within family firms in response to business environment pressures - Contributing to the understanding of digitalization at the intersection of rural entrepreneurship, family business, and innovation	Digitalization in family farms manifests both incrementally and radically, with a model illustrating areas of digitalization based on strategies to scale or diversify. Incremental digitalization is common in scaling strategies, while radical digitalization is prevalent in diversification strategies. Capital-intensive digitalization investments are more pertinent for scaling farms compared to those diversifying. Key themes: Incremental vs. radical digitalization, digitalization as a choice, policy implications.	(Appleton and Holt 2024)

(Continues)

TABLE 1 | (Continued)

Focus of the study	Key findings/themes	Sources
- Impact of family control on IT investment and adoption in MSMEs in India - Influence of family ownership on IT-related decisions - Effect of family member management on IT investment - Role of CEO duality in IT adoption decisions	Family ownership, family member management, and CEO duality all positively influence IT investment and adoption, with family ownership leading to notable increases in both, family member management enhancing investment and adoption chances, and CEO duality having the most substantial impact, significantly boosting both IT investment and adoption. Key themes: Impact of family control, differential impact of CEO duality, contextual limitations.	(Mand et al. 2022)
- Artificial Intelligence (AI) is significantly impacting family businesses - Future successors in family businesses play a crucial role in adopting AI technology - There is a need for further research on how AI can influence the next generation of family business leaders	Family businesses initially exhibit skepticism toward AI technology, yet its adoption is critical for their survival and growth. The role of family business successors, referred to as “Gen AI,” is pivotal in effectively leveraging AI technology. Key themes: Skepticism vs. Necessity, future research directions, policy and education.	(Lannon et al. 2024)
- Challenges faced by SMEs in developing economies during COVID-19 - Adoption of digital business models - Impact of artificial intelligence on family-owned firms - Impact of Internet of Things on family-owned firms - Impact of virtual reality on family-owned firms	Family-owned SMEs face significant challenges in adopting digital technologies and modifying their business plans. AI, IoT, and VR are identified as crucial for innovation and competitive advantage in the digital era, making their adoption essential for businesses to fulfill customer needs and sustain a competitive edge. Key themes: Digital transformation necessity, impact of COVID-19, support requirements.	(Ullah Khan et al. 2022)
- Embracing digital entrepreneurship in family businesses - Balancing traditional stability with digital innovation - Proposing a conceptual model for digital entrepreneurship adoption - Considering socioemotional wealth in the adoption process - Evaluating the role of family involvement in digital transformation	Family businesses often struggle with adopting digital entrepreneurship due to their preference for stability and gradual change. A conceptual model identifies key factors affecting digital entrepreneurship adoption and emphasizes the moderating impact of family involvement. Although measuring digital entrepreneurship adoption is challenging, existing digital transformation metrics can be adapted for this purpose. Key themes: Conflict between stability and digital change, socioemotional wealth and family involvement, and research directions for longitudinal and multi-level studies on digital entrepreneurship.	(Basly and Hammouda 2020)
- Key online marketing strategies developed by family firms in the digital era - Business models adapted by family firms for digital transformation - Technology applications utilized by family firms - Systematic literature review for strategy identification - Multiple correspondence analysis (MCA) with HOMALS framework in R programming for categorization and analysis	The research encompasses digital business models such as mobile marketing, e-commerce, CPC, CPM, and CPA, as well as digital marketing techniques including search marketing (SEO and SEM), social media marketing, social ads, social selling, websites, and online reputation optimization. It also explores technology applications like digital innovation, digital tools, innovative marketing, knowledge discovery, and online decision-making. Five research propositions have been developed for further exploration. Key themes: Digital business models and techniques, technology adoption, research and practical implications.	(Saura et al. 2023)

(Continues)

TABLE 1 | (Continued)

Focus of the study	Key findings/themes	Sources
- AI-integrated CRM technology and its impact on dynamic capabilities (sensing, seizing, transforming) of family businesses during crises - Focus on the COVID-19 pandemic - Exploration of how strategic intent (SI) moderates the sustainability of family businesses during crises	Adopting AI-CRM technology significantly improves the dynamic capabilities (sensing, seizing, transforming) of family businesses, which in turn positively impacts their sustainability during crises. Additionally, strategic intent moderates the relationship between AI-CRM adoption and these dynamic capabilities, influencing the sustainability outcomes of family businesses. Key themes: AI-CRM technology and dynamic capabilities, strategic intent, theoretical contributions, practical implications.	(Chaudhuri et al. 2023)
- Distinguish between family and nonfamily firms - Differentiate within the family firm category - Examine the impact of diverse behaviors within family firms - Assess how these behaviors influence strategic decisions - Focus on the adoption of disruptive technologies	Family influence in organizations often results in reduced formalization, resource dependence, and political resistance, while increasing emotional attachment to existing assets and rigidity in mental models. Although family firms typically exhibit a lower propensity for adopting disruptive technologies compared to non-family firms, they may implement these technologies more rapidly and persistently when they do. The diversity within family firms, including differing goals, governance structures, and resource capabilities, influences their strategic decisions and innovation adoption. Key themes: Heterogeneity in family firms, impact of family influence, need for comprehensive models.	(Chrisman et al. 2015)
- Role of human and cultural resources in digital strategies - Impact of unique attitudes on digital transformation - Influence of resources on digital strategy execution in family firms	Five key cultural and psychological factors for effective digital strategy implementation are: change management with a focus on long-term sustainability, emotional attachment to the firm, the impact of entrepreneurial legacy, personalized involvement of family members, and employee focus. These determinants contribute to competitive advantages and the creation of transgenerational wealth. However, further empirical research is needed to validate these factors' performance outcomes and enhance their generalizability. Key themes: Change management with a focus on long-term sustainability, emotional attachment and entrepreneurial legacy, personalized involvement and employee focus, idiosyncratic attitudes, and a synergistic approach.	(Ano and Bent 2022)
- Influence of owning family's involvement on digital transformation in family businesses - Impact of family's digital openness on transformation success - Role of family's entrepreneurial readiness in the transformation process	The success of family firms in digital transformation largely depends on the digital readiness of their organizational culture, which is influenced by the owning family's openness to new technologies. The entrepreneurial readiness of the owning family plays a crucial role in integrating new technologies into the organization, impacting business modeling and internal processes. Digital readiness helps these firms' overcome inertia, path dependency, and generational shadows often linked with risk aversion in family-run businesses. Key themes: Digital openness, entrepreneurial readiness, organizational culture and digital readiness, overcoming traditional challenges, and the interplay of family and organizational culture.	(Löhde et al. 2020)

(Continues)

TABLE 1 | (Continued)

Focus of the study	Key findings/themes	Sources
- Assess the family business model's role as a development opportunity and innovation driver in tourism - Examine the intersection of personal and family needs/preferences with business growth - Analyze the impact of the family business model on profit maximization - Evaluate the influence of the model on innovation in tourism business development	The study identified a correlation between tourism, hospitality, entrepreneurship, life cycle, and innovation dynamics, highlighting significant research gaps and suggesting future priorities. Despite the established intersection between tourism management and the family business model, there remains a limited number of related publications and research on this topic. Key themes: Family dynamics in tourism, innovation adoption, contextual differences, and seasonality and vulnerabilities.	(Arcese et al. 2021)
- Analyze direct effects of family involvement on technological innovation inputs, activities, and outputs - Examine moderating effects of family involvement on technological innovation - Extend existing innovation frameworks by incorporating agency theory - Explore the role of family involvement in driving innovation	Family involvement significantly affects innovation inputs, such as R&D expenditures, activities like leadership in new product development, and outputs, including the number of new products. However, existing research presents mixed findings on the impact of family involvement on innovation outputs. There remains a lack of comprehensive understanding and qualitative studies examining the moderating role of family involvement in innovation processes. Key themes: Family involvement and innovation, research gaps, methodological suggestions, and practical implications.	(De Massis et al. 2013)
- Factors influencing IT adoption in small family-owned businesses - Effects of IT adoption in small family-owned businesses - Utilizes the Diffusion of Innovations framework - Incorporates the Technology Acceptance Model (TAM) - Analyzes data from the National Family Business Survey - Tests the proposed model	Key factors influencing IT adoption in family businesses include the managers' prior knowledge and current IT use, as well as the business's location and community size/type. The ease of use and decision to adopt IT significantly affect the perceived usefulness and implementation of IT. Furthermore, the implementation of IT capabilities plays a major role in actual IT use and its perceived impact. Key themes: Role of business managers, stages of IT adoption, access barriers, strategic integration, future research needs.	(Niehm et al. 2010)

Source: Created by the authors.

