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R&D Collaborations and Twin Transition in Family Firms

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R&D Collaborations and Twin Transition in Family Firms

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ABSTRACT - SOMMARIO

This study examines how family firms implement the twin transition (simultaneous ecological and digital transition) the mutually reinforcing digital and green transformations that enhance sustainable competitiveness. While family firms possess a strong ability to innovate due to concentrated ownership and long-term orientation, they often display lower willingness to engage in innovation because of a reluctance to collaborate externally, creating a willingness–ability paradox. Based on a revelatory case study of a second-generation Italian family firm operating in the hospitality and agrifood sector, the study investigates how collaboration with a local research institution facilitated the firm's successful twin-transition process. The partnership followed an earlier failed collaboration with another organization, which collapsed due to value misalignment and lack of trust. The findings show that the new partnership's value congruence and shared commitment to regional sustainability fostered openness to experimentation and learning. The study conceptualizes willingness as a relational and dynamic construct, co-created through iterative engagement with trusted partners, and contributes to family business research by showing how trusted R&D collaborations enable family firms to align economic, environmental, and socioemotional goals, thereby overcoming motivational barriers and effectively advancing the twin-transition process.

Questo studio analizza come le imprese familiari implementano la *twin transition* (ossia la trasformazione simultanea ecologica e digitale), intesa come un insieme di processi digitali e green reciprocamente rafforzanti che accrescono la competitività sostenibile. Sebbene le imprese familiari dispongano di una forte *ability* nell'innovazione, derivante dalla concentrazione proprietaria e dall'orientamento di lungo periodo, esse manifestano spesso una ridotta *willingness* ad intraprendere percorsi innovativi, in particolare a causa della riluttanza a collaborare con partner esterni. Ciò genera il cosiddetto paradosso *willingness–ability*.

Sulla base di un caso di studio rivelatore relativo a un'impresa familiare italiana di seconda generazione operante nei settori dell'ospitalità e dell'agroalimentare, lo studio indaga come la collaborazione con un istituto di ricerca locale abbia facilitato l'implementazione del processo di *twin transition*. Tale partnership ha fatto seguito a una precedente collaborazione fallita con un'altra organizzazione, interrotta a causa di un disallineamento valoriale e di una carenza di fiducia.

I risultati evidenziano che la nuova collaborazione, fondata su una forte congruenza valoriale e su un impegno condiviso verso la sostenibilità regionale, ha favorito l'apertura alla sperimentazione e l'attivazione di processi di apprendimento congiunto. Lo studio concettualizza la *willingness* come un costrutto relazionale e dinamico, co-creato attraverso un coinvolgimento iterativo con partner fidati, e contribuisce alla letteratura sulle imprese familiari mostrando come collaborazioni di R&S basate sulla fiducia consentano di allineare obiettivi economici, ambientali e socioemotivi. In tal modo, tali collaborazioni permettono di superare le barriere motivazionali e di avanzare efficacemente nel percorso di *twin transition*.

Keywords: family firms; twin transition; R&D collaboration; willingness-ability paradox.

Messages from the Authors in memory of Professor Gianluca Colombo

Antonello Garzoni. *Gianluca Colombo was the Dean of the Strategic Department at SDA Bocconi when I started my academic career. After that, we had many opportunities to catch together in different projects, both in teaching and research. He was a talented researcher and a super gentle man, and we all miss his smile and the right word for everyone.*

Francesco Debelle. *I had the pleasure of meeting Professor Colombo for the first time at one of my earliest conferences, at the beginning of my doctoral journey. I remember well his kind words of encouragement and the valuable advice he shared. Although I had only a few opportunities to meet him in person, I will always remember his openness and genuine willingness to support and guide young scholars.*

1 – Introduction

The concept of the twin transition, the mutually reinforcing digital and green transformations fostering firms' sustainable competitiveness (Tabares et al., 2025), has recently gained growing scholarly attention (Colapinto & Masé, 2025). Understanding how innovation development and sustainability-oriented policies can be simultaneously pursued represents both a major source of potential competitive advantage and a necessary response to increasing scrutiny from key stakeholders such as regulators, customers, and society at large (Damioli et al., 2025). The twin transition also offers a particularly promising opportunity for family firms, organizations in which a family maintains strategic control and intends to pass the business to future generations (Chua et al., 1999). These firms are typically characterized by deep embeddedness in their local communities (Bau et al., 2019), a strong commitment to sustainability-related goals (Hadjielias et al., 2025), and the pursuit of non-economic objectives that shape their decision-making processes (Kotlar & De Massis, 2013).

However, while family owners often enjoy substantial discretionary ability stemming from concentrated ownership and long-term orientation, they may exhibit lower willingness to engage in innovation, particularly because of a reluctance to open up to external partners. This tension gives rise to the so-called willingness–ability paradox (Chrisman et al., 2015). It thus becomes essential to understand how family firms can overcome an initial motivational gap and successfully implement the twin transition by identifying suitable partners with whom to co-develop innovation and sustainability initiatives.

To explore this issue, we develop an in-depth single case study of a small family firm located in Southern Italy operating in the hospitality and agrifood sector. The case is revelatory as the firm offers a unique opportunity to observe how a family business successfully implements a twin-transition process through an R&D collaboration with a local leading research institution specialized in the agronomic field. This successful collaboration followed a previous unsuccessful attempt with a private firm, which did not work due to value misalignment and lack of trust. In contrast, the new partnership with the research institution was grounded in a shared commitment to regional sustainability and innovation. Our findings indicate that this value alignment was critical in fostering openness to experimentation. Importantly, our findings suggest that willingness is not a static attribute but rather a relational construct that evolves through iterative engagement with trusted partners.

