The Transformation of Family-Owned Enterprises into Design-Intensive Firms

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Abstract

This study examines how family-led small and medium-sized enterprises (SMEs) with little or no design experience are transforming into design-intensive firms. Extant research allows us to understand the distinct capabilities of design-intensive firms. This study defines the capabilities of new design leadership, including the unique capabilities of design-intensive firms, to assist SMEs in their transformation to design-intensive firms. Furthermore, this study empirically evaluates the influence of individual family CEOs' characteristics and industrial structural factors on the design leadership capabilities in family-led SMEs. The findings show that the efficiency of developing design leadership capabilities is influenced by the family CEO's awareness of traditional design identity, and designers assist family CEOs in building a new network with interpreters and managing their knowledge of sociocultural models. A family CEO's exploitation of traditional design identity and designers' exploration of design renewal must be managed as a portfolio to transform a traditional SME into a design-intensive firm. This study has critical implications for family-led SMEs as it emphasises the importance of passing on a firm's traditional design identity and design renewal as a portfolio to the next generation of CEOs for the firm to transform into a design-intensive firm.

Key words

design-intensive firms, collaborative innovation, family businesses, small and medium-sized enterprises, design leadership capabilities, absorptive capacity.

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Introduction

Recent research has illustrated that design-intensive family-led firms and small-medium enterprises (SMEs) gain a significant competitive advantage through collaborative innovation with external professionals (Dell'Era & Verganti, 2010; Magistretti et al., 2019, 2020; Verganti, 2008). A design-intensive firm is one in which "design is not a complementary element but the focus of their activities" (Magistretti et al., 2020), and one in which designers are not only used for styling and problem-solving, but also play a role in leading the co-evolution of problem finding and problem-solving (Dell'Era et al., 2018). Design-intensive firms also have a complex network of external interpreters to balance their traditional design identity and design renewal (Dell'Era & Verganti, 2010; Verganti, 2017; Magistretti et al., 2019). The interpreters identify weak signals of change in sociocultural models and contribute to developing novel visions that become future trends (Dell'Era & Verganti, 2010; Verganti & Öberg, 2013; Verganti, 2008). Design-intensive firms use design as a collective of knowledge from the external designer and the interpreters.

Collaborative innovation is practical as it compensates for SMEs' limited resources (Diéguez-Soto et al., 2018; Feranita et al., 2017). Collaborative innovation is "a form of inter-firm relationship that involves exchanging and sharing resources such as financial capital, information, knowledge, and technology with external parties to achieve innovation" (Feranita et al., 2017). Rather than being planned, learning in SMEs is temporal and contextual, and is implemented through social relationships (Fernández-Mesa et al., 2013; Pittaway & Rose, 2006).

Although collaboration with the external designer can provide a significant competitive advantage for family-owned SMEs, most still need to make design a core part of their business activities. Bringing in external design expertise requires the ability to identify the appropriate design expertise to bring in, which SMEs with little or no design experience lack (Acklin, 2013; Berends et al., 2011; Bruce et al., 1999; Chiva & Alegre, 2007). SMEs rarely have an in-house design department and lack a basic understanding of design (Berends et al., 2011), and designers are often viewed as a variable cost hired on a project-by-project basis (Berends et al., 2011; Bruce & Morris, 1994). Given that there are very few family-led SMEs that are design-intensive firms, understanding how family-led SMEs with little or no design experience transform into a design-intensive firm is critical. Hence, the research question of this study is to identify how a family CEO with little or no design experience absorbs external knowledge from collaborative innovation to transform into a design-intensive firm. A family CEO absorbing design capabilities is the first step in the transformation to design-intensive firms (Acklin, 2010, 2013).

A family CEO is responsible for unifying ownership and operation in family-owned firms (De Massis et al., 2013). Therefore, corporate activities can be changed quickly and flexibly when the family CEO understands design and builds design capabilities. Design leadership capabilities have received extensive research attention as an absorptive capacity (ACAP) for design (Acklin, 2010, 2013). According to Acklin (2013), design leadership capabilities include formulating design strategies and new business hypotheses, bringing external design expertise into the firm, and allocating resources. Developing design leadership capabilities, however, does not enable family-led SMEs to transform into design-intensive firms as it excludes the distinctive capabilities of design-intensive firms. Therefore, this study defines new design leadership capabilities as a theoretical framework for family-led SMEs transitioning to design-intensive firms.