In this study, the decision to focus on a single case, Aaseer Mixture, was driven by its potential to provide in-depth and nuanced insights into the unique challenges and dynamics of digital transformation in family-owned SMEs. This single-case approach is particularly valuable for exploring complex phenomena like intergenerational dynamics and the balance between tradition and innovation, which are best understood through rich, qualitative data (Ferreiro et al. 2019). Further, researchers adopted the definition of digital transformation as articulated Ancillai et al. (2023) as the capability of a business to coordinate with all functions related to business production to create innovative products and services and open new business opportunities for the stakeholders.

3.1.1 | Why Interpretative Phenomenological Analysis (IPA)?

IPA was chosen because it aligns closely with the study's objectives to explore the lived experiences of family members within

the SME. Unlike grounded theory, which focuses on generating theories, or narrative analysis, which emphasizes storytelling, IPA allows for a detailed exploration of how participants make sense of their personal and shared experiences (Eatough and Smith 2017). This idiographic approach is particularly suited for studying the interplay between family dynamics, digital transformation, and traditional practices, providing insights that other qualitative methods may overlook. Moreover, IPA's emphasis on the co-construction of meaning between researcher and participants ensures a deep understanding of the socio-cultural context (De Massis and Kotlar 2014; Smith 2004). This facilitates the exploration of meaning-making processes that are central to human-centered digital transformation within family businesses.

3.2 | Participants

De Massis and Kotlar (2014) argue that case studies best capture the unique features of family businesses, providing

valuable insights for management literature. They emphasize the importance of family businesses in addressing key debates in management and organizational theory, hoping their discussion will guide future case study research. Afterwards, in Sri Lanka, Adikaram and Surangi (2024) conducted a phenomenological study using a social constructivism approach to examine the impact of a crisis through individual's lived experiences. Similarly, this study focuses on digital transformation in family-owned SMEs in Sri Lanka by using a purposive sample of a single family-owned food and snacks manufacturing SME, 'Aaseer Mixture', located in the Northern region. The research aims to provide phenomenological insights into the digital transformation experiences of this food and snacks manufacturing business.

In the context of Sri Lanka's development needs, a significant research gap exists regarding the unique challenges of digital transformation. A phenomenological study, employing a qualitative approach and focusing on a third-generation family-owned business as a single case (De Massis and Kotlar 2014), is ideal for exploring how these businesses navigate and experience digital transformation. Table 2 presents demographic information about the family-owned manufacturing SME's participants.

3.3 | Data Collection

This study employed in-depth semi-structured interviews, allowing researchers to adapt questions based on participants' responses and explore emerging topics (Chapman and Smith 2002). Ishak and Rahman (2021) highlight semi-structured interviews as ideal for gathering open-ended data. A total of fifteen interviews were conducted, comprising five with second-generation father (with mother) and ten with third-generation children, each lasting between one and one and a half hours. The time gap between consecutive interviews, it is important to note that each interview was spaced approximately one week apart. This time interval was purposeful, allowing the researcher time to analyze initial responses and refine the interview questions as necessary (Six core family members participated in a total of fifteen interviews). The interviews were recorded, transcribed, and translated into English to facilitate analysis.

Table 3 presents the interview guide prepared by the first author. The questions were theoretically grounded in digital transformation literature (Bhardwaj et al. 2024; Varshney et al. 2024) while incorporating contextual insights from Sri Lankan family SMEs. They examine technology adoption barriers, generational dynamics, and business values. The guide was validated through expert review to ensure alignment with both academic frameworks and practical family business considerations (De Massis and Kotlar 2014) (Figures 2–4).

3.4 | Data Analysis

Interpretative Phenomenological Analysis (IPA) has been developed as a unique approach to conducting qualitative research in psychology that provides a theoretical foundation and comprehensive practical guidance (Eatough and Smith 2017). The purpose of IPA is to study in detail the processes through which participants make sense of their own experiences by looking at the participant's account of the processes they have gone through (Chapman and Smith 2002; Spiers et al. 2020). The approach follows interpretative, which focuses on understanding participants' personal interpretations of their experiences rather than fitting responses to existing theories (Smith et al. 1999).

Phenomenological research seeks in-depth understanding of experiences in small, homogeneous groups, with reporting following phenomenological principles to reveal participants' lived experiences (Smith and Fieldsend 2021). IPA combines thematic and idiographic approaches, deeply analyzing each case before theme development. Sequential transcript analysis ensures nuanced engagement, beginning with 'initial annotation' for both descriptive and conceptual interpretations (Braun and Clarke 2022). Therefore, in this study, researchers followed a designed process, including looking for themes in the first case, connecting the themes, continuing the analysis with other cases, ultimately concluding part focuses on transitioning from the final themes to drafting a narrative and a conclusive statement articulating the inherent meanings within the participants' experiences (Smith et al. 1999; Smith and Osborn 2015).

Thematic derivation in this study followed a rigorous step-by-step process based on the principles of IPA as outlined by

TABLE 2 | Demographics details of family-owned manufacturing SMEs' participants.

Code	Family member circle	Focusing primarily on family-owned business circle in order: (Family/Ownership/Business)	Years of experience in business	Total interview duration
FM1	Father	Ownership/Business/Family	40	261 min
FM2	Mother	Family/Ownership	2	065 min
FM3	Eldest daughter	Family/Business	11	130 min
FM4	Son	Business/Family	15	259 min
FM5	Second youngest daughter	Family/Business	10	061 min
FM6	Youngest daughter	Family/Business	7	068 min

Source: Created by the authors.

TABLE 3 | Interview guide—Semi-structured interview questions.

S. No.	Interview questions
1	Can you describe the history of your family-owned business and its evolution over the years?
2	What core values and traditions guide your business operations?
3	How do you currently manage and promote your business?
4	What are the main reasons for not adopting digital tools or technologies in your business?
5	How do you perceive digital transformation and its relevance to your business?
6	What concerns or challenges do you associate with integrating digital aspects into your business?
7	How do you think digital transformation might affect the traditional ways your business operates?
8	What impact do you think digital transformation will have on customer engagement and satisfaction?
9	How do family dynamics or generational differences influence your approach to digital transformation?
10	What advice would you give to other family-owned businesses hesitant about digital transformation?
11	Can you describe your experiences with digital tools or technologies, either in your business or personal life?
12	What challenges do you face in adopting digital technologies, and what kind of support or resources would encourage you to consider digital transformation?

Source: Created by the authors.