This study makes three main contributions to the literature on family business, innovation, and sustainability. *First*, it advances the emerging research stream on the twin transition in family firms (Colapinto & Masé, 2025) by showing that digitalization and sustainability are interdependent and relationally constructed goals, rather than parallel or isolated objectives. The twin-transition process is deeply influenced by intergenerational dynamics and by the firm's embeddedness in its local ecosystem. *Second*, the study extends the willingness–ability paradox framework (Chrisman et al., 2015) by conceptualizing willingness as a dynamic phenomenon. Our findings suggest that willingness can be cultivated and enhanced through trust-based collaboration and value alignment with external partners. *Third*, we contribute to the understanding of R&D collaboration in family firms (Feranita et al., 2017) by emphasizing the role of research institutions as credible and values-aligned counterparts. Indeed, our results confirm that family firms' commitment to sustainability is not merely a response to external pressures but often reflects long-standing identity goals and local legacy (Gazzola & Colombo, 2014). Carefully selected partnerships can activate these intrinsic motivations, helping family firms overcome internal resistance and advance toward innovations that jointly fulfill economic and environmental objectives.

2 – Literature Review

2.1 – *The twin transition in family firms*

The twin transition, defined as “two parallel and mutually reinforcing digital and green transitions, which amplify each other, leading to sustainable competitiveness for firms” (Tabares et al., 2025, p. 13), has attracted growing attention from both scholars and practitioners (Hammerschmidt et al., 2025). The twin transition acknowledges that digital and green transformations are complementary processes that mutually reinforce efficiency, innovation, and resilience. Through the twin transition, firms can pursue goals aligned with the Triple Bottom Line (Elkington, 1997), integrating economic, social, and environmental dimensions.

Family firms, defined as “a business governed and/or managed with the intention to shape and pursue the vision of the business held by a dominant coalition controlled by members of the same family or a small number of families in a manner that is potentially sustainable across generations” (Chua et al., 1999, p. 28), frequently exceed regulatory requirements in sustainability, driven by socioemotional wealth goals that emphasize reputation, identity, and

legacy (Berrone et al., 2012; Colapinto & Masé, 2025). Their focus on continuity and community welfare often translates into proactive social and environmental engagement (Campopiano & De Massis, 2015). Local embeddedness reinforces these orientations: proximity to employees and stakeholders nurtures mutual trust and shared responsibility, transforming sustainability into a relational practice (Herrero et al., 2024). In family firms, however, conservatism and centralized control may lead to incremental rather than radical innovation (Bouncken & Schmitt, 2022; Colombo et al., 2018). In this regard, generational succession often represents a turning point, as successors introduce greater openness and technological investment to gain legitimacy and demonstrate their capability to advance the firm further (Ren et al., 2023; Liu et al., 2023).

2.2 – *R&D collaborations in family firms*

Often, family firms cannot achieve the twin transition in isolation due to constraints in available resources and capabilities. R&D collaborations therefore represent a key mechanism through which these firms can access complementary assets, external knowledge, and innovation capabilities (Feranita et al., 2017). Defined as “a form of inter-firm relationship established to mutually benefit from each other’s resource complementarities in order to achieve innovation” (Martínez-Alonso et al., 2023, p. 2), such collaborations help overcome internal limitations and expand firms’ technological frontiers. Early research examined the effects of family ownership and control on collaboration propensity, showing that high family control tends to reduce the likelihood of engaging in R&D alliances, mainly due to concerns over control loss, opportunism, and unintended knowledge spillovers (Nieto et al., 2015; Block & Spiegel, 2013; Dong et al., 2022, 2025). More recent studies have moved beyond the simple family versus non-family dichotomy to highlight heterogeneity across governance structures (Daspit et al. 2021). Factors such as CEO education, top management team diversity, and the inclusion of non-family managers foster openness by professionalizing decision-making and enhancing absorptive capacity (Classen et al., 2012; Lambrechts et al., 2023). Ownership dispersion and intergenerational transitions can either facilitate or hinder collaboration, depending on alignment among family members (Dong et al., 2025).

At the relational level, embeddedness in local communities, reputation-based relationships, and multigenerational stakeholder ties enable durable alliances governed by trust and reciprocity rather than by formal contracts (Block & Spiegel, 2013; Bouncken et al., 2020; Audretsch et al., 2023). This social capital functions as both a coordination mechanism and a risk buffer, encouraging family firms to reach beyond their internal capabilities (Nieto et al., 2023; Dong et al., 2025).

Dynamic and absorptive capabilities further shape how family firms identify, assimilate, and exploit external knowledge (De Massis et al., 2018; Yildiz et al., 2021). Technological assets such as intellectual property rights, digital infrastructures, and advanced manufacturing systems enhance readiness for collaboration by safeguarding proprietary knowledge and supporting digital knowledge transfer (Martínez-Alonso et al., 2023; Nieto et al., 2023). Evidence suggests that family firms have traditionally preferred informal, trust-based partnerships with geographically proximate actors such as suppliers or regional partners (Nieto et al., 2015; Bouncken et al., 2020; Debelle et al. 2024). However, an increasing number now collaborate with universities, research institutes, and startups, broadening their innovation scope and enabling more radical outcomes (Aiello et al., 2021; Kim et al., 2023).