The remainder of this paper is organised as follows: Section 1 reviews extant literature on collaborative innovation with designers in SMEs, design-intensive firms and propose a theoretical framework regarding design leadership capabilities. Section 2 describes the methods used in this study. Section 3 presents the study's empirical findings, focusing on the relationship between the collaborative innovation process and design leadership capabilities. Finally, Section 4 discusses this study's theoretical and managerial implications and limitations.

1. Literature review

1.1. Collaborative innovation with external designers

Before the concept of open innovation was proposed, research on collaborative innovation has been discussed from resource-based, transactional, and relational perspectives, primarily as innovation is achieved by collaboration with external parties (Feranita et al., 2017). The concept of open innovation has led to a significant development in the debate over collaboration as a source of competitive advantage (Chesbrough, 2003). Open and collaborative innovation research in SMEs has primarily focused on technological innovation, its performance, technology transfer, resource limitation for R&D, and external collaborator networks (Feranita et al., 2017; Hossain & Kauranen, 2016; Usman et al., 2018; Diéguez-Soto et al., 2018). Conversely, innovation scholars have also focused on design-intensive industries as a collaborative innovation with external designers (D'Ippolito, 2014; Dell'Era & Verganti, 2010; Magistretti et al., 2019; Magistretti et al., 2020).

Since SMEs rarely have in-house design departments, collaborations with external designers are more common. A company's design processes are divided into two categories: collaborations with internal design departments and collaborations with external design firms (Chiva & Alegre, 2007). External designers' participation in new product development enables SMEs to achieve problem-finding and problem-solving co-evolution through an iterative process of divergence and convergence (Berends et al., 2011). However, since SMEs lack a basic understanding of design and have limited access to design resources, using design effectively is a challenging task for such firms (Berends et al., 2011; Fernández-Mesa et al., 2013; Moultrie et al., 2007; Oakley, 1982). According to Bruce et al. (1999), design project failures can be attributed to: "lack of senior management commitment to design," "poor financing of projects," "incomplete design brief," and "inappropriate sourcing of design competencies." Combining a firm's design knowledge with knowledge gained from previous collaborations with designers is critical (Simoni et al., 2019). According to Bertola and Teixeira (2003), designers in Italian SMEs serve as 1) "knowledge integrators," facilitating the flow of technology between companies and integrating it into products, and 2) "knowledge brokers," internalising knowledge shared within the supply chain and local communities, including users. Collaborations with designers allow SMEs to absorb design expertise from external sources (Acklin, 2010). However, collaborating with external designers necessitates the ability to identify appropriate design expertise to be introduced in the firm. Therefore, examining how SMEs with little or no experience acquire design expertise from external sources (Dell'Era et al., 2018; Fernández-Mesa et al., 2013) is critical.

1.2. Design-intensive firm

Previous studies on design-intensive firms have primarily focused on SMEs in the Italian furniture and lighting industries. Dell'Era et al. (2018) discovered that 80% of products in design-intensive firms in the Italian furniture industry are developed in collaboration with external designers, and the ratio of collaborating with external designers to employees is as high as 16%. Design-intensive firms do not hire external designers on a project-by-project basis, but rather manage them as a complex portfolio of designers (Dell'Era & Verganti, 2010; Magistretti et al., 2019). Interpreters who analyse the sociocultural model and identify weak signals of change are also part of the collaboration (Verganti, 2008, 2017). Dell'Era et al. (2018) discovered that design-intensive firms have a "technological gatekeeper of cultural production" that brings knowledge held by external interpreters into the firm.

Verganti (2009) highlighted that top management plays a critical role in managing the complex portfolio of interpreters and the dialogue with them. The dialogue aims to create future scenarios, lifestyle propositions, and a strategic vision for a new product (Dell'Era et al., 2018). According to these studies, in family-led SMEs with little or no experience, a family CEO serves as a gatekeeper and a key to acquiring external knowledge from interpreters and blending the firm's knowledge from previous collaborations.

