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How can family-owned Mittelstand firms use their unique resources to master the digitalization age? The role of family historical, venture, and collaborative capital

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Abstract Family-owned Mittelstand firms have often been characterized as Janus-faced, meaning they can have two contrasting sides when it comes to innovation. On one side, they are technology leaders—especially in niche markets. On the other side, they can be slow adopters, deeply rooted in tradition. Digitalization is one of the biggest innovation challenges to firms of all sizes and ownership types. Research and observations in business practice show that while some family-owned Mittelstand firms master digitalization despite limited resources and traditional industries, others lag dangerously behind. So, how can family-owned Mittelstand firms prepare for a digital future, and which familial idiosyncrasies might help them? Based on current observations and interview data, we propose a framework for how these firms can use their unique resources to tackle challenges related to digitalization. To be successful in a digital world, they must leverage their family historical capital, family collaborative capital, and family venture capital. We highlight why and how these capital types should be linked to fully leverage their potential.

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1. Family-owned Mittelstand firms in a digital world: Old firms, new challenges

Family firms are the backbone of global economic growth and wealth (La Porta et al., 1999). High market entry barriers have traditionally shielded these businesses from young emerging enterprises, allowing them to capture market share and respective profits (de Groote et al., 2021). Over the last few decades, however, the invention and implementation of digital technologies have significantly altered the conventional way of conducting business (Soluk, Miroshnychenko, et al., 2021). Relentless digitalization, or the adoption of digital technologies to transform into a more digital business (Soluk & Kammerlander, 2021), has pushed family firm incumbents in different industries toward the edge of existence (Björkdahl, 2020). As a result, seven of the 10 most valuable firms across the globe in 2019 had tech- or internet-based operating business models (Handley, 2019).

Family firms constitute some of the most innovative yet conservative businesses worldwide. In particular, family-owned Mittelstand firms are internationally renowned for innovation (De Massis et al., 2018; Logue et al., 2015). Mittelstand firms—in contrast to small and medium-sized enterprises (SMEs)—are not solely defined by quantitative criteria such as their size (Pahnke & Welter, 2019). Rather, they are distinguishable because ownership is usually in the hands of one or multiple families (Berlemann et al., 2018, 2021), their long history, and their self-perception as a Mittelstand firm (Berghoff, 2006) as well as their desire to provide long-term value and remain active for future generations (Welter et al., 2015). Mittelstand firms, in contrast to larger family firms such as Schaeffler AG or Henkel AG & Co. KGaA, are usually considered medium-size at most. However, another important difference between larger family firms and Mittelstand firms is that the latter are usually independent of external financiers and do not raise stock market funds (De Massis et al., 2018). Therefore, family-owned Mittelstand firms are often paradoxically described as resource-constrained despite their innovative reputation (Soluk, Miroshnychenko, et al., 2021).

Prior studies on how firms can successfully compete in a digital world typically focus on either large, corporate tech firms (i.e., Apple or Google) or discuss new technologies used by startups. However, best practices for tech giants and startups might not be readily transferrable to incumbent, mid-sized family firms due to their idiosyncrasies. From an economic, societal, and firm-level perspective, it is still equally important to provide these firms with ways to digitalize their businesses and remain competitive in a volatile, uncertain, complex, and ambiguous (VUCA) world (Millar et al., 2018). Existing empirical studies on this topic further emphasize the need to consider family and Mittelstand-firm-specific insights when discussing digitalization. While researchers identified different approaches to digitalization in family firms, the industry has been averse to doing so—especially in family-owned Mittelstand firms (Batt et al., 2020; Überbacher et al., 2020). Hence, a better understanding of best practices for this specific firm type is necessary. This article investigates such best practices based on a sample of digitally successful family-owned Mittelstand firms and derives a framework to support firm owners and managers in decision-making. Accordingly, family-owned Mittelstand firms must rely on and link three forms of family, business-specific capital. To be successful in a digital world, they must leverage and link their family historical capital, family venture capital, and family collaborative capital.

2. How family-owned Mittelstand firms evolve in a digital world

Family-owned Mittelstand firms are unique in their adaptation to digitalization (Soluk & Kammerlander, 2021). These firms' overarching goal of providing for the family, employees, clients, or even entire regions can motivate decision-makers to completely change the firm to stay competitive over time (i.e., generationally; Duran et al., 2016). Moreover, a firm's history and values provide specific resources that support change. In line with the resource-based view of the firm that argues how resource heterogeneity can affect firm performance (Barney, 1991), family-idiosyncratic resources aid in long-term business success (Habbershon & Williams, 1999). They help family-owned Mittelstand firms bridge financial constraints that arise from the absence of external financiers (Carnes & Ireland, 2013; De Massis et al., 2018). Intergenerational knowledge, patience, survivability, and social boundary resources are unique capabilities that family firms can develop due to the intimate interaction between family and business (Sirmon & Hitt, 2003).

To successfully manage digitalization, family-owned Mittelstand firms require specific digital innovations that relate to processes, products, and/or business models, among others (Soluk, Miroshnychenko, et al., 2021). The more effectively the family-owned Mittelstand firm develops these innovations, the more successful the company will be in the increasingly competitive digital environment (Soluk & Kammerlander, 2021). However, family firms are often considered Janus-faced (i.e., having two contrasting aspects) when it comes to innovation (De Massis, Di Minin, & Frattini, 2015). Despite such unique resources and associated competitive advantages, the prevalent emotions, risk-aversion, and reliance on old, established networks might stall the decision-making and implementation of digital processes, products, and business models in those firms, or inhibit adaptation to change (König et al., 2013). Additionally, the resource constraints in family-owned Mittelstand firms are one reason for the overall innovation efficiency, even though they might hamper more radical ideas (De Massis et al., 2018).

Especially in the digital space, keeping up with trends can be difficult for well-established, family-owned Mittelstand firms with long-tenured employees. In particular, considering their long-standing history and strong focus on family traditions, these firms are prone to organizational inertia, potentially impeding their ability to adapt to digital change (Fang et al., 2021). One effective way to overcome these challenges and survive the digital age is by extracting innovations from younger firms via investing in or cooperating with them (Chesbrough, 2002; de Groote & Backmann, 2020; Dushnitsky & Lenox, 2005). Open innovation can be a first step toward leveraging contemporary cooperation without large financial investment (Brinkerink et al., 2017). As entrepreneurial ventures are a vital source of innovation, corporate venture capital—defined as "equity investment by incumbent firms in independent entrepreneurial ventures" (Dushnitsky & Lenox, 2005, p. 615)—can be critical for the long-term survival of established firms. Therefore, corporate venture capital can enhance necessary digital innovation within established firms through knowledge and technology transfer. However, it is unclear how resource-constrained and traditional family-owned Mittelstand firms can utilize such cooperation to gain competitive advantage.