R&D collaborations enhance product and process innovation, patenting activity, and managerial capabilities (De Massis et al., 2018; Halder et al., 2023). Yet, family-related outcomes remain underexplored (Lambrechts et al., 2023). Recent studies have called for examining how such collaborations contribute to non-economic goals, including continuity, legitimacy, and sustainability, and how they support the twin transition through partnerships with universities and ecosystem actors (Lambrechts et al., 2023; Martínez-Alonso et al., 2023; Dong et al., 2025).

2.3 – Collaborative dynamics and the willingness-ability paradox in family firms

The willingness–ability paradox (Chrisman et al., 2015) provides a valuable interpretive lens for understanding how family firms engage in innovation and collaboration. It reflects the tension between their high ability to manage innovation processes - stemming from agile decision-making and concentrated control - and their lower willingness to collaborate externally, driven by a desire to retain full control and avoid dependence on other organizations. This paradox is particularly evident in the twin-transition context, which requires firms to integrate digital transformation and sustainability (Damioli et al., 2025). Strong path dependence and community embeddedness promote trust and continuity but can constrain openness to external ideas (Bau et al., 2019; Rondi et al., 2019).

Fears of control dilution, knowledge leakage, and value misalignment frequently limit collaboration (Feranita et al., 2017). Thus, although family firms possess the autonomy to pursue digital and green innovation, they often adopt incremental rather than radical collaborative approaches. Yet, the same characteristics that underlie caution can also become sources of collaborative strength.

Long-term orientation, stable ownership, and reputation-based trust enable family firms to establish enduring partnerships founded on reciprocity (De Massis et al., 2015; Llach & Nordqvist, 2010; Miller et al., 2008). They tend to excel in R&D alliances and co-development projects where tacit knowledge, mutual commitment, and relational governance are crucial (Martínez-Alonso et al., 2023). Empirical evidence documents successful participation in international joint ventures, public–private partnerships, and university collaborations that leverage complementary resources and learning (Debellis et al., 2021a, 2021b; Van Gils et al., 2019).

Intergenerational dynamics further shape these processes. Founders typically prioritize control and prudence, whereas successors pursue legitimacy and renewal through innovation and digitalization (Ren et al., 2023; Liu et al., 2023). Shared governance and alignment between family and business goals can transform initial reluctance into strategic openness (Fuetsch & Suess-Reyes, 2017; Calabró et al., 2019). As new generations embrace sustainability and digital fluency, collaboration is increasingly perceived not as a threat but as an extension of family legacy. These characteristics define the distinctive pathways through which family firms pursue innovation.

Their cautious yet relational approach fosters slower but more resilient openness. Understanding these dynamics is essential to explain how family firms reconcile the preservation of socioemotional wealth with the collaborative experimentation required for the twin transition.

3 – Methodology

3.1 – Research design and sampling strategy

We employed criterion sampling to ensure the selection of an information-rich case and relevant informants (Fletcher & Plakoyiannaki, 2011; Patton, 2002). First, we focused on industries characterized by a strong presence of both innovation and sustainability. Second, we sought family firms that had successfully navigated one or more generational transitions, allowing us to examine how different generations may shape the pursuit of twin-transition goals. Third, we prioritized cases providing access to informants with multiple perspectives within and around the firm (De Massis & Kotlar, 2014). Fourth, we targeted family firms actively engaged in R&D collaborations with other organizations. Finally, we selected this revelatory case because, despite its relatively small size, the firm has become one of the most renowned and sought-after destinations for weddings and hospitality in the region, making it particularly well-suited to explore how R&D collaborations and twin transitions foster success across both economic and socioemotional dimensions.

Tenuta Pinto is a prestigious hospitality venue specializing in weddings, exclusive events, and high-end stays that combine rural authenticity with refined guest experiences. The current CEO and first-generation leader, Domenico, inherited from his father, Vito, a deep love for the land and extensive knowledge of local agricultural traditions, transforming a rural enterprise into a thriving hospitality business. The second generation contributes fresh expertise and strategic vision, further strengthening Tenuta Pinto's organizational structure and advancing its ongoing twin-transition process.

3.2 – Data collection

Data were collected from both primary and secondary sources using a qualitative design that combined semi-structured interviews, direct observation, and archival analysis (Strauss & Corbin, 1998). Data collection began in the summer of 2023 and extended over several months, allowing for prolonged engagement with family members, collaborators, and the firm's environment to capture multiple voices and perspectives.

Primary data included in-depth interviews, site visits, and participant observation. Semi-structured interviews were conducted with members of the family firm as well as representatives of the partner organization involved in the ongoing R&D collaboration (CIHEAM). All interviews were audio-recorded, transcribed verbatim, and complemented with field notes and insights gathered through informal conversations during site visits and public events. Observations took place at the main venue of Tenuta Pinto, where the experimental sustainable garden and the digital technologies implemented, such as IoT sensors and data analytics systems, were directly examined.

Secondary data consisted of online materials, including website content, social media posts, press releases, and visual or multimedia sources (e.g., photographs, videos, and news broadcasts). These materials were analyzed to triangulate perspectives and strengthen construct validity. This triangulated approach (Eisenhardt, 1989; De Massis & Kotlar, 2014), combining multiple data sources and types, enhanced the robustness and credibility of the findings,

supporting theory development through contextual depth and evidential convergence (Rondi et al., 2024).