Smith and Fieldsend (2021). First, each interview transcript was thoroughly read multiple times to ensure complete familiarization with the data. During the initial reading, descriptive notes were made to capture key statements, significant events, and recurring phrases. In subsequent readings, conceptual and interpretive comments were developed to explore the deeper meanings behind participants' experiences. A detailed annotation process was conducted for each transcript, focusing on both emergent themes and individual idiosyncrasies. Following this, emergent themes were clustered based on conceptual similarities, with direct quotes used to validate and illustrate each theme. Connections between themes were mapped and refined through iterative discussions among the researchers, ensuring alignment with the study's objectives (see Figure 5). NVivo software was employed as the coding system, facilitating systematic analysis and organization of the qualitative data. Table 4 summarizes the analysis and findings. It presents a summary of initial codes (first order concepts, third phase of thematic analysis) those were later sorted into subthemes (second order concepts, fourth phase of thematic analysis) and finally into main themes addressing human-centric digital transformation.

3.5 | Study Rigor

First, the selection of a food manufacturing SME for this study is justified by its cultural significance, the unique challenges it faces in adopting digital technologies, and the value placed on family traditions and product authenticity. These factors make it an ideal sector for examining the intersection of Industry 5.0 technologies with family-owned business dynamics in Sri Lanka, and by extension, in other developing economies. While industries such as electronics or cosmetics may have different digital integration pathways, the food manufacturing sector's focus on tradition, quality, and family legacy offers a rich context for the research's human-centric model of digital transformation.

**FIGURE 2** | Observations of a second-generation father engaged in traditional manufacturing, manually cooking traditional Sri Lankan snacks.



FIGURE 3 | Observations of third-generation children involved in traditional manufacturing, manually preparing classic Sri Lankan snacks.

Second, statistical approaches often encounter difficulties when trying to apply generalized findings to specific contexts, as they may not account for individual variations and unique circumstances. In contrast, single-case studies investigate deeply into the lives of individuals or families, aiming to capture and preserve the distinct features of each case while still originating general insights. Unlike collective research, which focuses on examining predictor variables across large populations to identify broad trends, case studies emphasize the detailed patterns and meanings that emerge within individual cases. These studies aim to generalize their findings to theoretical propositions based on conceptual understanding rather than purely statistical analysis, allowing for a more nuanced interpretation of the data (Eatough and Smith 2017; Radley and Chamberlain 2001).

3.5.1 | Research Trustworthiness

To ensure the trustworthiness and accurate representation of participants, researchers employed member checks to verify interpretation accuracy and reliability based on participant feedback (Birt et al. 2016). Theoretical saturation was achieved when

additional data ceased to provide new insights, indicated by the consistency in experiences reported by both the initial (father) and the final (youngest generation child) participant. Analytical credibility was strengthened through peer debriefing with qualitative experts, and researcher reflexivity was maintained via audit trails (Morse 2015). Furthermore, feedback from qualitative research experts and seasoned researchers was solicited, contributing to the overall credibility of the analysis (Johnson et al. 2020). Thus, this study achieves extensive rigor (Agarwal et al. 2020).

4 | Findings

Family-owned food and snack manufacturing SME faces challenges in adopting technologies and machines without compromising product authenticity, which is deeply rooted in manual processes and family traditions. Concerns about disrupting established expertise and product quality, along with financial constraints, knowledge gaps, and intergenerational dynamics, complicate this transition. Balancing digitalization with personal touch and historical significance is crucial. This study



FIGURE 4 | The first author conducted semi-structured interviews, while the second author, with permission from all family members, took photographs. *Source:* Authors' phenomenological information-gathering.

uses IPA to explore ownership insights on digital integration, empowering family-centric digital evolution, and digital strategies. To end, three themes and nine subthemes emerged from the data (see Table 4).

4.1 | Ownership Insights on Digital Integration

4.1.1 | Traditional Methods vs. Digital Integration

The father of a second-generation snack manufacturing SME expresses his fear of losing unique qualities. There is concern that digital tools and machines such as modern gas cookers may compromise the unique flavor and distinctive taste achieved through traditional wood-fired cooking. The owner values the unique touch and skill involved in traditional methods, which define the authenticity of their business. This highlights the fear of losing unique qualities.

I am worried about integrating digital aspects into our operations. Modern gas cylinder cookers and other electric appliances cannot replicate the unique taste of traditional wood cooking methods. Although my children help in various production processes like mixing and preparing snacks, I am the only one who handles the firewood cooking. I rarely let my son help me because this task requires a certain touch and skill

that I have developed over the years. Adopting digital tools and machines may streamline some operations, but it risks compromising the quality and reliability that define our business.

(FM1)

The family is committed to maintaining their traditional, hands-on approach to snack-making, which they feel sets them apart. They fear that adopting digital tools might alter the essence of their established expertise. This clearly shows their dedication to preserving hands-on, manual processes.

Our family has been making snacks traditionally for generations. As a family we are committed to maintaining our traditional approach and age-old recipes to making snacks, which are our unique features. We fear that adopting digital tools may change the essence of our expertise, which we don't want to lose.

(FM2)

While other local businesses have embraced digital tools like social media and online ordering, the owner is hesitant. They worry that going digital will make customer interactions feel less personal and seek a balance between preserving tradition and embracing modernization.