3. Research design

Our study followed a three-step approach. First, we systematically reviewed all literature focused on the digitalization of family-owned Mittelstand firms (Tranfield et al., 2003). We used EBSCO to search for articles using the following keywords: digitalization (or digitalisation), digitization (or digitisation), digital transformation, family firm, family business, family enterprise, family ownership, family-owned, and Mittelstand. We narrowed our search to peer-reviewed, academic journal articles in English (n = 484), yet we only considered further articles that listed digitalization in family and Mittelstand firms as a core topic (n = 15). Seven articles remained after checking for article quality using the Chartered Association of Business Schools journal ranking. We provide an overview of this literature in Appendix A1. Because literature directly addressing our focal topic was scarce, we also relied on articles about adjacent topics such as SME digitalization or Mittelstand innovation. This literature informed our interview-based data collection and analysis and helped develop the overall framework.

Second, we employed a qualitative research approach due to the explorative nature of our research question and the scarcity of research focused on the digitalization of family-owned Mittelstand firms (Yin, 2013). We conducted semi-structured, key-informant interviews with representatives of German family-owned Mittelstand firms. To be eligible for our sample, the firms required the following criteria:

- They needed family-controlled ownership (i.e., majority ownership) by one or a small number of families. We then focused on firms in which transgenerational succession had already taken place, was taking place at the time of the interviews, or was planned (Chua et al., 1999).
- At least one family member had to actively participate in business activities as a top management team member or supervisory board member.
- They had to be private firms as they are more independent from external financiers and do not raise funds via stock markets (De Massis et al., 2018).
- The firms had to engage in digitalization (i.e., the adoption of digital technologies to transform into a more digital business; Soluk & Kammerlander, 2021).

We aimed to cover the whole spectrum of family-owned Mittelstand firms through our selection. Therefore, we selected a variety of firms in

Table 1. Overview of firm characteristics of firms interviewed

Firm	GICS classification industry	B2B/B2C	Generation	Employees	Family ownership	Family management[a]	Digitalization foci
FF1	Consumer durables & apparel	B2C	4	> 10,000	fully family-owned	multiple family managers (6)	e-commerce, digital marketing
FF2	Materials	B2B	3	51-250	majority family-owned	one family manager	digital processes
FF3	Diversified financials	B2B	2	11-50	majority family-owned	multiple family managers	digital processes
FF4	Consumer durables & apparel	B2C	1	51-250	majority family-owned	multiple family managers	digitalization of the point of sales, e-commerce
FF5	Consumer durables & apparel	B2C	4	501-1,000	fully family-owned	multiple family managers	digital processes
FF6	Food, beverage, & tobacco	Both	6	51-250	fully family-owned	one family manager	digital marketing
FF7	Consumer services	Both	1	1,001-5,000	fully family-owned	one family manager	digital business models
FF8	Food, beverage, & tobacco	B2B	3	51-250	fully-family owned	multiple family managers	e-commerce
FF9	Utilities	Both	4	1,001-5,000	fully-family owned	multiple family managers	digital products, digital business models
FF10	Capital goods	B2B	4	5001-10,000	fully-family owned	multiple family managers	digital products, digital business models
FF11	Food, beverage, & tobacco	Both	9	51-250	fully-family owned	multiple family managers	digital processes, e-commerce
FF12	Food, beverage, & tobacco	B2B	4	> 10,000	fully-family owned	no family manager	digital processes, digital business models
FF13	Consumer durables & apparel	Both	2	501-1,000	fully-family owned	multiple family managers	digital processes, e-commerce
FF14	Capital goods	B2B	3	1,001-5,000	fully family-owned	multiple family managers	digital processes, digital products

Table 1 (*continued*)

Firm	GICS classification industry	B2B/B2C	Generation	Employees	Family ownership	Family management[a]	Digitalization foci
FF15	Materials	B2B	5	$>$ 10,000	fully family-owned	multiple family managers	digital processes
FF16	Food, beverage, & tobacco	Both	4	1,001-5,000	majority family-owned	multiple family managers	digital processes, digital marketing
FF17	Materials	B2B	2	501-1,000	fully family-owned	multiple family managers	digital processes
FF18	Commercial & professional services	B2C	2	11-50	majority family-owned	multiple family managers	digital processes
FF19	Materials	Both	4	11-50	majority family-owned	one family manager	digital processes
FF20	Food, beverage, & tobacco	Both	2	11-50	fully-family owned	multiple family managers	digital processes, e-commerce
FF21	Software & services	B2B	1	11-50	majority family-owned	one family manager	digital products
FF22	Capital goods	B2B	5	1,001-5,000	majority family-owned	multiple family managers	digital processes, digital products
FF23	Capital goods	B2B	3	501-1,000	majority family-owned	multiple family managers (3)	digital products
FF24	Commercial & professional services	Both	2	11-50	fully-family owned	multiple family managers (4)	digital products
FF25	Capital goods	B2B	1	11-50	fully-family owned	one family manager	digital processes
FF26	Healthcare equipment & services	B2B	2	11-50	fully-family owned	multiple family managers (2)	digital processes
FF27	Capital goods	B2B	2	11-50	fully-family owned	one family manager	digital processes
FF28	Capital goods	Both	4	501-1,000	majority family-owned	multiple family managers	e-commerce
FF29	Capital goods	B2B	2	1,001-5,000	fully-family owned	multiple family managers (3)	digital products, digital business models
FF30	Capital goods	B2B	5	1,001-5,000	fully-family owned	one family manager	digital processes, digital products

(*continued on next page*)

Table 1 (*continued*)

Firm	GICS classification industry	B2B/B2C	Generation	Employees	Family ownership	Family management[a]	Digitalization foci
FF31	Capital goods	B2B	6	501-1,000	fully-family owned	multiple family managers (3)	digital processes, digital products
FF32	Capital goods	B2B	4	51-250	majority family-owned	multiple family managers (3)	digital processes
FF33	Food, beverage, & tobacco	B2B	5	1,001-5,000	fully-family owned	no family manager	digital processes, digital marketing
FF34	Retailing	Both	4	1,001-5,000	fully-family owned	multiple family managers (3)	digital products

[a] In cases with no family managers, at least one family member held a board position.