3.3 – Data analysis

The qualitative data were analyzed through an abductive and iterative process (Timmermans & Tavory, 2012), moving continuously between empirical evidence and theoretical interpretation to develop a grounded yet conceptually informed understanding of the phenomenon. This approach enabled us to connect emergent patterns in the data with the study's conceptual foundations, thereby enhancing theoretical coherence and internal validity (Yin, 2017). The analytical process was guided by the Antecedents–Activities–Outcomes framework of family business innovation (De Massis et al., 2022) to capture how family-specific factors, collaborative actions, and resulting effects interacted throughout the R&D collaboration.

The first stage involved a comprehensive reading and open coding of all interview transcripts, field notes, and secondary materials. This phase focused on tracing the chronological development of the collaboration and mapping activities, actors, and key interactions. Descriptive coding helped delineate the process structure, revealing the sequential flow of events and the mechanisms shaping collaboration dynamics.

In the second stage, the analysis deepened to identify antecedents related to family goals, values, and resources that enabled Tenuta Pinto to engage in the R&D collaboration and address the willingness–ability paradox. Particular attention was devoted to contextual moderators, such as intergenerational influences, governance characteristics, and relational trust, that affected collaborative openness and strategic decision-making.

The third stage focused on outcomes, identifying both realized and anticipated effects of the collaboration at the organizational and family levels. Special emphasis was placed on how the partnership contributed to the firm's advancement in the twin transition, integrating digital transformation with sustainability-oriented innovation.

4 – Findings

4.1 – Antecedents of willingness and ability: identity, values and goals

Attitude represents the mindset of entrepreneurial families and encompasses the values, beliefs, and cognitive frames that shape how family actors perceive and enact business opportunities. It is both a cognitive and action-oriented construct that guides how family members initiate and implement change (Nordqvist & Melin, 2010). Tenuta Pinto exemplifies how a family enterprise can balance the preservation of socioemotional wealth with openness to innovation and external collaboration. Maintaining unity and harmony among family members emerges as a guiding principle in strategic decision-making, particularly when collaborative initiatives might challenge family cohesion or control.

The company is the heart of our family, the thread that connects us all. The most important thing for a family business is to maintain unity despite the challenges encountered in professional life. (Domenico Pinto, 1st generation, CEO).

We are a company and a family; the success of the business depends on how united we remain in our decisions and actions. (Nicole Pinto, 2nd generation, Marketing Manager).

This strong family orientation fosters an innovation-driven mindset, viewing innovation as vital to both business competitiveness and family continuity. Openness to change is reinforced through daily practices of experimentation and improvement. To sustain this innovative attitude, Tenuta Pinto relies on mechanisms that nurture openness and shared decision-making. Dialogue across generations and horizontal governance are considered essential to maintaining both agility and cohesion.

We operate with a horizontal vision, strengthening dialogue between family and managers within decision-making mechanisms. It is necessary to develop an entrepreneurial horizon oriented toward Europe and the world. (Domenico Pinto, 1st generation, CEO).

To grow exponentially, the sharing of ideas and the support of all family and company members are crucial. We discuss, reach compromises, and experiment, if you don't try, you can't improve. (Giuseppe Pedone, 2nd generation, Executive Chef).

Alongside innovation, collaboration is conceived as a complementary orientation and a central mechanism for achieving long-term sustainability. The firm's collaborative stance extends to universities, research institutions, and local ecosystem actors, integrating external expertise while maintaining its family-driven identity.

Today, we rely on scientific research and innovation to offer high-quality products, translating into an experience and an emotion [...] Alone, you can't go anywhere. (Domenico Pinto, CEO).

These attitudes are underpinned by a coherent set of values that define Tenuta Pinto's identity. The love for the land inherited from previous generations and the intergenerational transmission of curiosity and respect for agricultural traditions coexist with modern corporate values such as innovation, sustainability, and biodiversity.

Curiosity is one element that has always driven Tenuta Pinto to innovate and collaborate, a desire to learn. (Domenico Pinto, 1st generation, CEO).

As a business, we operate and will continue to operate based on three fundamental principles: innovation, sustainability, and biodiversity. (Nicole Pinto, 2nd generation, Marketing Manager).

At Tenuta Pinto, family-centered goals, unity, harmony, and transgenerational continuity, coexist with firm-centered objectives related to innovation, market expansion, and sustainable growth. These goals converge in the firm's collaboration with CIHEAM, which aims to secure long-term survival while enhancing family well-being.

Through this collaboration, we want to develop a lasting project that can be carried forward by future generations of the family. This aligns with the goal of contributing to the family's well-being, both in terms of health and continuity. (Domenico Pinto, 1st generation, CEO).

We want to leave a legacy for future generations, both within and outside the family. (Giuseppe Pedone, 2nd generation, Executive Chef).

Economic and non-economic goals also extend to strengthening the brand's reputation and promoting Apulian and Mediterranean culture. The family seeks to act as an ambassador of the Mediterranean Diet and its sustainable lifestyle, positioning the firm as a model of excellence.

A crucial antecedent of the collaboration's success was the alignment of goals between Tenuta Pinto and CIHEAM. Prior to this partnership, the firm had attempted a collaboration with another research institution, which was discontinued due to a misalignment between scientific and entrepreneurial priorities.