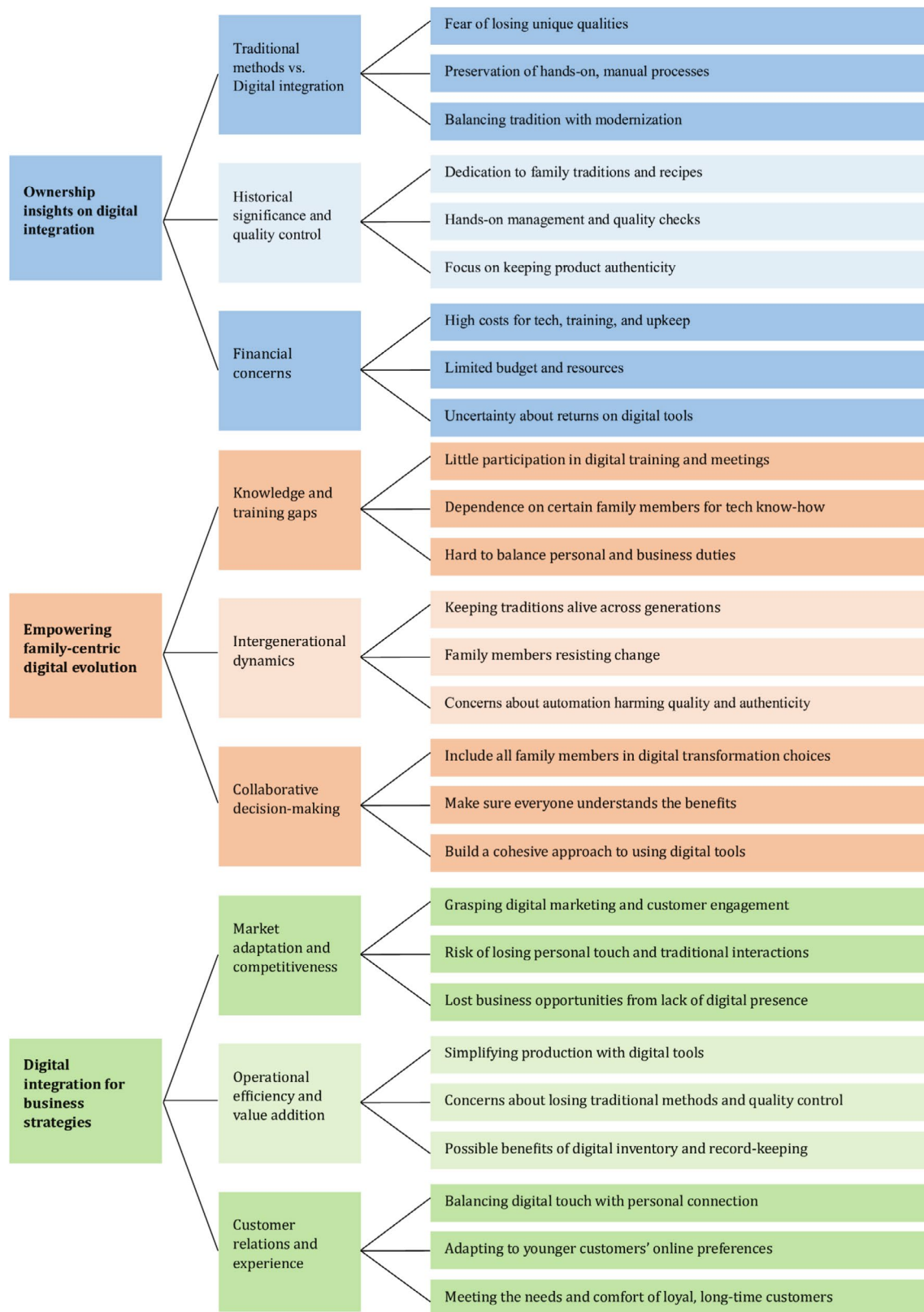


FIGURE 5 | Thematic map graphically illustrating how the codes and categories are linked and nested. *Source:* Created by the authors.

I've seen other small businesses use digital tools like social media and online ordering, but I'm not sure if this is right for us. Moving online may make communication more transactional. The challenge is

to balance our traditional methods with new digital tools to preserve our authenticity and heritage while exploring growth opportunities.

(FM1)

TABLE 4 | Summary of the analysis and findings.

Main themes	Subthemes	Initial findings
Ownership insights on digital integration	Traditional methods vs. Digital integration	Fear of losing unique qualities
		Preservation of hands-on, manual processes
	Historical significance and quality control	Balancing tradition with modernization
		Dedication to family traditions and recipes
		Hands-on management and quality checks
		Focus on keeping product authenticity
	Financial concerns	High costs for tech, training, and upkeep
		Limited budget and resources
		Uncertainty about returns on digital tools
		Little participation in digital training and meetings
Empowering family-centric digital evolution	Knowledge and training gaps	Dependence on certain family members for tech know-how
		Hard to balance personal and business duties
	Intergenerational dynamics	Keeping traditions alive across generations
		Family members resisting change
		Concerns about automation harming quality and authenticity
		Include all family members in digital transformation choices
	Collaborative decision-making	Make sure everyone understands the benefits
		Build a cohesive approach to using digital tools
		Grasping digital marketing and customer engagement
		Risk of losing personal touch and traditional interactions
Digital integration for business strategies	Market adaptation and competitiveness	Lost business opportunities from lack of digital presence
		Simplifying production with digital tools
		Concerns about losing traditional methods and quality control
		Possible benefits of digital inventory and record-keeping
	Operational efficiency and value addition	Balancing digital touch with personal connection
		Adapting to younger customers' online preferences
		Meeting the needs and comfort of loyal, long-time customers
	Customer relations and experience	

Source: Created by the authors.

4.1.2 | Historical Significance and Quality Control

Established in Sri Lanka's capital city, the business has been rooted in traditional cooking and quality for over 50 years. This historical commitment is seen as crucial to their success and reputation, highlighting their dedication to family traditions and recipes.

Our family business started 50 years ago when my father's brother started making traditional Sri Lankan snacks in Colombo. He was known for his unique recipes and commitment to quality, which quickly made his products popular.

(FM1)

The owner personally manages and ensures the quality of each batch of snacks, emphasizing that each product reflects the family's tradition and care. This approach ensures hands-on management and quality assurance.

I believe in hands-on management, ensuring that each batch of snacks meets our quality standards. Every product we make carries a piece of our family's tradition. I personally oversee the mixing and tasting to ensure everything meets our high standards. When customers taste our snacks, I want them to feel the love and care that goes into each batch.

(FM1)

There is a strong belief that traditional methods and recipes are central to the brand's identity. The owner is vigilant about digital tools that might alter their established practices, emphasizing the importance of maintaining product authenticity.

For me, product authenticity is principal. With over 50 years in business, I've seen how our traditional methods have shaped our brand. I firmly believe that protecting the quality of our snacks is essential to our success and identity.

(FM2)

Product reliability and maintaining established practices are central to the identities of this business. While recognizing the benefits of digital transformation, there is a strong desire to preserve traditional methods that define their reputation and success.

4.1.3 | Financial Concerns

The financial burden of integrating digital tools, including technology, machinery, training and maintenance, is significant for a family-owned SME. The owner is concerned about the impact on their budget and whether the investment will be justified.

I think, one of the biggest challenges is that digital tools and machines require a large financial investment. As a small business with a tight budget, the technology, machines, training and maintenance costs are significant, and we need to ensure that the benefits outweigh these costs.

(FM1)

The small budget restricts their capacity to invest in digital transformation, and they are concerned about diverting resources from other crucial areas of the business. This clearly highlights the issues of limited budget and resource allocation.

From my point of view, dedicating resources to digital integration means diverting time, money, and effort from other important areas of our family-owned business.

(FM2)

Uncertainty over investment in digital tools creates apprehension about initial costs and potential benefits. Owner is looking for cheaper options and want clear insights on how digital transformation can positively impact their business.

I'm concerned about the initial cost of implementing digital technologies. Are there affordable options for small businesses like ours? What kind of return on investment can we realistically expect? Understanding these factors is important to determine if digital transformation is feasible

(FM1)

These financial challenges create uncertainty about the return on investment and whether the benefits of digital transformation will outweigh the costs. Businesses should carefully evaluate the affordability and potential impact of digital tools and machines to ensure that such investments provide sufficient value and support their long-term sustainability.

Finally, the family's fear of losing the essence of their traditional products resonates with Chrisman et al.'s (2015) observation that family businesses often resist adopting disruptive technologies to preserve stability and legacy. Moreover, the emphasis on maintaining quality and traditions aligns with Ano and Bent's (2022) findings on the role of socio-emotional wealth in shaping attitudes toward technological adoption in family businesses.

4.2 | Empowering Family-Centric Digital Evolution

4.2.1 | Knowledge and Training Gaps

Interview statements from a family-owned food and snack manufacturing SME reveal limited involvement in training and digital aspects. Lack of exposure to digital training and technology-focused meetings for family members can hinder a family-owned business's potential for digital transformation.

I'm not interested in digital training or attending technology-focused outside meetings. My approach is to stick to tried and true methods. We rely on traditional methods for everything from manufacturing to sales. We keep our records manually and handle customer interactions face-to-face.

(FM5)

Findings reveal a reliance on specific members for technical knowledge, which can create gaps in digital understanding among other members of the family-owned business, potentially slowing down the integration of new technologies.

I don't have much knowledge about digital technology. In our family business, it's mainly my brother who handles all the training and meetings outside. I haven't been involved in any Northern Chamber of Industries (NCI) meetings or digital training sessions. My brother attends those, and he seems to manage everything related to that aspect. I've never felt the need to get involved since he takes care of it.

(FM5)

This reliance on a single family member can hinder overall digital knowledge and integration within the business.

Next, balancing responsibilities is a significant challenge. Family members, especially women who juggle personal responsibilities with business responsibilities, may find it challenging to integrate digital tools into their operations, affecting their ability to familiarize themselves with technological changes.

Being the younger sister in the family, with two children and the responsibility of taking care of our elderly mother, I find the integration of digital aspects into our business quite challenging. While I am comfortable with the traditional way of manufacturing, handling digital tools and machines is difficult for me. I simply don't have the time to learn and adapt to these new technologies, as I am constantly stumbling my personal life, family responsibilities, and duties within our family business.