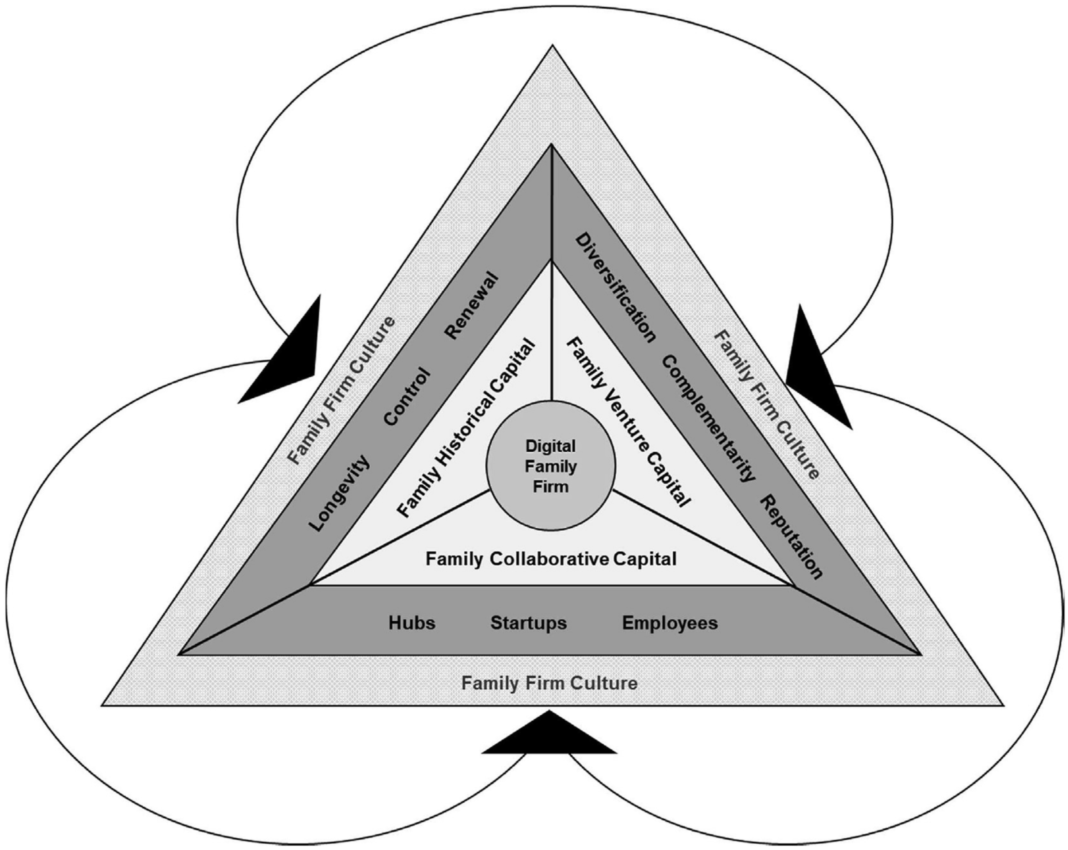
different industries ranging from 10 to more than 10,000 employees (Seawright & Gerring, 2008). Different generations lead the family-owned Mittelstand firms, with an average firm age of almost 100 years. We conducted interviews until we reached theoretical saturation (i.e., until additional interviews only marginally contributed additional insight; Glaser & Strauss, 2017), which led to a final sample of 35 interviews within 34 firms. Table 1 provides an overview of the sampled firms and their characteristics. We selected interview partners who were top decision-makers and, due to their position in the firm, were able to answer questions related to both the firm's digitalization strategy and the influence of the owner family (Aguinis & Solarino, 2019). Our interview partners included 11 family successors, 13 CEOs, and five innovation or new product development heads. The other interview partners held different positions, such as chief strategy officer or head of human resources. All interviewees remain unnamed, and we present all information related to our primary data sources anonymously. Interview questions covered the firm's history, its digitalization efforts with a specific focus on impeding and fostering factors, and the role of the family. All interviews were recorded and transcribed within 24 hours (Oliver et al., 2005). We also triangulated the interview findings with additional firms that were not part of the initial sample (Diaz-Moriana et al., 2020), specifically German family-owned Mittelstand firms. For instance, we compared findings to family business digital innovation stories shared at practitioner-oriented conferences, online events, or university guest lectures. Because this information was publicly available, we could often reference the firms by name when exemplified.

After data collection, two of the authors independently coded the interview data (Yin, 2013). Their coding approach was largely inductive yet informed by prior research (Diaz-Moriana et al., 2020). The single cases were summarized, and similarities and differences between cases were detected. In cases of disagreement, the authors discussed the issue until a consensus was reached (Belotto, 2018). Below, we provide the synthesized findings of our study, as summarized in Figure 1. Appendix A2 shows illustrative quotes from the interviews for all concepts in the model.

4. The three types of capital that family-owned Mittelstand firms need to master digitalization

Our findings showed that what made the family-owned Mittelstand firms that had success in the past (i.e., their family firm culture and related values) still provide an essential foundation for successful modern digitalization. However, this foundation must be renewed and extended to

Figure 1. Family-owned Mittelstand firm digitalization framework



thrive in a more digitalized environment. Our study revealed three types of capital in family-owned Mittelstand firms that can be leveraged to master challenges in a digital environment: family historical capital, family venture capital, and family collaborative capital. In Section 4.1—4.4, we elaborate on each capital type and look at how each type of capital was exploited in the past and how they must be renewed for the digital world. Subsequently, we elaborate on their linkages.

4.1. Family historical capital

The family-owned Mittelstand firm stakeholders we interviewed mentioned the importance of family historical capital (i.e., the experience and knowledge accumulated over time from company tradition for digitalization endeavors). In contrast to other related concepts such as knowledge capital (Laperche, 2007), family historical capital underlines the crucial importance of the family, company history, and the resulting generational traditions. Such established practices facilitate a unique family legacy, and the family typically sees its preservation as an essential duty in their work within the business. This tradition and legacy are reflected in the company's goodwill, which also develops over generations. In this context, the interviewees mentioned the desire for longevity, control, and renewal as essential dimensions of this type of capital in their organizations.

In the past, the firms cherished their family historical capital in part by exploiting their family's and firm's decades or centuries of industry experience during the process, products, or business model improvements. Thus, the case evidenced longevity as an essential pillar of family-owned Mittelstand firms for cherishing their family historical capital. FF23 shared one of their doctrines that proudly signified traditions and long-term orientation: "We do not think in quarterly figures; we think in years. In some cases, it just takes multiple years, and you need to have a long wind to turn an idea into something that is accepted on the market."

Further exemplifying long-term orientation and patience, the German pharma company Merck started research on liquid crystals in 1904 even though commercially successful applications did not emerge until the late 1960s. Due to Merck's patience, it held more than 2,500 liquid crystal patents in the early 2000s, and its researchers have won the German Future Prize. Long-term business practices provide family-owned Mittelstand firms with the required stamina to overcome the VUCA world's uncertainties and capture digital business opportunities.

Another element of family historical capital is the concentrated control in family-owned Mittelstand firms. Family managerial ownership has long been associated with effective decision-making and accelerated innovation (e.g., König et al., 2013). FF19 explained that they are "extremely quick because we don't need a big plan or trial phase, we just try on our machines and develop it directly." Similarly, FF4 representatives stated that "if there is an opportunity, we can be more direct and less bureaucratic than major corporations…we can be quicker because the authority to decide is centralized." Alternatively, as the FF28 representative put it, "[We can be quicker] because we don't have long paths to go, our supervisory committee is my granddad." As another example, at the start of the COVID-19 pandemic, Peter Zens, managing owner of an agricultural business that incorporates growing crops and flowers, a petting zoo, animal sanctuary, restaurant, and event services, took quick and creative steps to save the family firm. Pandemic aftereffects caused the farm and restaurant services to temporarily close. To save the business and to further be able to provide for his employees and the animals, Zens shifted to a digitalized business model. This included an online shop, as well as a paid/fee service (Call a Llama) to invite animals from the zoo to join in videoconferences. Earnings were used to buy animal feed.