Before the collaboration with CIHEAM, we had started working with another research institute [...] but one element was missing: their aim to produce what we were looking for, so that chefs could have high-quality raw materials to integrate into our offerings. (Domenico Pinto, 1st generation, CEO).

In 2021, we initiated a collaboration with a university that ultimately did not progress due to its limited focus on food and culinary aspects, central to our strategy. (Giuseppe Pedone, 2nd generation, Executive Chef).

The partnership with CIHEAM, in contrast, was founded on shared strategic objectives, combining scientific research on the Mediterranean Diet with the firm's entrepreneurial goals of innovation and sustainability.

I acted as a tutor and innovation broker between the Pinto company and institutional actors, coordinating the development of the corporate interaction. (CIHEAM Agroecology Consultant).

Finally, contextual factors reinforced the firm's willingness and ability to innovate. Tenuta Pinto operates in Apulia, a region whose agricultural and cultural heritage provides fertile ground for sustainable innovation. The company leverages this Mediterranean context, where gastronomy, climate, and tourism converge, to support its sustainability-driven strategy.

Operating in Apulia, being an Apulian company, is an accelerator in the field of food sustainability. The Mediterranean region holds a prominent position due to its culinary culture and climatic conditions. (Domenico Pinto, 1st generation, CEO).

4.2 – The R&D collaboration process: dynamics and key mechanisms

The R&D collaboration between Tenuta Pinto and CIHEAM unfolded through a dynamic and iterative process characterized by co-design, experimentation, and network expansion. The partnership was built on a bottom-up, problem-solving approach, aligning project activities with the company's strategic priorities.

We identified a pathway based on the implementation of the 'One Health' strategy and the dissemination of concepts related to the sustainability of food systems, case study: Mediterranean Diet, together with targeted actions to address corporate needs through a problem-solving approach. (CIHEAM Agroecology Consultant).

This approach reflected a shared commitment to combining entrepreneurial and scientific logics. The first stage involved a joint assessment of Tenuta Pinto's profile and strategic objectives, identifying innovation needs and supply-chain bottlenecks in the hospitality and catering sectors. Based on this analysis, the partners selected the 'One Health' framework, a holistic perspective linking ecosystem, consumer, and animal health, as the conceptual anchor of the initiative.

Implementation began in autumn 2022 with the development of an experimental sustainable garden within Azienda Agricola Pinto, designed to supply the restaurant activities of Tenuta

Pinto Country House. The project introduced a compost-based biofertilizer produced from the Organic Fraction of Municipal Solid Waste generated in the town where the firm operates. Its main goal was to enhance soil fertility and the nutraceutical value of the farm's products.

As the collaboration evolved, it expanded to include political and institutional stakeholders. Building on this momentum, Tenuta Pinto established a Rural Community together with seven other regional enterprises in the agri-food and hospitality sectors. The community functions as an informal network aimed at certifying the sustainability of the regional supply chain through measurable indicators.

We established a 'Community' founded on a shared vision of a sustainable future and presented it publicly during the G7 Summit. (Domenico Pinto, 1st generation, CEO).

This initiative marked a turning point in Tenuta Pinto's innovation journey, symbolizing its integration into events of international relevance involving policymakers and public institutions.

The second phase of the project focuses on the establishment of a multifunctional agricultural enterprise that combines sustainable agricultural production, based on circular-economy principles, with scientific outreach and community engagement around the Mediterranean Diet and food sustainability. In this context, Industry 4.0 technologies are embedded into production and certification processes. Artificial intelligence, machine learning, IoT sensors, and blockchain are used to monitor the organoleptic, nutritional, and nutraceutical properties of soil and crops, ensuring compliance with sustainability benchmarks and data traceability.

The new agricultural firm focuses on balancing Mediterranean scrubland with agro-biodiversity, applying IoT and AI for resource measurement and management. (Domenico Pinto, 1st generation, CEO).

Collectively, these mechanisms reveal a process of co-evolution between scientific knowledge and family-firm strategy. The collaboration's dynamics, grounded in goal alignment, iterative experimentation, and ecosystem engagement, enabled Tenuta Pinto to translate sustainability principles into tangible practices. By embedding Industry 4.0 technologies and circular-economy logics within its operations, the firm not only expanded its innovation capacity but also positioned itself as a regional catalyst for the twin transition.

4.3 – Outcomes of the twin transition: family, firm and sustainability dimensions

The collaboration between Tenuta Pinto and CIHEAM has generated a set of interrelated outcomes across family, firm, and sustainability dimensions. Some of these have already materialized, while others are ongoing or represent expected developments. Collectively, they illustrate how R&D collaboration can transform a family firm's strategic orientation, strengthen its digital and environmental capabilities, and help achieve socioemotional wealth goals such as enhancing territorial identity and preserving the family legacy for future generations.