1.3. Theoretical framework: Design leadership capabilities

Acklin (2013) developed the design management absorption model (DMAM) as a process by which SMEs with little or no design experience could develop absorptive capacity (ACAP) for design practice. Previous studies on absorptive ACAP have examined knowledge acquisition from a firm's external network (Cohen & Levinthal, 1990; Zahra & George, 2002). The DMAM emphasises the importance of a family CEO's design leadership capabilities early in the process. Design leadership capabilities refer to capabilities in acquisition and assimilation as potential ACAP (PACAP) (Zahra & George, 2002). According to Daspit et al. (2019), the survival of a family firm is dependent on PACAP as the breadth of family members' knowledge is limited.

As stated previously, this study defines alternative design leadership capabilities that can assist a traditional firm in transforming into a design-intensive one. Verganti (2009) stated that the top management in design-intensive firms is a leader and provides a vision and direction for innovation. The top management is also responsible for directly engaging in a dialogue with external interpreters.

Therefore, new design leadership capabilities required to transform a traditional family-owned SME into a design-intensive firm include 1) the ability to build and manage a network of external collaborators, 2) the ability to formulate a design strategy by envisioning potential future scenarios, 3) the ability to identify new business opportunities, 4) the ability to source design expertise and combine it with the expertise of in-house employees, and 5) the ability to allocate in-house resources in the assimilation (Table 1).

Table 1. Comparison of design leadership capabilities.

	Design leadership capabilities for transforming into a design-intensive firm	**Design leadership capabilities (Acklin, 2013)**
Acquisition	To build and manage a network of external collaborators	-
	To formulate a design strategy by envisioning potential future scenarios	To formulate a design strategy
	To define hypotheses for new business opportunity	To define hypotheses for new business opportunity
Assimilation	To source design expertise and combine it with in-house team expertise	To source design expertise and combine it with in-house team expertise
	To allocate in-house resources	To allocate in-house resources

Source: created by authors.

To summarise, a family CEO's acquisition of design leadership capabilities is critical to transforming SMEs with little or no design experience into design-intensive firms. Existing research, however, has not yet clarified how design leadership capabilities are acquired.

2. Methodology

2.1 Research design

The main objective of this study is to understand how a family CEO with little or no design experience can develop design leadership capabilities through collaborative innovation. The study investigates how collaborative innovation with external designers and interpreters can help family CEOs in small and medium-sized enterprises (SMEs) develop design leadership skills. To achieve this, an exploratory case study methodology has been adopted. This does not aim at statistical generalization, but rather at analytical generalization (Yin, 1984). The case study approach is ideal for understanding the dynamics of the process (Yin, 1984). Since there is a lack of research on how family-led SMEs with little or no design experience can transform into design-intensive firms, this study has chosen a critical case for analytic generalisation. The research strategy used in this study will help reveal the family CEO's black box between collaborative innovation and design leadership capability.

2.2 Empirical settings

This study focuses on FUXION, a design implementation support program launched by the Nagoya City government in Japan in 2020. The program aims to assist SMEs with little or no design experience. It includes a seminar that provides an overview of design fundamentals, which is conducted by Mitemo Co. Ltd. This professional consulting firm has been contracted by the Nagoya government to support the implementation of design management. Following the seminar, SMEs participate in collaborative workshops facilitated by the consulting firm, with the assistance of interpreters from various industries and professional designers. These external collaborators are recruited by Nagoya City through an open call for applications and then matched with SMEs by the consulting firm. Each team is comprised of four or five members, with the interpreters and designers supporting each team.

Table 2 presents the whole program. The first phase comprises a program with 7.5 hours of design, design methodology, and design management lectures. This phase encourages family CEOs to under-

stand the general design process, design methods, and tools to broaden their knowledge before implementing collaboration. The second phase aims to develop design leadership capabilities required for the firm to transform into a design-intensive one through pilot projects in which a family CEO collaborates with interpreters. The phase consists of four days of four-hour workshops, which include 1) the development of a vision based on the company's traditional identity and technology to identify a target user; 2) an iterative process of user observation, ideation, and rapid prototyping to establish and validate new business hypotheses; and 3) implementation of a solution and brand communication design.

Table 2. The collaborative innovation process in FUXION.