One way to maintain control over the core business while sparking necessary creativity is to set up distinct businesses for innovation in digitalization that are controlled by family members. FF9 combines incremental and disruptive innovations over time. The core business continually develops and innovates existing products, whereas the incubator and internal innovation team develop entirely new products:

> "Our core business is focused on heating technology which we constantly develop from traditional fossil fuels like oil and gas towards renewable energies…A new focus is services decoupled from traditional hardware. Our clients can now purchase heat as a monthly subscription, like heat leasing—an entirely new revenue stream to diversify our product portfolio." (FF9)

Aside from cherishing what they have, family-owned Mittelstand firms must also renew this family historical capital to succeed in the VUCA world. The firms can realize this renewal by leveraging management succession opportunities within the family. For example, firms that were particularly successful in terms of digitalization deliberately used family-internal succession processes to fuel their development. Several interviewed successors and predecessors confirmed that introducing family-internal successors to the business sooner rather than later is beneficial to conveying values, entrepreneurial spirit, culture, and a sense of ownership (FF6, FF18, FF20, FF28). Subsequently, family-internal successors may bring a whole new set of knowledge and personal contacts into the firm, increasing digitalization capabilities:

> "Without me initiating this huge transformation and executing it, nothing would have happened in the next couple of years. My parents simply do not have the bandwidth nor the knowledge to manage such a [digital] transformation." (FF18)

Several successors explained innovation, digitalization, and automatization of processes and the introduction of e-commerce shops and online marketing to be among their first strategic projects (FF1, FF2, FF5, FF11 FF18, FF20, FF28).

Lena Schaumann provides another example. She is the fourth generation CEO of furniture chain Möbel Schaumann. Schaumann founded startup Lumizil in the e-commerce sector before officially taking over the family-owned Mittelstand firm. Founding her startup helped her gain both experience (e.g., in leadership, firm management, and the digital world) and legitimacy (e.g., by successfully starting and running an e-commerce business before becoming the official family-internal successor). Schaumann knew her father's business, traditions, and long-term focus from early childhood as her parents often brought her to the family-owned Mittelstand firm.

4.2. Family venture capital

Family venture capital, a private equity investment from the family-owned Mittelstand firm into innovative startups, represents the second type of capital in our model. In the past, external financiers or underwriters were not allowed in internal decision-making processes, allowing original owners to retain complete control over the business. Therefore, family-owned Mittelstand firms have been characterized as reluctant to provide or take external capital. However, we found that family-owned Mittelstand firms were able to master digitalization by purposefully engaging in activities related to family venture capital and not solely reinvesting in the existing business. In some cases, the financial capital invested may originate within the family firm. Still, affluent business families may also act directly as an investor (e.g., FF22) without the firm being involved. In some cases, business families decide whether to invest via the firm, the family, or both based on the concrete investment opportunity:

> "We are an extended family. So, of course, it works quite well. Everyone here should have the chance to establish themselves, to learn the ropes. And whether that is to say with one's business idea...because it has always been the case in the past that we have continued to develop. With related but nevertheless new things....That is not written down somewhere or a fixed process. But it is incentivized, and the company finances it, so to speak. Because we probably have enough money to do it ourselves. So, we would get financing from the company. Then we would probably do half/half or 30/70 or whatever. That incentive is definitely there. And it is also communicated by my grandfather, by my father. We are up for it." (FF28)

Accessing resources, such as patents, trademarks, and copyrights, through family venture capital plays an important role in family firms. These resources are increasingly important due to digitalization being complex and knowledge-intensive. In contrast to other forms of private equity or corporate venture capital, the investment time frame is particularly long and often detached from clear financial targets or a strong involvement with the business' next generation of family entrepreneurs. Entrepreneurial intent is passed on from senior family members to the next generation, fueling the preceding manager's desire to engage in entrepreneurship through family venture capital. The digital-savvy agenda of these next-generation family members provides the impetus for their strong involvement in entrepreneurial decision-making:

> "This is something I [nextgen family member] am already doing in my day-to-day work on a consulting basis—not on an operational basis, however. This is because this topic is not aligned with someone in our family firm, and I am working for a VC fund at the moment, in which we invested as a firm as well. I am technically living the connection between both." (FF1)

The FF1 case evidenced that strategic acquisitions achieve diversification, and investments strengthen complementarity in the firms for mutual benefit, enhancing the reputation. Rather than reflect ("take perspective") on which capital is best for growing the firm as they did historically, families must also invest their firm in startups or promising technological projects ("give perspective"). Family-owned Mittelstand firms lay the foundation for successful digitalization through family venture capital with this new perspective.

Family-owned Mittelstand firms may be involved in venture capital activities or strategic acquisitions to minimize risks, diversify their business, and ultimately strengthen competitiveness. For instance, with assistance from his son, the family CEO of FF3 made startup investments part of the firm's business model when he realized the core business industry was declining. FF13 diversified its family holding in 2016 with an acquisition outside the core business. Driven by the need to improve digital infrastructure, it looked for alternative ways to integrate existing digital solutions into one highly customized program. After receiving quotes from major market players in the IT industry, FF13 decided to become digitally independent by buying a digital solutions startup:

> "SAP quoted a five million Euro project, but we thought we would rather buy an IT firm for three million and invest one million for programming according to our own needs. That still leaves us with a positive opportunity cost of one million. We did that and did that very successfully." (FF13)

FF13 used the product internally as an "important step toward independence." Driven by the family CEO, it even decided to sell the readily developed product to other players in the market facing similar IT issues. Therefore, FF13 integrated the digital technologies startup into the firm as a new and independent business unit. Entering an entirely new market was not the acquisition's initial intention; however, it turned out to be very successful. FF13 now proudly purports to have accomplished "having the management of [their own] data in [their] own hands." Another example is the more than 150-year-old German plant manufacturer VOITH AG, which has acquired a majority stake in Pilotfish, a Swedish startup that focuses on cloud-based applications (Handley, 2019). Both partners explained that their cooperation through an investment by the family-owned Mittelstand firm is a critical milestone in jointly developing digital business models. In turn, these novel digital business models serve as the basis for sustainable corporate success and securing the independence of VOITH AG as a family-owned Mittelstand firm in the long run.