At the family level, the collaboration fostered a renewed sense of unity and collective purpose. Participation in the project required intergenerational dialogue, shared decision-making, and the integration of diverse skills among family members. These mechanisms reinforced cohesion and created a shared narrative around innovation as a vehicle for continuity and legacy preservation. The project also reshaped the family's perception of its identity and

purpose as stewards of sustainability and ambassadors of Mediterranean culture. The collaboration thus reaffirmed the family's symbolic capital while extending its legacy beyond the firm's boundaries. At the firm level, one of the most immediate effects was the sustainable innovation of Tenuta Pinto's business model, integrating circular-economy principles and Industry 4.0 technologies into its operations. The partnership accelerated digital learning and capability development, especially in the application of IoT, AI, and blockchain systems for production monitoring and sustainability certification. These technological integrations fostered a measurable increase in digital readiness, enabling the firm to adopt data-driven management practices and align its operations with the twin transition's technological imperatives.

Basing much of our project on digital technologies will undoubtedly allow us to enhance our competencies in this area, keeping pace with market trends. (Domenico Pinto, 1st generation, CEO).

Product and process innovations emerged as further tangible outcomes. Experimental gardening techniques based on biofertilizers and sustainable soil management generated products with improved nutraceutical properties and environmental performance.

We have succeeded in creating a more natural and sustainable product. (Giuseppe Pedone, 2nd generation, Executive Chef).

The initiative positioned Tenuta Pinto as both a beneficiary and a driver of regional innovation, contributing to the diffusion of sustainable practices and technological literacy among SMEs. The collaboration also strengthened the firm's relationships with public institutions, ensuring policy alignment and access to visibility platforms.

At the sustainability level, the project produced both tangible and intangible outcomes. Tangibly, it advanced soil regeneration, product quality, and traceability; intangibly, it fostered knowledge co-creation, aligning scientific research with family-firm innovation. By embedding sustainability principles into daily operations and translating them into measurable indicators, the firm enhanced its environmental stewardship while consolidating its competitive position.

Finally, the collaboration triggered a symbolic reconfiguration of the family firm's role within its ecosystem. By combining scientific research with entrepreneurial agency, Tenuta Pinto emerged as a regional catalyst for the twin transition.

Our collaboration with CIHEAM has opened new pathways for the region, showing that innovation in agriculture and hospitality can coexist with tradition and sustainability. (Domenico Pinto, 1st generation, CEO)

In sum, the outcomes of the collaboration show how R&D partnerships can simultaneously reinforce the family's legacy, renew the firm's business model, and generate positive spillovers across the local ecosystem. Through this process, Tenuta Pinto has evolved from a family firm rooted in local traditions to an orchestrator of collaborative innovation and sustainable transformation, embodying the intertwined logic of the twin transition.

5 – Discussion

The case of Tenuta Pinto allowed us to examine how family firms pursue the twin transition, integrating digitalization and sustainability, through R&D collaborations. Family values, the

strong connection with the local territory, and goal alignment with the partner organization enabled the firm to engage in a successful collaboration and joint twin-transition process. Rather than fixed attributes, these dimensions co-evolve through trust, goal congruence, and capability building. We developed the framework depicted in Figure 1, which clarifies when and how family firms' openness translates into digital-green capabilities and sustained implementation.

The framework suggests that the willingness–ability relationship in family firms is dynamic, recursive, and relational. It evolves through three interconnected domains: (1) antecedents rooted in family identity, values, and goal alignment; (2) R&D collaborative mechanisms that transform willingness into joint action; and (3) outcomes at family, firm, and sustainability levels. The process is iterative, highlighting that ability and willingness are not discrete preconditions but co-constitutive forces shaping how family firms engage with R&D collaborations and advance the twin transition.