Phase	**1**	**2**		
	Learning of • design process • design method • design tools	To develop a vision based on the company's traditional identity and technology to identify a target use	An iterative process of user observation, ideation, and rapid prototyping to establish and validate new business hypotheses	Implementation of a solution and brand communication design
PCACP	Prior knowledge of design (Antecedent of PCACP)	Acquisition	Assimilation	
Design leadership capabilities to transform into a design-intensive firm		Building and managing a network of external collaborators Formulating a design strategy by envisioning potential future scenarios Defining hypotheses for new business opportunities	Sourcing design expertise and combining it with in-house team expertise Allocating in-house resources	

Source: created by authors.

In this study, two embedded subcases in which family CEOs participated in a pilot project were selected using replication logic (Yin, 1984). Table 3 presents an overview of the two family-led SMEs involved in the FUXION program that were selected for the study. These two CEOs were theoretically selected as cases in which design leadership capabilities were acquired efficiently through the process and cases in which they were not. By comparing the acquisition processes of these two CEOs, we discover the contextual factors that influence the efficiency with which design leadership capabilities are acquired.

Table 3. Case overview.

	Company A (Team A)	**Company B (Team B)**
Industry	Manufacturing	Manufacturing
Product	Rainwear	Wooden sofa frame
Year of establishment	1921	1976
No. of Employees	17	9
Generation of family CEO	3rd	2nd

Source: created by authors.

2.3 Data collection and analysis

This study gathers both primary and secondary data (Table 4). For primary data, semi-structured interviews lasting 45 to 60 minutes were conducted through ZOOM Videoconferencing platform between February 2022 and May 2022. In addition to the CEO, the interviewees were the designers who

participated in each team and the experts and facilitators who participated in both teams for the triangulation.

Table 4. Data collection.

Source	Type of data	Evidence	Use in the analysis
Primary	First round: Semi-structured interviews	Two interviews with two CEOs 110 minutes 25 pages of transcript	Data on self-assessment of design process and design leadership capability
	Second round: Semi-structured interviews	Four interviews with the facilitator, the designers, and the interpreter 205 minutes 47 pages of transcript	Triangulating information from two CEOs.
Secondary	Miro, an online whiteboard	Two boards	Triangulating CEOs' self-assessment of design processes

Source: created by authors.

Table 5 presents the respondent profile. The criteria for developing design leadership capabilities were included in the questions. The facilitator, designers, and interpreters, as well as the family CEOs, were all interviewed. As secondary data, we examined Miro, an online whiteboard used by each team to conduct their online work. The data were used to verify project progress and to triangulate informants.

Table 5. Interviewees.

Participant ID	Role in FUXION team	Expertise
A	Facilitator	Design consultant
B	Leader in team A	Family CEO of Company A
C	Leader in team B	Family CEO of Company B
D	Collaborator in team A	Architect, Business consultant for SMEs
E	Collaborator in team B	Designer
F	Collaborator in teams A and B	Engineer

Source: created by authors.

3. Research results

3.1 Case description

Company A

Company A, which has extensive experience in the B2C industry, manufactures rainwear primarily for general consumers and firefighters. The desire to join FUXION stemmed from the family CEO's passion for reviving a traditional product, rainwear, for the fishing industry. According to the CEO,

"The reason why I joined FUSION this time is because it is the 100th anniversary of the company's establishment... I think one of the reasons is to go back to the basics again." (Participant ID:B)

At the beginning of the process, the designer took the lead in envisioning based on the company's traditional identity and technological advantages without the entrepreneur's passion. The vision matched the family CEO's passion, and the team discovered a meaningful direction for their new business in rainwear for the fishing industry. Collaborator D described this process as follows:

"At the time Fusion started, the family CEO originally said he wanted to make that fisherman's rainwear…The rainwear for fishermen is quite compatible with our new vision, so we thought it would be a good idea to develop rainwear for fishermen." (ID:D)

The team then attempted to develop a solution for fishermen's rainwear, but the facilitator recommended that they stop their development process and conduct a user observation instead. Facilitator A described this process as follows:

"From there, they were already trying to create some kind of solution, and I stopped them…Don't take anything with you, just observe. And then the rest of the time, you can go to the site and see what's not related to that, like what they're using, what they're talking about, what kind of work they're doing, not how the rainwear is used, but how they're living, how they're working, what they're talking about while they're working. I told them to observe." (ID:A)

As a result, the team developed a new business hypothesis based on user observations at three different sites. Furthermore, the team tested the hypothesis iteratively by building prototypes and showing them to customers while continuing to observe them. According to collaborator D,

"We have been making concept catalogues, which show the concept of the business we are considering, and then showing them to various clients to elicit their specific requests." (ID:D)

Concurrent with user observation, technical solution development and cost simulation were carried out within a short span of time. This was also an iterative process.