(FM6)

4.2.2 | Intergenerational Dynamics

There is a strong emphasis on traditional methods and continuity through generations, which can reinforce a commitment to established practices and resist digital transformation, despite the benefits digital transformation might offer.

Looking back, the journey has been tough but rewarding. I have seen generations grow up with our snacks, and many of our customers are now in Jaffna passing on their love for our products to their children. It's this sense of tradition and continuity that keeps us going ... I believe that the quality of our products comes from the hands-on approach we take in every step of the process.

(FM2)

There is resistance to change due to long-standing family traditions of older generations, which can lead to reluctance to adopt new digital methods. Concerns about disrupting established workflows and overburdening already stretched resources are common.

There is a natural resistance to change within our family members. We have been doing things a certain way for generations, and shifting to new digital methods can be unapproachable and unsettling for everyone involved. Running a small business requires us to wear many hats, and finding the time to learn and implement digital tools is a challenge. We're already stretched thin with our daily operations.

(FM4)

Next, there is a generational concern that automation might compromise the quality and authenticity of ingredients highly valued in traditional family businesses. This concern leads to reluctance among generations to embrace new technologies.

While modern technology could make some processes faster, we worry that it might compromise the quality and authenticity of our products. Our customers appreciate the traditional taste that comes from our hands.

(FM2)

Another statement emphasized:

In our family business, traditions and established practices have always been valued over adopting new technologies. We have a strong emphasis on maintaining the methods that have been passed down through generations. The dynamics within our family business often involve debates over whether investing in digital transformation aligns with our core values of workmanship and personal touch. There's a concern that automation could compromise the quality and authenticity we're known for.

(FM3)

4.2.3 | Collaborative Decision-Making

Involving all family members in digital transformation decisions is crucial for ensuring comprehensive understanding of potential benefits, facilitating smoother transitions, and enhancing acceptance of new technologies and machines within family-owned businesses.

Yes, I agree that involving all family members in the decision-making process ensures that they understand the potential benefits and have a voice, making change easier and accepted.

(FM5)

Interviews reveal that understanding the true benefits of digital transformation and adopting a collaborative approach help align the family with the changes, facilitating more cohesive digital integration.

My sisters don't understand the real benefit. First, they need to understand and provide hands-on support. This collaborative approach helps the whole family align with the changes, and facilitates a healthier integration of digital tools and machines.

(FM4)

Interview statements of family-owned business reveal that adopting digital tools is seen as a way to revitalize the business and secure its future, motivating the next generation to stay involved and align the business with their skills and interests.

The fear of our family business ending with our generation is real. However, we believe that adopting digital tools can revitalize the business and provide a compelling reason for our children to stay involved. By integrating technology, we aim to make the business more efficient and aligned with the skills and interests of the next generation.

(FM5)

Engaging all family members in digital transformation decisions fosters shared understanding, smoother integration, and

acceptance of new technologies, motivating the next generation and securing the business's future viability.

Finally, the limited participation in digital training and reliance on specific family members mirrors the findings of Löhde et al. (2020), who identified the need for cultivating a supportive and inclusive digital culture in family businesses. Additionally, the observed intergenerational resistance to digital transformation reflects themes discussed by Basly and Hammouda (2020), who highlight the impact of skepticism and adherence to traditional practices on technology adoption.

4.3 | Digital Integration for Business Strategies

4.3.1 | Market Adaptation and Competitiveness

While interviewees report understanding the potential of digital marketing to expand their audience and improve customer engagement, they face uncertainty in its implementation. Industrial training organizations are advocating digital payment systems and an online presence to make ordering easier and increase product visibility and market competitiveness, yet businesses are not acting on these recommendations.

I've learned about digital marketing from NCI workshops and other trade exhibitions, and understand its potential to reach a wider audience. I'm unsure where to start or how to apply it to our traditional business.

(FM4)

There is concern that digital transformation could erode the personal touch and traditional customer interactions that define the business.

One of my main concerns with digital transformation is the risk of losing the personal touch that defines our business. Our customers appreciate the direct interaction and the traditional methods we use, which might not enlighten well in a digital format.

(FM1)

Furthermore, the absence of a digital presence has led to significant missed opportunities. As one member stated:

We missed out on a potential business opportunity with supermarkets and other big stores in town because we couldn't effectively present our production capabilities. A digital portfolio or website showcasing our products, along with color coding, barcoding, and digitally advanced packaging and processes, could have made a stronger impression and helped us secure the deal. Without digital tools, we struggle to highlight our strengths and compete effectively in a more digital-centric business environment.

(FM4)

Overall, the hesitation to fully embrace digital transformation stems from concerns about losing personal customer interactions and missing business opportunities. Despite recognizing the benefits of digital engagement for market adaptation and competitiveness, this SME struggles to integrate such tools without compromising the personal touch and traditional values that define their brand.

4.3.2 | Operational Efficiency and Value Addition

There is a keen interest in leveraging digital tools and machines to enhance operational efficiency, streamline production processes, and uphold quality and tradition. One of the significant value-related benefits of digital transformation is in operational efficiency, which contributes directly to the product distribution process. Digital tools can support inventory management, logistics, and supply chain coordination, leading to better control over product distribution, faster delivery times, and reduced costs. One participant stated:

In five years, I hope our business continues to grow steadily while maintaining the quality and tradition that our customers value. If we do integrate digital technologies, I see them playing a role in streamlining our operations and making us more efficient. For instance, digital tools and machines could help us manage our inventory better, reduce time consumption, and ensure a more organized production process.

(FM3)

This perspective highlights the anticipated benefits of digital solutions in improving process organization and efficiency. For instance, implementing a digital inventory management system allows businesses to track product availability in real time, ensuring that customer demand is met promptly. It can also optimize distribution channels. By integrating these solutions, businesses can expand their distribution footprint, offering products to new customer demographics and geographical locations.

At the same time, there are concerns about integrating digital tools and machines with traditional quality control methods. There is apprehension that technology might compromise the unique taste and quality of products. One participant expressed:

Digital transformation might streamline our production processes, making them faster and more efficient. However, I'm concerned that it could change the traditional methods that give our products their unique taste and quality. We have very hands-on quality control, with each family member involved in different stages of production. Digital tools might automate some of these processes, but I'm worried that it could lead to a loss of the meticulous care we put into each batch.

(FM4)

Another added,

Balancing tradition with digitalization is a challenge, but we struggle to find ways where technology can complement rather than replace our traditional methods. For instance, using digital tools for inventory management could streamline operations while keeping essential aspects of our handmade manufacturing process. Only this way, we can enhance efficiency without compromising the authenticity of our products.

(FM5)

This perspective underscores the challenge of balancing tradition with digitization is challenging, but finding ways to complement technology rather than replace traditional methods can improve product reliability without compromising it.

Interview statements reveal the potential benefits of digital inventory management and record-keeping to enhance operations. As one interviewee noted:

I think there is so much potential in digital inventory management and record-keeping to enhance operational efficiency. In the future, we will even consider using billing machines and more.

(FM4)

Although, there is significant interest in leveraging digital solutions to boost efficiency, there are concerns about potentially compromising traditional methods and the quality of products. Balancing technological advancements with the preservation of established practices remains a key challenge for this SME, as they seek to integrate digital tools and machines in a way that complements rather than replaces their traditional processes.