We also observed that the firms invest family venture capital in expanding their internal resource base, thus achieving complementarity. This is particularly relevant for family-owned Mittelstand firms as, in contrast to large corporations, their high degree of specialization often means they do not possess the relevant breadth of digital expertise necessary for coping with VUCA requirements. Family-owned Mittelstand firms achieve complementarity by generating and internalizing information, ideas, and knowledge relevant to the digitalization and realization of new market opportunities for and within the firm. For instance, FF14 financed the foundation of a startup in Berlin in pursuit of new ways to tackle digitalization. Due to its staff predominantly having an engineering background, the CEO decided to externally invest in digitalization ideas from individuals with different academic backgrounds and mindsets. This helped the family-owned Mittelstand firm focus on its values while exploiting digitalization potential.

> "We build a startup with crazy Berlin individuals...They are looking at new digitalization strategies, away from engineering. For us, it was important to see how we could approach topics without engineering influence. That is an example of a startup that we built externally. Without those, we do not have the chance to stay competitive." (FF14)

Another critical reason firms invest with family venture capital is to present themselves as strong and thought-leading companies on the market, thereby enhancing their reputation and (indirectly) the family. The family CEO of FF27, which operates in the civil engineering industry, founded a startup 3 years ago. This has always been the CEO's "dream" (FF27), coinciding with the trend that family members often want to add something of their "own" to the business (Riar et al., 2022). This proprietary asset in the 21st century is often a digitalized business unit or digitalization startup. The FF27 startup aimed to provide a platform for individuals working in the civil engineering industry to connect and share expertise about construction sites. This communication platform would allow individuals who have worked on the same construction site to connect and exchange expertise for money:

> "In the civil engineering industry, two key aspects are needed: the technical perspective and the human intersection. Therefore, my idea was to build a social network where individuals in that industry can exchange their knowledge. 'Look, I worked on that construction site. Before you dig a hole there, let's talk." (FF27)

Not only did the family-owned Mittelstand firm benefit from the startup as an investment, but it also increased the firm's and family's visibility, resulting in a modernized reputation. This brought the firm special attention in the media, region, and among other business families, and therefore changed the public image of the family-owned Mittelstand firm (FF27).

Creating a modernized reputation is particularly important as startups are occasionally reluctant to work with family-owned Mittelstand firms, despite the established firms' desire to mutually benefit:

> "We have great interest in working with startups, but it simply does not play out sometimes—and that happens to us despite me having worked for [major German venture capitalist] and [high-growth e-commerce startup]! Some startups sit on their high horse, being so incredibly convinced of their idea that they are not even willing to get in touch with family firms. I have the feeling established firms are willing to learn from startups, but the other way around, there is not much traction." (FF32)

Family venture capital can also be a way to prevent reputational damage in case of failed projects. The respondent for FF2 stated that if the family became active in startup investments, it would only do so in a completely independent structure of the original business—and enable divestment—to prevent reputational damage in case of failure. Similarly, FF33 entered a new market segment with its core business but was not commercially successful in this sector, prompting the company to leave the market again. Shortly after that, however, FF33 acquired a stake in an up-and-coming startup in the previously abandoned sector to still reap its potential.

Current events confirm that an increased number of family-owned Mittelstand firms engage in family venture capital activities to expand business context or diversify family firm portfolios. The more than 130-year-old family-owned Mittelstand firm Bahlsen, known for its cookies, now combines startup investments with attempts to renew and improve its reputation: next-gen family member Verena helped set up the Berlin-based incubator Kitchentown to develop sustainable and healthy food. Werner M. Bahlsen, chairman of the board of directors at Bahlsen, said: "This will help us in our sector not to stand still" (Rüweling, 2019).

4.3. Family collaborative capital

The third type of unique capital is family collaborative capital (i.e., the collaborative networks between family-owned Mittelstand firms and their external and internal business partners). Apart from well-functioning, conventional business relationships, such as those captured by social capital (Kwon & Adler, 2014; Soluk, 2022), family collaborative capital refers to a joint problem-solving approach rather than mere conventional delivery relationships. While conventional business cooperation in social capital is usually based on contracts and formal agreements, family collaborative capital is typically based on intangible resources such as high mutual trust in the reciprocal benefits of the partnership. Joint problem solving inherent to collaborative capital requires a high degree of transparency and openness between family-owned Mittelstand firms and their partners. On this basis, emergent knowledge sharing has the potential to permeate even the most complex business challenges. Regarding family collaborative capital, family-owned Mittelstand firms used to focus on partnerships with other established firms with high levels of similarity. To successfully handle modern digitalization, however, family-owned Mittelstand firms must extend their networks to different types of partners; hubs, startups, and employees have become relevant partners in their networks. Long-term development and profitability driven by continuous innovation are not only dependent on family resources, but also on further or external resources of knowledge, talent, techniques, and material. Especially in the digitalization age, these resources are vital for family-owned Mittelstand firms that occasionally suffer from a lack of external talent due to their often-rural locations and long employee tenures.

Sampled firms regularly collaborated with or funded their academic innovation hubs to foster digitalization. For instance, the next-gen of FF5 explained how he is currently setting up a regional digital hub in alliance with a renowned technical university, which should foster innovation and entrepreneurship for regional enterprises. This digital hub was designed as a collaborative initiative for employees from all cooperating firms and students in the first phase:

> "It should provide a platform where firms and students come together. It is a big room within a former church. I could envision young projects working out of that space. There they can not only work but also get to know people. Potentially they could work on concrete issues (i.e., a tech topic) where other people could help, but we would also be willing to help young startups. It is not always obvious who provides and who receives help. It is usually rather a give-and-take." (FF5)

The top management of FF5 consists of a family member and external managing director (a member of the fourth generation) who recently joined the firm and regards the turn toward digitalization and new partnerships as his primary task. FF7 created an innovation lab, becoming the only "[family] firm with an innovation lab in their respective industry." A professor supervises this lab and works closely with top management to allow "hourly catch-ups" (FF7) and feedback. Topics and research propositions are provided either by students or based on management areas of interest to further develop products and business models:

> "They receive a large spectrum of knowledge and information. They can work freely and creatively or on specific problematic areas. Of course, all students that work in the innovation lab are handpicked, but I would say those are young individuals who simply burn with curiosity." (FF7)

Next-generation members may play an important role in connecting with hubs by establishing relationships with relevant universities and academics during their studies:

> "Of course, we also have a generation change from generation four to generation five. [Family member] studied at Technical University X, then earned his MBA. He then went to Spain and South America and is very open-minded about that. For example, the former supervisor of his thesis at the university started his own business. He does a lot of work in the field of data mining, from which

the mechanical engineering industry expects certain things in the direction of artificial intelligence." (FF22)

The successor of FF2 envisioned collaboration with students from a reputational business school and the industry academy, both within close geographical proximity. His idea was to set up a shared project team from both universities to see "what is possible with regards to innovation within our industry" (FF2) based on the combined knowledge of business students and the technical and industrial know-how of the academy. The rise of newly founded institutions tailored to the specific digitalization needs of family-owned Mittelstand firms reflects this growing cooperation between these firms and hubs. For instance, the Technical University of Munich (TUM) created a platform in 2021 with the "FamilienunternehmerTUM" (i.e., family entrepreneur TUM) initiative that provides family-owned Mittelstand firms with access to knowledge, experiences, technologies, and the entire ecosystem of the university.