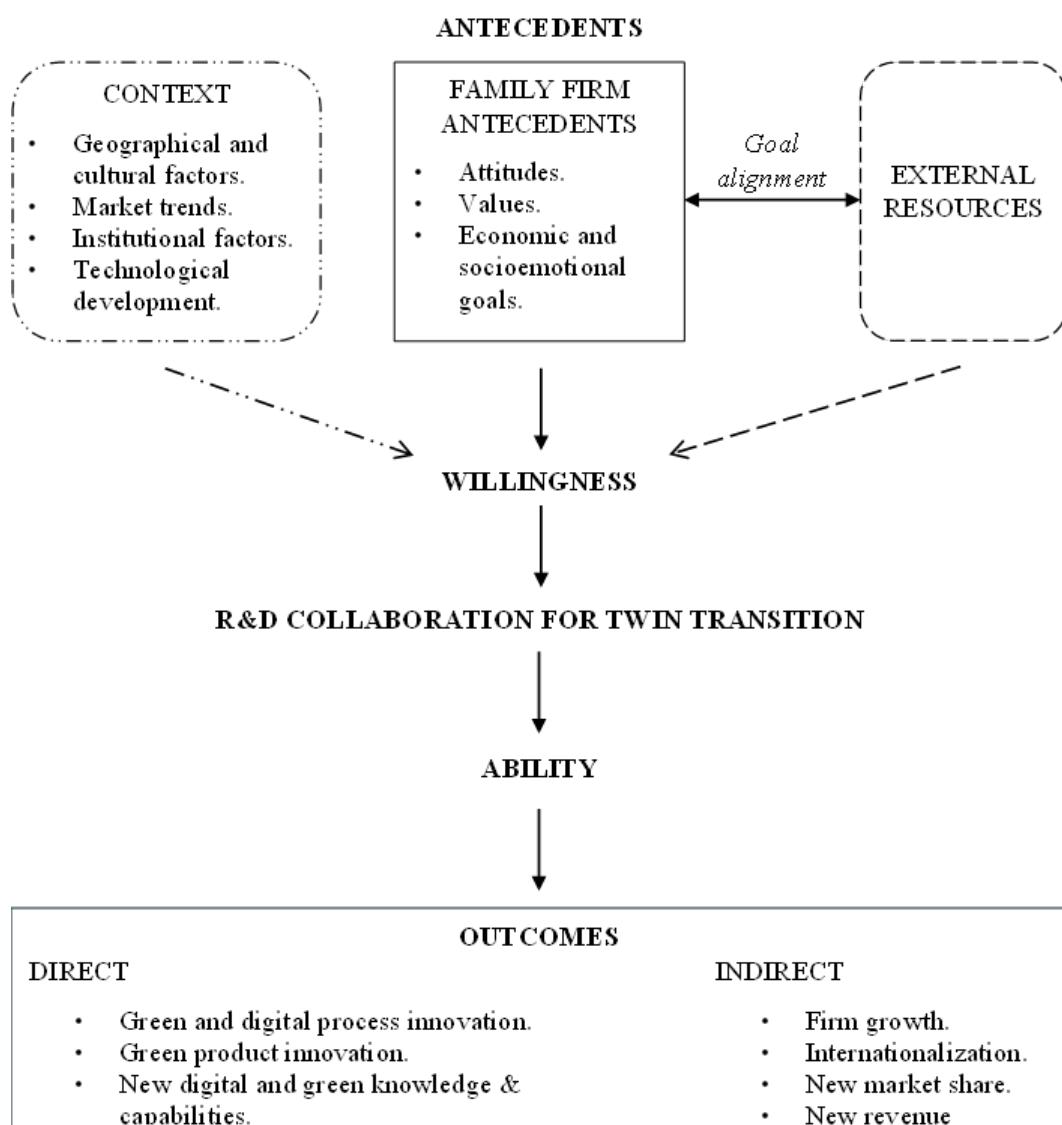


Fig. 1 – Process framework on R&D Collaboration for Twin Transition in Family Firm
(Source: authors' own creation)

At the antecedent level, family identity and values play a pivotal role in shaping willingness. Family firms' orientation toward socioemotional wealth, long-term stewardship, and community embeddedness acts as both constraint and catalyst (Berrone et al., 2012; Campopiano & De Massis, 2015). In Tenuta Pinto's case, values such as harmony, continuity, and local embeddedness anchored willingness to collaborate, but translating them into strategic openness required alignment with innovation-oriented goals. This reflects how non-economic goals can stimulate sustainability-driven innovation when integrated with business imperatives (Herrero et al., 2024). The firm's emphasis on curiosity, learning, and community impact transformed socioemotional wealth preservation into a proactive search for legitimacy and renewal. Thus, willingness was not an initial condition but an evolving commitment emerging from the interplay between identity and opportunity.

A central insight concerns goal alignment as a precondition for willingness. Literature on R&D collaborations emphasizes that shared objectives, mutual expectations, and trust are critical to preventing opportunism and ensuring commitment (De Groote et al., 2023; Martínez-Alonso et al., 2023). Our evidence reinforces that misalignment between scientific and entrepreneurial priorities, as observed in Tenuta Pinto's earlier failed collaboration, undermines willingness. Conversely, convergence of goals between the family firm and its partner created a relational space in which collaboration could thrive. In this sense, cooperation between family and non-family partners fosters trust and enhances absorptive capacity (Dong et al., 2025; Calabro et al., 2019). Goal alignment thus acts as a bridging mechanism between willingness and ability: it transforms the desire to collaborate into the capacity to operationalize shared strategies. The framework also clarifies that willingness is relationally constructed and emerges through repeated interaction and mutual adaptation with external partners. This observation expands the conceptualization of willingness within the willingness–ability framework (Chrisman et al., 2015), showing that relational trust, rather than hierarchical control, can sustain openness and reinforce the family's legitimacy, identity, and long-term orientation. Willingness therefore depends not only on intrinsic motivation but also on partners' ability to validate and amplify family-based values within a shared purpose, an aspect largely overlooked in prior research on R&D collaborations in family firms (Feranita et al., 2017; Dong et al., 2025).

Willingness materializes into collaborative action through trust-based governance, mutual learning, and capability complementarity. Consistent with prior work on relational embeddedness (Bouncken et al., 2020; Audretsch et al., 2023), trust replaced formal control, enabling partners to experiment and iterate flexibly. In family SMEs, where resources are limited and risk aversion is high, such informal governance reduces transaction costs and encourages adaptive coordination. Family-specific resources, trust, reputation, and long-term orientation, combine with partners' scientific and technological resources to generate digital process and green product innovations (De Groote et al., 2018; Halder et al., 2023). Importantly, once activated through collaboration, family-specific resources become co-specialized assets that enhance both ability (via new knowledge and technological integration) and willingness (via identity reinforcement and perceived legitimacy) (Gazzola & Colombo, 2014).

The processual dimension of the framework reveals that ability and willingness co-evolve throughout collaboration stages. In early phases, willingness, driven by family values and goal alignment, precedes ability, initiating openness to external inputs. As collaboration unfolds, ability grows through joint experimentation, knowledge transfer, and technological learning,

feeding back into increased willingness by reducing perceived risks and demonstrating tangible benefits. This recursive loop offers a temporal extension to the willingness–ability paradox: ability is not merely a structural endowment but a capability accumulated through sustained interaction. The evidence thus supports a process view in which relational experience progressively transforms hesitation into strategic confidence.