"We have been working on verifying the technical issues. ...We have made an income/expense simulation, showing the cost of production and SG&A expenses. We also examined whether or not the fabric lots would actually go into production, whether or not too much inventory would be produced, and discussed how much we should set the selling price. Well, it was like this was repeated over and over again." (ID:D)

Company B

Company B is a subcontractor that manufactures wooden sofa frames for furniture manufacturers. The company has been in the B2B industry and has no products sold directly to consumers under its own brand. While the company had technological advantages in manufacturing processes, it was unaware of the importance of the traditional identity that had been cultivated. Even the CEO of the company did not have much design experience and did not understand the importance of envisioning. According to the CEO,

"To be honest, as a subcontractor for a manufacturer like ours, I never have the opportunity to work with or talk to designers. So, I really only have a vague idea of what a designer does." (ID:C)

In contrast to Company A, Company B did not decide what direction to take during the envisioning stage based on the family CEO's passions and the company's traditional identity. Instead, the family CEO of Company B asked the company's team members to be creative. As a result, only technical constraints were considered, solution development was initiated, and ideas diverged. Collaborator F described this process as follows:

"It started with an idea that I liked and that someone would be happy if I made something like this or something like this." (ID:F)

Due to a lack of direction for ideation, the collaborators were forced to rely on their inherent ideas, and their respective expertise was underutilised. As a result, ideas diverged without any selection criteria, and time passed without a user setting for observation. During the ideation phase, the FUXION process was recommended for conducting user observation and iteratively establishing and testing business hypotheses. However, because no user observations were conducted, the validity of the emerging ideas was not verified, and a lack of vision also prevented idea convergence. Facilitator A described this process as follows:

"The FUXION workshop was designed to ask the participants to use the company's resources to find users who might be able to provide the product, but he did not take that action at that point. Well, without being able to make a decision, the idea just kept spreading…Teams that are successful in design thinking...have learned from observing their customer. Teams that are not driven by design thinking end up building a castle in the air or discussing within the team. In this way, the direction of the project is not determined at all." (ID:A)

Time constraints prompted the convergence of ideas and forced the team to narrow down its product offerings, as FUXION had set a goal of exhibiting at the show. Therefore, CEO B revealed to the team his intrinsic ideas, which he had concealed during the process. In the words of collaborator F:

"Everyone was getting more and more attached to their own ideas, and I thought it would be difficult to come to a consensus, but in the end, during the discussion, he [family CEO B]...had this idea before the FUXION started. And he disclosed it to us. ...We decided to adopt the president's idea because we had to get results in the first three months." (ID:F)

The team received much positive feedback from users after deciding on and exhibiting the idea at the show. As a result, family CEO B realised the importance of taking an experimentalist approach to the process and learning from failure. Through a series of FUXION experiences, family CEO B understood that vision determines the direction of subsequent product ideation and brand communication. In other words, he learned the process of strategically using a design from the failure of this design process. Family CEO B and team member F described the importance of iterative processes as follows:

"After I decided that I wanted to submit my work to an exhibition and started preparing for it, I realised that direction is important, and that's what I realised, so that's the biggest lesson for me." (ID:C)

"We might have learned a little more if we had done it once, failed, and repeated the process twice." (ID:F)

3.2. Design leadership capabilities

Table 6 presents how far the family CEOs have progressed in their design leadership capabilities. FUXION enabled family CEO A to understand and practice design leadership capabilities step-by-step throughout the process, whereas family CEO B, who did not follow the program, understood the significance of design leadership capabilities after the entire process was completed through introspection.