4.3.3 | Customer Relations and Experience

There are significant concerns about the impact of digital engagement on customer relationships. Maintaining personal contact is important, and there are fears that digital tools may compromise this by making communication more transactional. One participant expressed:

Our customers love the traditional taste and quality of our products, which come from our hands-on, manual processes. I worry that introducing digital tools and machines might change the essence of our production and compromise the authenticity that our customers value. We have a close relationship with our customers, who appreciate the personal touch in our service. Moving to digital platforms could make our interactions more impersonal and transactional, which is a significant concern for us.

(FM4)

Another added:

One of my concerns is that this shift might make our interactions with customers more impersonal. Our customers value the personal touch and direct communication they get from us, and moving online could take away from that experience.

(FM5)

Interview statement reveals that while they recognize younger customers' preferences for online interactions and digital payments, they have not yet taken any action in accordance with these changes. One interviewee shared:

Younger customers have suggested adopting card payment systems and going online to make ordering easier and increase product awareness. It's something I'm considering, but I haven't taken any steps yet.

(FM4)

Finally, there is a concern about transitioning toward digital engagement. Specifically, there is a worry about the comfort levels of loyal, long-time customers, with one statement highlighting that:

Some of our loyal, long-time customers might not be comfortable with digital platforms. There's a risk that they could feel separate if we shift too much towards digital engagement and move away from traditional methods.

(FM6)

Addressing the needs and comfort levels of these loyal customers remains a significant challenge.

Finally, the family's cautious approach to digital marketing aligns with Saura et al.'s (2023) findings, which suggest that family businesses often struggle with adopting digital strategies due to concerns about disrupting established customer interactions. Furthermore, the potential for digital tools to enhance operational efficiency and customer satisfaction, as observed in this study, complements Chaudhuri et al.'s (2023) exploration of how AI-CRM systems can support family business sustainability by improving dynamic capabilities.

For digital transformation, a family-owned food and snack manufacturing SME faces challenges in integrating digital tools and machinery while preserving the personal touch valued by loyal customers. Balancing traditional practices with digital advancements is critical to maintaining customer satisfaction and business relevance. Concerns about the loss of unique qualities from wood cooking, such as the unique flavor and potential compromise of product reliability, are widespread. The family members as employees are committed to preserving family traditions and labor-intensive processes. But they struggle with digitalization, financial constraints, digital knowledge gaps, and resistance to change. While recognizing the benefits of digital marketing and operational efficiency, there is concern about losing personal customer interactions

and brand credibility. Embracing digital technologies is essential for future reliability, assisting succession, and maintaining relevance for future generations.

5 | Discussion

This study revisits the research questions on the role of digital integration in maintaining traditional product authenticity, the barriers faced by family-owned SMEs, and how digital integration dynamics influence the transformation process. By analyzing the lived experiences of family members in a third-generation food manufacturing SME, researchers have uncovered significant insights into the challenges and opportunities posed by digital transformation in such businesses. One of the key contributions of this study is the development of a human-centric digital transformation model, tailored specifically for family-owned SMEs within the context of Industry 5.0. This model seeks to balance technological advancement with the preservation of family values and traditional practices. While this contribution is substantial, there is room for more explicit comparisons with prior research models to enrich the theoretical implications of this study.

This study contributes to the literature on digital transformation in family-owned SMEs by providing a nuanced understanding of how family dynamics impact the adoption of digital tools. The findings suggest that family-owned businesses in Sri Lanka are cautious about integrating digital technologies due to concerns over product authenticity and maintaining personal customer relationships. However, there is also recognition of the need for digital transformation to remain competitive, particularly in adapting to the demands of younger customers and improving operational efficiency. The study highlights the importance of a human-centric approach to digital transformation, where technology is integrated in a way that complements, rather than replaces, traditional business practices.

5.1 | Revisiting the Research Questions

This phenomenological study addresses three research questions. The first question focuses on understanding how family-owned manufacturing SMEs perceive the impact of digital integration on maintaining their traditional product quality and reliability. These findings reveal valuable owner insights into digital integration, shedding light on how SME owners navigate and balance the benefits of digital transformation while preserving the quality and reliability of their traditional products and traditional practices.

Family-owned SME is afraid that digital and machinery appliances, such as modern gas cookers, may compromise the unique characteristics that set their products apart. This fear stems from a widespread unwillingness to change established practices that are integral to their reliability and success. The challenge lies in balancing the undeniable benefits of digital integrations with the need to maintain personal customer interactions and traditional values. In line with that, Appleton and Holt (2024) highlight this issue, showing that digitization

strategies vary widely based on business objectives, and Chrisman et al. (2015) confirm that family businesses' preference for stability inhibits their adoption of disruptive technologies.

Family businesses with deep historical roots place a strong emphasis on keeping traditional practices and strict quality control, considering them integral to their brand identity and success. These businesses regularly involve family members directly in quality control processes, emphasizing the importance of their personal touch in protecting the business' reputation. The preference for traditional retention reflects a broader trend to value reliability over digital innovation, as these businesses are wary of how new technologies can disrupt established practices. Further, De Massis et al. (2013), reveal that family participation plays an important role in innovation processes and Ano and Bent (2022) emphasis on preserving traditions with emotional ties that influence attitudes toward digital transformation.

Financial constraints are a significant matter for family-owned businesses when investing on digital integrations. The high-cost technology, training and maintenance can be unaffordable, leading many businesses to prioritize immediate financial needs over long-term digital benefits. Limited budgets often limit the ability to invest in digital integration, and there is uncertainty about the return on investment from such digitalization. Niehm et al. (2010) found that factors such as financial barriers, prior knowledge and business location influence information technology adoption and Ullah Khan et al. (2022) emphasized that SMEs in developing economies face challenges in adopting digital technologies, emphasizing the need for support measures to overcome these financial and resource-related constraints.

The second question focuses on understanding what the primary constraints and knowledge gaps hindering the integration of digital tools and machines in family-owned manufacturing SMEs are. The findings reveal the need to empower family-centric digital evolution. A key challenge for family-owned businesses in integrating digital is the knowledge and training gap within the family. Limited participation in training programs often relies on a few members for technical expertise, slowing overall digital transformation. Moreover, family members balancing multiple roles may struggle to effectively integrate digital solutions. Research by Löhde et al. (2020) and Mand et al. (2022) highlights the need to address these gaps by fostering digital readiness and a supportive culture to improve information technology investment and integration.

Intergenerational dynamics play an important role in the digital transformation of family-owned businesses. A strong commitment to preserving traditional practices can create resistance to digital transformation, as family members may fear that adopting new technologies will disrupt established workflows and undermine long-standing traditions. This resistance is often rooted in concerns about how automation may affect the quality and reliability of products. Studies by Basly and Hammouda (2020) and Lannon et al. (2024) highlight the impact of these dynamics on digital integration, suggesting that skepticism of new technologies and a focus on socio-emotional resources hinder willingness to embrace digital methods.

Effective collaborative decision-making is crucial to enable digital transformation in family businesses. Involving all family members in decisions related to digital transformation can lead to smoother transitions and greater integration of new technologies. By ensuring alignment among family members, businesses can develop a cohesive strategy for digital transformation. This inclusive approach not only helps in achieving a unified vision, but also encourages the next generation to engage with the business and align digital strategies with their skills and interests. Further, Saura et al. (2023) and Arcese et al. (2021) emphasize the benefits of involving all family members in digital strategic decisions to improve digital presence and innovation, thus improving the overall effectiveness of digital transformations in family businesses.

The third question focuses on understanding how digital integration dynamics influence the digital transformation process in family-owned manufacturing SMEs. The findings indicate that digital integration is crucial for enhancing business strategies related to market adaptation and competitiveness, improving operational efficiency, and refining customer relations and experience.