While hubs provide an integral way to enable collaborations, family-owned Mittelstand firms also seek more direct and bidirectional collaborations with external partners, particularly startups. Hence, investing in startups via family venture capital—as described above—and collaborating with them play an important role in the digitalization endeavors of family-owned Mittelstand firms. In particular, such collaboration was mentioned by incumbent firms wanting to extend and renew their resource base even if they were too small (e.g., FF4, FF6, FF11, FF20) or risk-averse (e.g., FF28, FF32) to make direct investments in startups. The collaborations may be initiated in different ways. For example, FF24 encouraged students to found a startup and become customers:

> "We always leveraged working students for the green labeling of buildings. Two students did a fantastic job, so we sat down with them and said: 'Start it. You will not have any troubles with the number of orders coming in. We will provide enough orders and will advocate for you.' These two started their own business, and we have had a great relationship ever since." (FF24)

The next-generation family manager of FF11 saw an opportunity to collaborate with but explicitly not invest in a startup:

> "It is great cooperation with a startup because we have been cooperating with them from the very beginning onwards; other breweries were not involved in that early stage. This was luckily due to the [business school] network...Back then, I said to our sales department, 'we have to do this, this is the future,' and our sales figures confirm that now." (FF11)

A nonfamily manager working at FF20 introduced a startup working on an industry-specific solution for e-commerce processes to the owner family. After carefully reflecting on this investment opportunity, the owner family decided to collaborate rather than invest. Overall, our findings from the interviews showed that many of the firms wanted to enter collaborations with startups in the future but faced obstacles. Some reported that there were no existing startups on the market with technologies that are relevant for their firm (e.g., FF13, FF19), while some stated that the cultural differences were too great (e.g., FF7, FF32).

Employee relationships also play a crucial role for family-owned Mittelstand firms. Employee appreciation in these firms can increase the psychological ownership of all staff members. Subsequently, a sense of belonging increases motivation, efficiency, and innovativeness. For sustainable innovation, employees at all hierarchical levels within the firm must be engaged and contribute. FF14 explained that highly skilled employees are a vital resource for digital innovation in rapidly changing industries: "We live from ideas of our skilled employees...At least 30% of our staff has an engineering background from [renowned local technical university]. Without technology development, we would cease to exist."

Introducing fundamental strategic changes such as digitalization initiatives requires significant trust between the owning family, management, and employees:

> "Two main factors [are required to implement a fundamental cultural change]... Firstly, bilateral trust—driven by the trust between owner family and employees. There have never been any redundancies for operational reasons. Secondly, a constructive dialogue is driven by opportunities...and within this dialogue, the framing with which we [management] address our workforce has changed." (FF9)

FF10 emphasized the trusted relationship between family and employees that goes beyond contractual relationships common among nonfamily firms as the primary driver of digital innovation. Considered a caring, providing, and sheltering institution, the family creates a high level of employee loyalty, enabling them to optimize intrinsically motivated employee project outcomes:

> "The family creates longstanding commitment. We will stand by you—in good times and in bad. There were never any layoffs. That is something most employees are thankful for. Many employees are using their personal free time to pursue certain [business-related] topics. Some even visit industry fairs in their leisure time." (FF10)

Next-generation members may incorporate fresh ideas from experience with companies in the new economy. By doing so, they can connect the traditionally strong relationships in family firms with new ways of business from digital pioneers:

> "One of the concepts I brought into the family firm from Google [previous employer] consists of weekly coaching meetings with managers reporting to me...One part of the meeting is always 'think outside the box' given I think it is essential to offer a platform [for development, creativity]. I expect my leading managers to provide the same for their employees." (FF32)

A future-oriented, caring environment creates a strong, trustworthy relationship between the owning family and their workforce. These close relationships also result in family-owned companies such as Viessmann—a pioneer in linking traditional family firm values with the requirements of digital VUCA environments and the startup ecosystem—that refers to its more than 12,000 employees as family members. This emphasizes the close ties between family and workforce that transform the business digitally. Despite the typically flat hierarchies, agile roles, and close relationships, the family remains at the head of the company: "Some of our newer business models were only possible because roles within the firm are so agile and allow for development...Still, the family is the firms' head" (FF13).

FF30 developed a strategy to prepare for the digital age that involved all different types of capital. It hired a specialist to drive digitalization, collaboration, and investment in startups and build an ecosystem around its core business areas:

> "Basically, the aim is to investigate the entire field of startups and open innovation outside [firm name]. What innovations and startups are there for new technologies? What smart teams are there that could be interesting for [firm name]? What forward-looking innovations are there that we need to keep there, that we need to recognize, and the question of where we can perhaps collaborate? Where can we partner? What can we possibly participate in? This is one field, and the other field[s] are essentially M&A transactions. Field number three is cooperations, where we do not enter a relationship on the capital side, but we actually cooperate with each other: on the development side, on the distribution side." (FF30)

4.4. The interplay between family historical, venture, and collaborative capital

Beyond our observations of how family-owned Mittelstand firms extend these three forms of family capital, we also observed how they interplay. For instance, family historical capital laid an essential foundation for the actions that emerged through family venture capital and family collaborative capital. More specifically, firms' long history and intergenerational perspectives strongly influence the selection of collaboration partners. Although family-owned Mittelstand firms also supplement their carefully selected business partners with novel partners in digital projects, these firms having high levels of trust still play a decisive role in selecting such partners. This is evident in customer-oriented networks and their relationships with employees and cooperation with hubs and startups. Existing contacts with professors and other individuals encouraged many family-owned Mittelstand firms to engage in these partnerships. For instance, the trusting relationships within the Technical University of Munich prompted family-owned Mittelstand firms such as Wacker Chemie and Knorr-Bremse to collaborate with Munich Urban Colab, a startup center initiated jointly by UnternehmerTUM and the City of Munich (Jakobs, 2021).

In addition, family historical capital has a decisive influence on the family venture capital preferences of family-owned Mittelstand firms. The observed firms incorporated the family's divergent perspectives—which were developed over generations—while configuring diversification or complementarity. This was particularly true in cases in which a company's reputation is secured through family venture capital, often derived directly from the family history. The machine manufacturer Trumpf, known for its high specialization in laser machines, exemplifies how family historical capital informs investment decisions. Trumpf (2022) converts its historically grown specialization into family venture capital investments, which are supposed to be "complementary or adjacent in market or technology" to its core business.