Building and managing a network of external collaborators

Company A had previously participated in several collaborations. However, most of these collaborations were for marketing existing products or developing manufacturing solutions. Therefore, the company had no experience in design-intensive collaborations. Company B was also a subcontracting business with little opportunity to design its own products as customers provided the necessary specifications. Both family CEOs did not fully understand the design practice in a single process due to practising design through the process. They described their understanding of design as follows:

"I think the designer's presence was probably more important in the FUXION, but to be honest, I could not utilise the designer to that extent." (ID:B)

"Through FUXION, I think I have gained a vague idea of the wide variety of fields in which designers work. I haven't actually done the actual work that many times, so there are still things I don't understand, but I think I clearly understand better than I did before I participated." (ID:C)

Due to a lack of a deep understanding of design, the family CEOs could not acquire the capability to build and manage a network of external collaborators on their own.

"I believe that we cannot survive unless we collaborate with outside designers and brand ourselves, and I intend to do so, but I am not sure I have quite figured out how to work with them yet." (ID:B)

"I think it would be difficult." (ID:C)

Family CEO B, a subcontractor, had a lower efficiency in acquiring new knowledge due to the narrower breadth of previous knowledge. Because product specifications are specified by the customer for subcontractors, acquiring limited technical information for developing solutions takes precedence over acquiring broad domain knowledge on a daily basis. According to designer E,

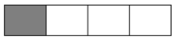
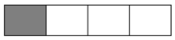
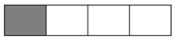
"Putting it simply, it may be that overwhelming lack of knowledge. Since he [family CEO C] keep on subcontracting. I think maybe there were times when he didn't know where to go, and even if he did go, he did not know what to ask." (ID:E)

In contrast, the following references clarify that both family CEOs developed the capability to build and manage a network of external collaborators indirectly through the presence of designers as intermediaries.

"Our team was fortunate to have the designer as the team leader, who facilitated the team well, and I feel that we were able to draw out the knowledge of each member." (ID:B)

"The designer is good at involving various people in his work, and we are still asking for his support... I think it would be good for small businesses to work in that way." (ID:C)

Table 6. Evaluation of design leadership capabilities.

PACAP	**Acquisition**		**Assimilation**		
Design leadership capabilities	Building and managing a network of external collaborators	Formulating a design strategy by envisioning future scenarios	Defining hypotheses for new business opportunities	Sourcing design expertise and combining it with in-house team expertise	Allocating in-house resources
Family CEO A	Capability understanding is achieved. Practice is possible with an intermediary and successful.	Capability understanding is achieved. Practice is possible and successful.	Capability understanding is achieved. Practice is possible and successful.	Capability understanding is achieved. Practice is possible and ongoing.	Capability understanding is achieved. Practice is possible and successful.
Progression bar					
Family CEO B	Capability understanding is achieved. Practice is possible with an intermediary and successful.	Capability understanding is achieved. Practice fails.	Capability understanding is achieved. Practice fails.	Capability understanding is achieved. Practice is not started.	Capability understanding is achieved. Practice is not started.
Progression bar					

Source: created by authors.

Formulating a design strategy by envisioning future scenarios

Before joining FUXION, both companies considered design to be an add-on to product development rather than a core corporate activity. FUXION enabled both family CEOs to fully comprehend the significance of creating and instilling a vision within the company to strategically create and execute new businesses. Both family CEOs described their design strategies as follows:

"Design management is similar to visionary management based on vision. The vision is drawn by design. Working for a company that develops rainwear is not primarily about making money, but about solving social issues in the world by achieving the vision we have created." (ID:B)

"I need to be more clear about which direction I am going in, or I will not be able to set a direction for my exhibition preparations. I realized at the time of the exhibition that I should have decided on my vision at an earlier stage." (ID:C)

Family CEO A was also successful in strategically incorporating the company's vision into the core of its activities, and even reviewed existing businesses that were not aligned with the design strategy. In the words of collaborator D,

"I think that he was able to understand the importance of vision tremendously… I got a bit of an impression that the idea that business strategies should be followed accordingly is something that was naturally acquired." (ID:D)

Conversely, Family CEO B went into ideation without envisioning, resulting in many ideas. His team repeated the process of creating and testing several prototypes. As a result, too much time was spent on the prototyping cycle rather than implementing a vision-based strategic process. Family CEO B describes this as follows:

"Now, I understand now that it would be difficult in terms of resources to make this and that, and to attempt to research this and that on-site, but when we started, I thought that maybe we should try making just a little bit of everything and sell them all." (ID:C)

He did not develop the capability within the process to the point where he could put it into practice, as he understood the importance of strategy much later, after the ideation process had failed without an appropriate vision.