Contextual factors act as amplifiers of this cycle. The regional ecosystem, together with European policy frameworks, provides cognitive proximity, institutional support, reputational legitimacy, and funding opportunities, conditions known to strengthen collaboration among family SMEs and foster digital and green transitions (Audretsch et al., 2023; Dal Mas et al., 2024). The framework therefore situates family firms within multi-level ecosystems where institutional, territorial, and cultural embeddedness jointly condition the success of R&D collaborations (Sjödin et al., 2024; Colombo & Gazzola, 2013).

The framework also sheds light on how family and non-family logics interact in shaping ability. Research has shown that strong family involvement can either enable or constrain absorptive capacity (Classen et al., 2012; Lambrechts et al., 2023). In our case, open dialogue across family and managerial roles and a horizontal governance style transformed potential rigidity into a learning mechanism. By distributing decision-making and involving younger generations, the firm enhanced its absorptive capacity and responsiveness, key capabilities for implementing digital technologies and eco-innovation (Yıldız et al., 2021; Montresor & Vezzani, 2023). Hence, family governance does not inherently impede collaboration; rather, it can become a structural enabler of the twin transition.

The outcomes emerging from the framework can be interpreted along two dimensions: direct and indirect. Direct outcomes include business-model innovation, digital capability development, and green product innovation, achieved through resource and knowledge transfer mechanisms and Industry 4.0 technologies (Secundo et al., 2025). Indirect outcomes concern broader transformation, strengthened networks, enhanced legitimacy, and long-term strategic competitiveness (Gazzola & Colombo, 2014). Digitalization and sustainability thus reinforce competitive advantage when embedded within purpose-driven business models (Benedetti et al., 2023; Nudurupati et al., 2022). For family firms, this dual transformation also produces symbolic outcomes: renewed identity, intergenerational continuity, and enhanced reputation, which contribute to socioemotional wealth preservation within a triple-bottom-line perspective (Colapinto & Masé, 2025). The twin transition, when enacted collaboratively, becomes both an economic and emotional project, uniting business performance with family legacy.

Taken together, these findings reframe the willingness–ability paradox as a dynamic process rather than a static tension. Family firms do not simply oscillate between ability and willingness; they continually reconstruct both through collaborative engagement. Ability grows as willingness deepens, and willingness strengthens as ability proves its value. This recursive logic challenges traditional assumptions of a unidirectional relationship where willingness merely precedes ability. Instead, the study reveals a virtuous cycle driven by alignment, trust, and learning. In doing so, it extends previous conceptualizations of the paradox (Chrisman et al., 2015; Gómez-Mejía et al., 2014), situating it within a relational and process-based understanding of family-firm transformation. In sum, the framework advances knowledge of how family firms overcome the willingness–ability paradox to implement the twin transition through R&D

collaborations. It conceptualizes willingness as a relational construct built on identity and goal alignment, and ability as a dynamic capability developed through knowledge exchange and contextual reinforcement (Chirico et al., 2012). This integrative view offers a pathway to explain how family SMEs, traditionally viewed as conservative and resource-constrained, can leverage their idiosyncratic characteristics to achieve a successful twin transition that fulfills both economic and socioemotional goals.

6 – Contributions

This study advances understanding of how family firms implement the twin transition by reframing the willingness–ability paradox as a dynamic, relational, and processual phenomenon. Theoretically, it contributes to the family business and innovation literatures by conceptualizing willingness not as a fixed disposition but as a relational construct that evolves through trust, goal alignment, and iterative collaboration. It also extends the notion of ability beyond static resource endowments to include dynamic capabilities developed through interaction, knowledge exchange, and contextual reinforcement. The resulting framework integrates family identity, governance, and ecosystem embeddedness, providing a process model that links antecedents, collaborative mechanisms, and multilevel outcomes in digital–green transformation.

From a managerial standpoint, the study highlights that successful R&D collaboration in family firms depends less on formal structures than on value congruence and mutual trust. Family managers can transform socioemotional wealth goals into drivers of innovation by identifying partners that share long-term orientations and sustainability values. Practically, building horizontal governance, fostering intergenerational dialogue, and engaging in iterative experimentation can convert initial caution into strategic openness.

For policymakers and ecosystem actors, the findings underscore the importance of supporting hybrid collaborations that combine scientific, entrepreneurial, and territorial logics. Policies that enhance cognitive proximity, institutional legitimacy, and access to technological infrastructure can enable family SMEs to act as regional catalysts of the twin transition, promoting both competitiveness and sustainable development.

7 – Conclusion

This study examined how family firms can achieve the twin transition through trust-based R&D collaborations that integrate digitalization and sustainability. The revelatory case of Tenuta Pinto shows how family values, territorial embeddedness, and goal alignment with research partners co-evolve to transform the willingness–ability paradox from a constraint into a developmental process.

The proposed framework demonstrates that willingness and ability are mutually reinforcing forces, dynamically shaped by identity, collaboration, and context. Through iterative experimentation and ecosystem partnerships, family firms can convert socioemotional motives into drivers of digital–green innovation. The study contributes to a processual understanding of family-firm transformation, showing that even small, resource-constrained family businesses can act as orchestrators of collaborative sustainability. Ultimately, the twin transition emerges

not only as a technological challenge but as an intergenerational project that unites family legacy with future-oriented competitiveness.

8 – References

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