We also observed important connections between family collaborative capital and family venture capital. For instance, family-owned Mittelstand firms often invested capital into startups that they already knew and trusted through collaborations with hubs. Furthermore, family-owned Mittelstand firms preferred collaborating with a startup before investing venture capital. This approach to creating transparency and trust coincides with the family-owned Mittelstand firms' desire to minimize unnecessary default risks—securing both their financial and nonfinancial endowments. Family collaborative capital can thus be considered an important gateway for family-owned Mittelstand firms to invest venture capital. One example is the family entrepreneur Gunther Wobser, later-generation, family-owner-manager of German-based company Lauda, who moved to Silicon Valley for a year to bolster collaborative capital and leverage respective ties to later inform investment decisions (Müller, 2019).

Our study highlights how family-owned Mittelstand firms can master digitalization despite resource constraints (De Massis et al., 2018) by leveraging family-specific capital that is often tied to family idiosyncrasies and next-generation members. Our model emphasizes the potential benefits of family-owned Mittelstand firms collaborating with startups to prepare for the digital future. FF17, however, does not cooperate with startups but is generally open to workshops with external parties for exchanging ideas on a give-and-take basis. Such formats can also be attractive for smaller, family-owned Mittelstand firms that do not have the financial resources to make large financial investments via family venture capital. In general, there was an institutional trend of family-owned Mittelstand firms interacting with other established firms and startups. For example, Maschinenraum—which translates into machine room—is a shared innovation ecosystem that brings together different family-owned businesses from the German Mittelstand to develop new realities and drive digitalization. Maschinenraum supports companies by sharing resources, methods, and infrastructures as catalysts for industrial change. With its network and knowledge from established companies, startups, and innovators, Maschinenraum enables its members to learn and shape the next generation of Mittelstand together.

5. Discussion

Our study has important implications for scholarly research, management practice, and policymaking. First, it contributes to the academic debate on digitalization in family-owned Mittelstand firms as well as companies in general (Soluk & Kammerlander, 2021). We showed how family and Mittelstand firm idiosyncrasies, such as unique family culture, long-term decision-making horizons, and the desire to maintain control can affect the digitalization efforts of businesses (Duran et al., 2016). Building upon the resource-based firm perspective, we explained the prominent role that heterogeneous company resources play in digitalization (Barney, 1991). We extended previous knowledge of resource-constrained, family-owned Mittelstand firms and how they can successfully realize digitalization initiatives despite their tendency for self-financing (De Massis et al., 2018). In tandem with our qualitative evidence, we highlighted the idiosyncratic role of family historical capital, family venture capital, and family collaborative capital, which are different from previous forms of capital (De Massis, Frattini, et al., 2015). We furthered extant research and revealed how family involvement in resource-constrained companies can generate specific resources and competitive advantages via digitalization. Regarding management research beyond the family firm domain, we revealed the crucial role of corporate cultures and ownership motives, which may also apply to other dominant coalitions (Tekic & Koroteev, 2019).

Second, we informed owners, managers, and advisors about digitalization in family-owned Mittelstand firms. By illustrating the dependencies between family-related motives and their resources, we provided transparency to practitioners and raised awareness about specific digitalization mechanisms of family-owned Mittelstand firms (Soluk, Kammerlander, & De Massis, 2021). Due to their limited resources, family-owned Mittelstand firms do not have access to the same resources as larger corporate counterparts, leaving practitioners with enormous hurdles (De Massis et al., 2018). This challenging situation necessitates unique and creative approaches to value creation. Section 1 revealed that collaborative approaches such as UnternehmerTUM or Maschinenraum, in which family-owned Mittelstand firms work together with their peers and/or startups on joint solutions, are promising initiatives. We extended previous studies that solely focused on new ventures to include collaborative approaches by focusing on more established companies (Soluk, Miroshnychenko, et al., 2021). In contrast to heterogeneous approaches from a variety of firms, we provided practitioners with more nuanced insight into the family dynamics behind digitalization (Chrisman et al., 2015). Due to alternative approaches to corporate financing and the absence of family involvement, we assumed distinct mechanisms for medium-sized companies held by external shareholders other than a family by private equity entities (Schickinger et al., 2021). We implore future research to develop the specific differences and conduct a dedicated comparison between family and nonfamily firms.

Third, we contributed to the debate on digitalization from the policymaking perspective (Teece, 2018). Due to the significant economic importance of family-owned Mittelstand firms, which account for a large share of the gross domestic product in Germany and many other countries, legislators associate the support of family-owned Mittelstand firms with economic prosperity (Berghoff, 2006; De Massis et al., 2018). Because the successful digitalization of family-owned Mittelstand firms is a decisive factor in their long-term performance, policymakers must carefully assess specific incentive schemes (Pahnke & Welter, 2019; Welter et al., 2015). Our evidence suggests that collaboration in hubs facilitated by government authorities can be a purposeful intervention by enabling family-owned Mittelstand firms to implement necessary complementary approaches to digitalization (De Man & Luvison, 2019; Youtie & Shapira, 2008). Due to these institutions' awareness and multiplying effects, supporting hubs could be more efficient than subsidizing individual family-owned Mittelstand firms. Tax incentives or regulations to protect intellectual property that encourages collaboration could further support policymaking efforts.

Appendix A1. Overview of results of systematic literature review on family/Mittelstand firms and digitalization

Article	Method	Main findings
Ceipek et al. (2021)	Quantitative	• Due to the characteristics of their family managers, family-managed firms do not welcome the risks related to exploratory Internet of Things (IoT) innovation. The perceived benefit of risk diversification from technological diversification is lower than the cost of abandoning family-centered goals. • The top management team composition in firms wanting to be at the forefront of the digital transformation must be accurately designed, avoiding a high proportion of family members.
Kraus et al. (2020)	Qualitative	• The COVID-19 crisis triggered a significant yet unintended cultural change in family firms. • The pandemic led to stronger solidarity and cohesion within the company and a tentative digitalization.
Prügl and Spitzley (2021)	Quantitative	• German Mittelstand firms, primarily owned and managed by enterprising families and seen as innovation role models, appear reluctant to place strategic emphasis on venturing outside the firm's boundaries for digital transformation. • Family communication patterns impact the strategic priority for or against external corporate venturing via identity-related considerations.
Rashid and Ratten (2020)	Qualitative	• Family businesses struggle to cope with the thriving digital market. • To survive in the market, family firms need a digital mindset and the ability to respond to change. • The intelligence and wisdom necessary for creating and maintaining an intellectual asset should be used to invest in new technologies. Importantly, businesses must maintain an emotionally and artificially intelligent brand.

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Article	Method	Main findings
Soluk and Kammerlander (2021)	Qualitative	• The digital transformation of Mittelstand firms is a three-stage process: digitalization, product and service digitalization, and business model digitalization, with specific triggers for each stage. • Several operational and dynamic capabilities are required throughout this digital transformation process. • Three combinations of family-specific enablers and barriers support or hinder the development of dynamic capabilities and either accelerate or impede the family firms' advancement.
Soluk, Kammerlander, and De Massis (2021)	Qualitative	• An exogenous shock further reinforces the family firm's resource constraints and the family's fear of losing their socioemotional wealth. These motivational sources trigger behavioral changes in both the firm and the family. • In addition to a temporarily induced short-term orientation, these changes manifest in (pseudo)family cohesion, less rigid mental models, and the utilization of digital technologies. • Organizational outcomes thereof are new alliances, digital platforms, and the adaptive capacity of family firms.
Soluk, Miroshnychenko, et al. (2021)	Quantitative	• Specific dynamic capabilities mediate the positive relationship between family influence and digital business model innovation. • Surprisingly, the relationship between family influence and dynamic capabilities is weakened by environmental dynamism.