"If there is no one who agrees with the same kind of great vision, such as issues that I want to solve for the future that I want to achieve with them, telling you that they want to do it together with you—an established mechanism like that, then the team wouldn't function. This is what has been really bothering me the most about the team at this point." (ID:C)

Defining hypotheses for new business opportunities

Family CEO A had previously developed business hypotheses based on intuitive ideas, with no user observations or socio-cultural model analysis. According to facilitator A,

"They said, 'We're going to make a product, take it to the customer, and get feedback from the customer.' And I said, 'Well, no. ...Don't take anything with you, just observe.' I told them to observe how they live, how they work, what they talk about while they work." (ID:A)

As a result, family CEO A recognised the significance of beginning with user observations when developing a new business hypothesis. In the words of the CEO,

"What I learned from going to the field was that ... what kind of problems do fishermen have besides rainwear ... what is their daily schedule, etc.? When we go fishing together on a fishing boat, there is a lot of time spent not fishing. We can talk about a lot of things at these times." (ID:B)

In contrast, Family CEO B could not identify a targeted user and conduct user observation based on their vision. Therefore, new business hypotheses were developed under time constraints rather than user constraints. However, with the facilitator's continuous support, they understood the importance of taking an experimental approach and learning from mistakes while developing new business hypotheses. According to the facilitator,

"In his case, he still wants to be convinced and move forward. So, in order to be convinced, he first sold the product experimentally to see how users reacted. He tried to see the reaction of who would be interested and then approach them. A change in him occurred, like he would move forward even slightly." (ID:A)

Sourcing design expertise, combining it with in-house team expertise, and allocating in-house resources

Both family CEOs recognised that their current organisational structures are incapable of incorporating design into the core of their operations. This has prompted them to work on specific organisational reforms.

"Engaging in new innovation activities while conducting sales for existing customers would be best if we could do that, but I think it would still be a bit difficult. We were inevitably overwhelmed by the need to deal with conventional customers, so we created a section dedicated to innovation to prevent this from happening." (ID:B)

"One thing I am considering is to completely separate the new business development organization from the company...I think it would be easier for the time being if the new business development

organization were to be completely separated from the company...if it were to become a sales, marketing, and development company, and manufacturing were to be outsourced from there." (ID:C)

Both CEOs recognize that employees involved in design activities must break away from the routines of their current businesses to make design strategy the core of their activities. Family CEO A has already established a specialized department and has begun to develop new businesses with design at their core. Following the completion of the process, the newly acquired external knowledge in the department is shared with other departments, resulting in improved internal performance. In the words of the facilitator,

"By giving feedback to the sales department about the opinions we have heard from outside, in order to make them understand, perhaps it will lead to achievements after a while." (ID:A)

4. Discussion

This study aimed to investigate how a family CEO with little or no design experience builds design leadership capabilities from collaborative innovation. The findings revealed that the efficiency of developing design leadership capabilities is likely to be influenced by a family CEO's awareness of their firm's traditional design identity, which refers to an attempt to increase the market recognition of a traditional product long-term collaborations with existing interpreters (Magistretti et al., 2019). During collaborative innovation, Family CEO A successfully developed design capabilities and practiced design-intensive collaborations, whereas family CEO B understood the significance of the capabilities through introspection much after the completion of the entire process. A traditional design identity works as a problem search frame, defined as "the boundaries of the interest of firms and individual innovators to shape and direct problem-finding activity" (Garbuio & Lin, 2021, p. 706). Ideas become overcrowded because the constraints that determine the meaningful direction of ideas do not exist without a problem search frame (Verganti, 2017). Family CEO B, amid a proliferation of ideas, could not determine which knowledge was critical to his company. Given that acquisition is influenced by the perceived value of externally imported knowledge, traditional design identities influence the perception of whether new knowledge from external collaborators is helpful for the company (Todorova & Durisin, 2007). The awareness of traditional design identity, being internal awareness (Cohen & Levinthal, 1990; Saad et al., 2017), enabled family CEO A to blend the firm's existing knowledge with the knowledge gained from collaborations with the interpreters within the process. This may demonstrate that awareness of traditional design identity improves the efficiency with which CEOs acquire relevant knowledge from the interpreters, and it positively impacts the development of design leadership capabilities.