Family businesses recognize the potential benefits of digital marketing, such as expanding reach and improving customer engagement. However, challenges in integrating digital strategies can affect their competitiveness. Concerns include the risk of losing the personal touch central to their business identity and the potential loss of personal customer relationships. In addition, lack of digital presence led to missed opportunities such as failure to secure contracts with large stores. Chaudhuri et al. (2023) also found that AI-CRM technology will improve business efficiency and market relevance, underscoring the need for digital integration.

Through streamlining processes such as inventory management and production organization, and maintaining quality standards, digital tools provide improved operational efficiency. Despite these advantages, there are concerns that digital tools may compromise traditional quality control methods. Businesses seek balance by integrating digital solutions in ways that complement rather than replace established practices. Research by De Massis et al. (2013) emphasizes the need to preserve operational efficiency and quality.

Integrating digital tools and machines raises concerns about maintaining the personal touch valued by customers. While younger customers prefer online interactions and digital payments, integrating these preferences is still a task. Long-term loyal customers accustomed to traditional methods may experience difficulties on digital platforms, raising concerns about isolating this important customer base. Ano and Bent (2022) emphasize the need to balance digital strategies with personal connections to maintain customer satisfaction. Similarly, Saura et al. (2023) highlight the importance of developing digital strategies that improve overall customer relationships and experiences, underscoring the need to carefully navigate digital integration while preserving valuable customer interactions.

Finally, based on the findings, researchers have developed a novel framework, presented below (see Figure 6), as a

human-centric digital transformation model specifically constructed for family-owned businesses within Industry 5.0. The development of the human-centric digital transformation model in this study is particularly significant as it builds upon existing frameworks, such as the three-circle model of family businesses (Tagiuri and Davis 1996) and previous models of digital transformation in SMEs. The three-circle model has provided foundational insights into the intersections of family, ownership, and business within family-owned enterprises. However, the existing literature tends to focus on broader organizational dynamics or technology adoption without fully considering the nuanced intergenerational dynamics and emotional attachments to traditional practices. Our model incorporates these elements, proposing that digital transformation in family businesses cannot be decoupled from family values and emotional connections to heritage.

Additionally, existing research on Industry 5.0 (Leng et al. 2022; van Erp et al. 2024) primarily addresses technological implications for businesses but often overlooks the human element an area that our model seeks to fill. By focusing on human-technology collaboration, our study extends the work of Hein-Pensel et al. (2023), who emphasized the importance of incorporating human factors into digital maturity models for SMEs. In contrast to previous models that are more technology-centric, this study proposes a balanced approach, integrating both the technological and human-centered aspects of Industry 5.0, which aligns better with the challenges faced by family-owned SMEs in developing economies.

5.2 | Theoretical Implications

This phenomenological study enhances theoretical understanding of human-centered digital transformation within Industry 5.0 (I5.0), focusing specifically on family-owned SMEs in Sri Lanka. It advances qualitative research by providing insights into how these businesses navigate the complexities of digital transformation while preserving traditional values, offering a richer perspective on the unique challenges and opportunities faced by family-owned enterprises in developing countries.

He et al.'s (2025) recent study reveals how founder control drives significant digital transformation in medium and large enterprises through concentrated decision-making and risk-taking. In contrast, this study shows that owners' cautious approach to balancing tradition with modernization, concerns about maintaining historical value and quality, and financial uncertainty regarding return on investment can delay digital initiatives in small and medium enterprises. While most existing studies focus on digital transformation in family businesses generally, this study offers important theoretical contributions specifically for understanding how such transformations unfold within the SME context.

A key theoretical contribution of this research is the development of a human-centric digital transformation model for family business within Industry 5.0 (see Figure 6). The development of a human-centric digital transformation model within the context of Industry 5.0, specifically designed for family-owned SMEs, is a key contribution of this study. This model underscores the balance between embracing modern technological

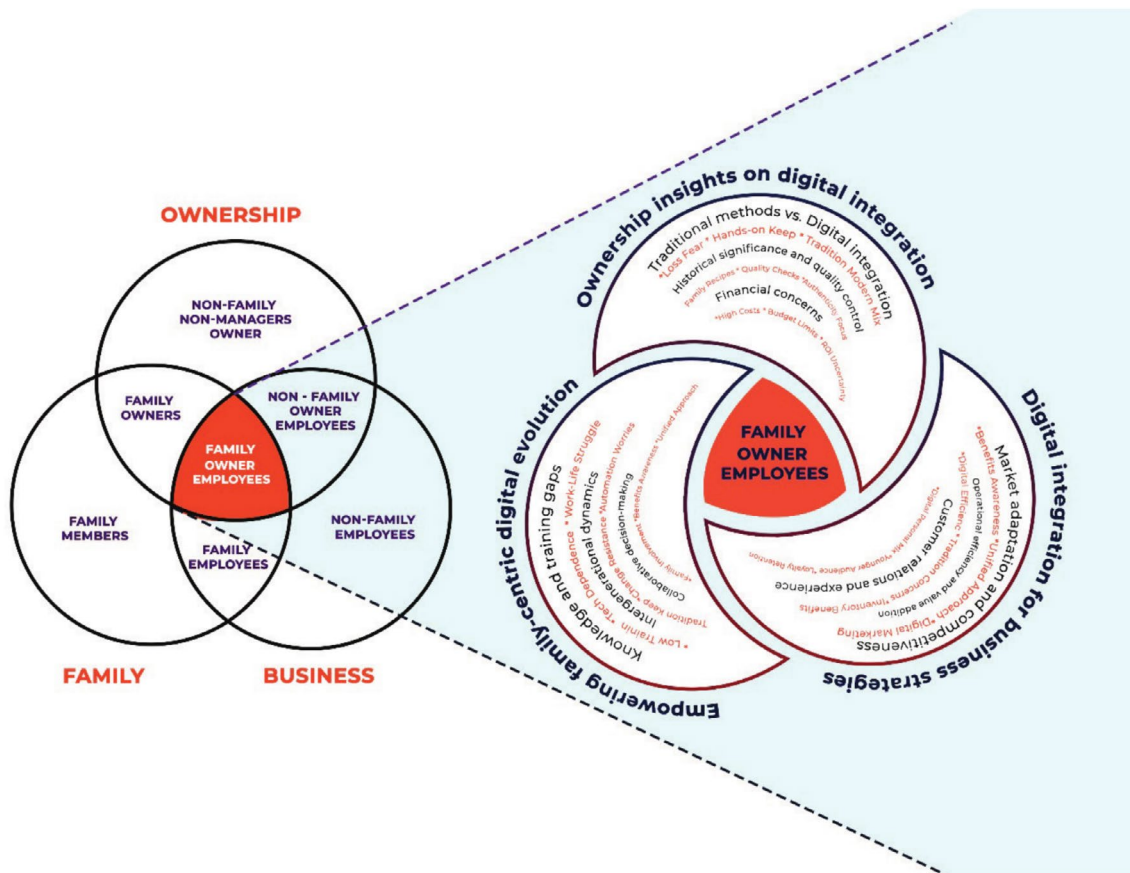


FIGURE 6 | Human-centric digital transformation model for family business within Industry 5.0. *Source:* Created by the authors.

advancements and preserving core family values and traditional business practices. However, to enhance the theoretical contribution of this model, it is crucial to position it within the broader landscape of existing frameworks for digital transformation in family-owned businesses.

Upon reviewing established models in digital transformation for family firms, such as De Massis et al. (2013) on innovation in family businesses and Löhde et al. (2020) on digital readiness, this study's model emphasizes the intersection of human-centered values, intergenerational influence, and digital evolution. The existing frameworks, while comprehensive in addressing technological adoption and the role of the family, often overlook the nuanced challenges faced by family businesses in developing economies, such as Sri Lanka, where socio-economic constraints, familial resistance to change, and the preservation of traditional practices create significant barriers to digital transformation.