Appendix A2. Illustrating quotes for main concepts entailed in the conceptual model

	Concept	Quote
	Family firm culture	"Until I was six, I did not have any siblings, so I spent most evenings listening to their discussions with my parents. I then pitched my idea of a small pony farm in front of our tavern. Since the children can play with the ponies—parents want to stay longer in the tavern and come by more often. I tried to sell my ideas and own interests in the early stages...My parents always listened to my ideas...My ideas got better now, but the same concept still applies—I am always being listened to." (FF6) "My grandfather was incredibly strong in trying out new things. He had this genuine curiosity which I am seeing in my parents as well—they are sufficiently farsighted to know that the business-as-usual attitude will not work in the long run." (FF8)
Family historical capital	**Longevity**	"The most important factors for our long-term progression were—we have always been conservative, we have never used any debt, and we think sustainable. The sustainable thinking is something that I would define as key...Being fair to everyone and building a sustainable business, nothing which is of short duration only...We always take a long-term view, rather than focusing on rapid growth." (FF28) "My father sees himself as a businessman who is committed to the firm in the long run, which means, for him, the focus is not generating high revenues during his generation but rather handing over the family firm to

(*continued*)

	Concept	Quote
		the next generation in a healthy condition. This naturally requires that we do not always take the full risk." (FF1)
	Control	"I am also there…at most as a consultant. I do not have an active role there. But naturally…It is all determined by my father [family CEO]. Any thematic content or anything that employees are supposed to somehow redevelop, that is all determined by my father." (FF3) "We have various projects, and the employee who came up with the idea or someone who is personally more or less connected [to the project] actually leads it...always under my [family CEO] guidance, but also at the end, as a supporter/friend independently next to the daily business." (FF24)
	Renewal	"Three and a half years ago, almost four years. This digital transformation was accompanied by a cultural change; it synchronizes with it and is very much exemplified by [family successor]. It starts with clothing, continues with the way we approach each other, our working style, etc., and that also underscores authenticity—to answer the question about the jury and the like. No one from the family sits on the operational jury, but as soon as it goes up to investment, the idea donors present directly to the corresponding committee, which [family successor] then chairs." (FF9) "The founding generation usually builds the firm covering a broad-ranging industry, and the second generation then needs to specialize. Nowadays, you rarely find allrounders in the market; most firms specialize in their industry…The second generation needs to bring that clarity." (FF19)
Family venture capital	**Diversification**	"The world is getting more and more complex day by day. Especially if you take a view on industry 4.0, in most cases, it is impossible to stay competitive in the market with just your own product. You cannot survive with just your product; you need to provide a system. To provide an entirely sustainable system, you need to partner and exchange constantly." (FF30) "I could envision, once I join the management in August, I will try to centralize the topic of innovation and then build a little hub that I will supervise, which does not necessarily mean I will open a team with 15 people, but rather screening the market around us for instance, but also finding innovative startups and connecting them with the relevant business units so that they can evaluate whether cooperation would be of relevance for us or not. So, I would take over the process of scouting, thereby formalizing this process." (FF1)
	Complementarity	"The first filter, so to speak, that we use is the industry specifications. (X) Tech and (Y)Tech. The second filter is culture. This plays a huge role. Culture does not mean that they have to be the same (as we are), but that they can be complementary, but still with the values that are important to us. For example, we have super freaky industrial designers of whom you would assume that they definitely do not work in a family business. That is totally complementary, but with a set of values that are completely consistent with ours." (FF9) "We support the startups in HR, finance, everything outside their core operations. We assume that they have their own skills in their core area of business…But then ideally, going forward, the group as such would also help with the core skills…that would be the ideal case that we combine both as this is worth more than just money for the startup, which would increase the overall business case." (FF12)
	Reputation	"And I have now developed from this position to the point where I have been given the task of managing our venture capital activities, in B2C investments, in company building, in intrapreneurship, trend scouting, and

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	Concept	Quote
		also as an interface to our digital activities. Intrapreneurship, trend scouting, and interface with our digital activities, to put a little bit of the group's door to say: 'We will then make a shelter out of it for the existing corporate ventures that we have.' Agricultural engineering is one of the most digitized industries of all. In this way, we can carry the topic out of the group, so to speak, and reflect it back into these individual departments of the group." (FF10) "First, production efficiency and automation levels must be increased. The second is environmental friendliness. Here, I am already of the opinion that in five to 10 years, you will be punished, on the one hand by consumers, but on the other hand also by the executive. Our government says there are now CO2 certificates. If I don't manage to keep my CO2 balance neutral in 10 years, then it may then I may have to calculate with considerable costs." (FF11)
Family collaborative capital	**Employees**	"We celebrated this failure pretty huge. Everyone was aware of the project and the failure, but we made sure everyone knew what contribution these colleagues had made. We clearly learned that this industry or topic is not relevant to us. That is a valid learning outcome and should be acknowledged. They didn't have to worry…We [innovation management team], as well as the founding family, showed our appreciation for the work of those colleagues." (FF9) "Everyone knows each other; everyone greets each other…My uncle always greets all his employees with a kiss on the cheek and addresses employees by names. The environment is very familiar." (FF31)
	Startups	"I know that we worked with a startup in [city]…It was about compaction control, how to network the position of the individual machines with each other. Yes, that was a smaller project." (FF29) "We do not have any standardized processes. What I am going to do now, though, I am going to work with a new startup that analyzes the entire [core product] market online. You can also find out about your range, at what price and under what title your products are offered, where they are online and where they are no longer online, (i.e., sold out). As a result, you can go more in the direction of sales, and there you also get better insights into the competition because you automatically also deal with the retailers and online retailers." (FF20)
	Hubs	"That was actually the case again. It is a coincidence that this has already been mentioned—at [company name], there was once an event on the subject of knowledge management from the university. And since [company which hosted the event] is a customer of ours, I thought it would be interesting to take part. And then, I looked at the event, and that is where the interest came from. And then, the business development agency, which supports this project, collected business cards, and then they also followed up and asked if anyone would be interested in looking at such an event. Then I got in touch with them." (FF26) "There is cooperation, and there are multipliers, so there is cooperation with four universities. And then there is also cooperation with large construction companies or with large associations and, among others, with the local governmental associations. This has developed over the years. And there are still individual multiplicators, like [an online platform for engineers] or other portals, which support us then at least on a nonfinancial basis." (FF27)

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