The human-centric model proposed here builds on prior models by integrating family dynamics, intergenerational values, and sustainability goals factors—often underestimated in technological adoption frameworks. For instance, De Massis et al. (2013) highlight the importance of family involvement in innovation, but our model further extends this by specifically addressing how intergenerational conflict (i.e., resistance from older generations who hold on to traditional practices) and financial constraints impede seamless digital integration. In comparison to other models like Saura et al. (2023) and Chrisman et al. (2015), which tend to focus on the technical aspects of

digital transformation and its operational impacts, this study introduces a holistic, human-centric approach that places equal weight on emotional, cultural, and societal factors that shape family businesses.

Thus, this model can be viewed as complementary to the existing frameworks while offering a more inclusive perspective that integrates family values, long-term sustainability, and the intergenerational transmission of business practices into the process of digital transformation. This study's model, grounded in Industry 5.0's values of human well-being, resilience, and sustainability, makes an important theoretical contribution. Further, the development of a human-centric model for digital transformation, aligns with the principles of Industry 5.0, which advocates for harmonious integration of technology and human values. This model provides a theoretical basis for future research that examines how family-owned businesses can embrace Industry 5.0 principles while maintaining their unique family identities. Future empirical research should explore the adaptability of this model across other sectors and regions, assessing how it can be refined and tested in a variety of family-owned SMEs to further enhance its theoretical validity and practical relevance.

5.3 | Practical Implications

The findings from this study not only provide theoretical contributions but also offer practical insights for family-owned SMEs

seeking to navigate the complexities of digital transformation. Based on the experiences of the participants, researchers have identified several key areas where practitioners can focus their efforts to successfully integrate digital technologies while preserving traditional business practices:

Incremental digital integration: Family-owned SMEs should adopt a gradual, phased approach to digital integration. Rather than opting for a complete overhaul, which could disrupt established practices, businesses can start by digitizing specific aspects, such as inventory management, customer relationship management (CRM), or financial record-keeping. This approach ensures that family businesses maintain control over their core operations while gradually adapting to technological advancements. The use of digital tools for inventory management, as mentioned by the family members in this study, is one example where operational efficiency can be improved without sacrificing traditional craftsmanship.

Preserving core family values: One of the primary concerns among family business owners is the potential loss of authenticity and traditional values with the adoption of new technologies. SMEs should focus on integrating digital solutions that complement, rather than replace, family traditions. For example, digital tools can be used for marketing purposes such as developing an online presence or utilizing social media for customer engagement without replacing face-to-face interactions that are central to the business's identity. SMEs could also consider offering personalized digital services (e.g., custom orders) to preserve the personal touch while appealing to the growing digital customer base.

Intergenerational collaboration: Involving all family members in the decision-making process is crucial for the success of digital transformation. Family members often have different levels of understanding and resistance to technology, and this can create barriers to integration. In our study, the importance of engaging younger generations, who may have more digital skills, alongside older generations, who have a deeper connection to the traditional aspects of the business, is emphasized. Businesses should foster intergenerational collaboration through joint decision-making, which helps ensure alignment between traditional values and modern technologies. Regular family meetings to discuss digital strategies and assess potential impacts on business practices can also promote a shared vision for the future.

Capacity building and training: A significant barrier to digital integration identified in this study is the knowledge gap, particularly among family members who have limited exposure to digital technologies. For successful digital transformation, SMEs must invest in targeted training programs that cater to the specific needs of family members. This could include basic digital literacy workshops for older generations and specialized training for younger generations to leverage advanced technologies such as AI, machine learning, and digital marketing tools. In addition, SMEs can explore collaborations with external consultants or industry partners to facilitate knowledge transfer and capacity building.

Financial planning and resource allocation: Financial constraints are another critical challenge for family-owned SMEs

when it comes to adopting digital technologies. Many SMEs in developing economies like Sri Lanka operate with limited budgets, which makes it difficult to justify the significant upfront costs of digital tools and machinery. It is essential for family businesses to develop a clear financial plan for digital investments. This includes considering government grants or financial support programs aimed at promoting digital transformation in SMEs. Dai et al.'s (2025) study provide evidence supporting the importance of policy-level interventions in enabling and accelerating digital transformation. Additionally, businesses should prioritize investments that offer the most immediate benefits, such as tools that improve operational efficiency or customer engagement.

In a nutshell, this study offers a framework for family-owned SMEs to navigate the complexities of digital transformation while retaining their traditional practices. The human-centric digital transformation model researchers developed offers an approach that acknowledges both the technological and human factors critical to successful transformation in family businesses. By focusing on incremental integration, intergenerational collaboration, and capacity building, family-owned SMEs can integrate digital technologies while preserving their legacy, ensuring long-term sustainability and competitiveness.

6 | Conclusion

6.1 | Conclusion and Limitations

This study has contributed significantly to understanding the dynamics of human-centric digital transformation within family-owned SMEs in Sri Lanka, particularly in the context of Industry 5.0. By employing a qualitative phenomenological approach, this research has highlighted the challenges and opportunities faced by family-owned businesses as they navigate the complexities of digital integration. The findings reveal that for family-owned SMEs, the process of digital integration is viewed as a way to enhance existing practices without disrupting the business's core identity. Though as these SMEs increasingly adopt digital tools, they recognize that these changes may necessitate a more profound transformation of their organizational structure, business model, and value creation processes, providing a tailored human-centric model for SMEs operating within Industry 5.0.

However, it is essential to recognize the limitations of this study. The primary limitation stems from the use of a single case study, which restricts the generalizability of the findings. While the insights gained from the case of 'Aaseer Mixture', a family-owned food and snack manufacturing SME, provide rich and contextualized data, the findings may not fully reflect the experiences of SMEs in other sectors or regions. The unique characteristics of this specific SME, including its location in Northern Sri Lanka and its traditional food manufacturing processes, may not be representative of all family-owned businesses, particularly in other industries such as electronics, garments, or services.

6.2 | Future Scope of Study

Given these limitations, future research could address the generalizability of the findings by expanding the sample size and

conducting comparative case studies across different industries and regions. Such studies could explore how different types of family-owned businesses, especially those in other sectors like electronics, textiles, or technology, approach digital transformation. By incorporating a broader range of industries, researchers could refine and expand the human-centric model presented in this study, making it more applicable to a wider array of family-owned businesses.

Another avenue for future research is to examine the long-term impact of digital transformation on family-owned SMEs. While this study provides insights into the initial challenges and concerns regarding digital integration, future research could track the progress of these businesses over time, evaluating the sustainability and long-term benefits of digital tools on business performance, market competitiveness, and family succession. Longitudinal studies could also explore how digital transformation influences family dynamics, particularly in relation to intergenerational leadership transitions and the preservation of family legacy.

Finally, the development of a more comprehensive theoretical framework that integrates both human-centered values and technological advancements could be explored. Future research could investigate how to effectively balance the preservation of family values with the pressures and demands of technological change in family-owned businesses. A deeper exploration of the human factors involved, such as emotional attachment to traditional practices and socioemotional wealth, could enrich the understanding of family business dynamics in the digital era.

In conclusion, while this study contributes to the theoretical understanding of digital transformation in family-owned SMEs within the context of Industry 5.0, further research is needed to validate the proposed model (Human-centric digital transformation model for family business within Industry 5.0) and explore its application across diverse family businesses. By addressing these limitations and expanding the scope of research, future studies can provide more actionable insights and practical guidance for family-owned SMEs seeking to navigate the challenges of digital transformation in an ever-evolving technological landscape.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Data sharing not applicable to this article as no datasets were generated or analyzed during the current study.

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