Meanwhile, adhering to traditional design identities impedes acquiring new, broader knowledge. The two family CEOs' practices revealed that the ability to build and manage a network of external collaborators is only acquired through intermediaries. Due to their limited knowledge breadth, both the family CEOs failed to recognise the value of the interpreters' knowledge regarding sociocultural models unrelated to the traditional design identity without the intermediaries. According to Rondi et al. (2019), family-led SMEs are traditional and conservative, and their acquisition capability is influenced by their existing knowledge and experience (Boyd & Hollensen, 2012; Zahra & George, 2002).

The findings of this study suggest that design renewal, defined as the ability to continuously refresh a network with interpreters (Magistretti et al., 2019), depends on collaboration with an experienced designer in family-led SMEs with little or no design experience. While design renewal works as external awareness (Cohen & Levinthal, 1990; Saad et al., 2017), the designers serve as knowledge transfer agents and integrators across industries (Bertola & Teixeira, 2003; Hargadon & Sutton, 1997), helping family CEOs to build a new network with interpreters and manage their knowledge of sociocultural models. Thus, this study demonstrates that, in family-led SMEs with little or no design experience, the exploitation of traditional design identity by a family CEO and exploration of design renewal by the

designers must be managed as a portfolio to transform the firm into a design-intensive organisation (Magistretti et al., 2019; Magistretti et al., 2020; Dell'Era & Verganti, 2010). The portfolio construction, however, depends on the long-term accumulation of multiple collaborations.

In this regard, it is critical for a family-led SME to pass on its traditional design identity and design renewal as a portfolio to the next generation of CEOs to transform the firm into a design-intensive one. According to several major studies on succession, there is limited research on the intergenerational management of the portfolio of traditional design identity and design renewal (Fletcher et al., 2012; Handler, 1994; De Massis et al., 2008). In their seminal study, Magistretti et al. (2019) discovered that the balance of traditional design identity and design renewal differs depending on the type of family involvement. Magistretti et al. (2020) also found that when family-based ownership transitions to a fund-based one, the balance of design tradition intensity and depth shifts. Thus, future studies must examine how to build and manage the process of intergenerational portfolio succession of family-led SMEs with little or no design experience, as succession in SMEs is a process that must be planned systematically (Le Breton-Miller et al., 2004; Sharma et al., 2003; Umans et al., 2021).

Another finding of this study is that when the envisioning process is inefficient, time constraints become critical to the design process. Other constraints for idea convergence are required without constraints from traditional design identity. In such cases, DT strategically employs user observations to determine the direction of ideas. However, subcontractors with no design experience cannot identify a target user based on their traditional design identity. Although extant research on DT elucidates the challenges of implementing DT with a determined user (Carlgren & BenMahmoud-Jouini, 2022; Carlgren et al., 2016), the problem of being unable to identify users has not been examined. Hence, this study concludes that one of the most critical challenges in the transformation of SMEs without design experience into design-intensive firms is determining what constraints to use to identify users without a traditional design identity. Previous studies have found that time constraints positively impact design creativity (Mehta & Zhu, 2016). According to April et al. (2019), when there is sufficient time, there is more flexibility in idea generation, allowing for exploration and experimentation; however, when time is limited, disciplined and focused actions are implemented.

Nevertheless, as highlighted by Verganti (2017), ideation without a vision eventually results in the overcrowding of ideas that cannot be converted into meaningful business plans. Hence, DT conducts observations to select ideas relevant to the user. Therefore, it is critical in the design practice of a subcontractor SME with no design experience to actively set time constraints from the beginning to elicit disciplined and focused action rather than disordered divergence of ideas.

Conclusions

This study has significant managerial implications for CEOs of family-owned SMEs as it emphasises the importance of developing a vision and design strategy based on a firm's traditional design identity, while leaving the building and management of an external collaborators' network, as well as design renewal, to an experienced designer. Because the design strategy is based on a traditional design identity dependent on the family's distinctive resource, it is relatively easy for family CEOs with no or little design experience to gain capability in design strategy. However, given that the ability to build and manage a network with external interpreters is dependent on the broader knowledge gained from design practices in various industries, it is difficult for family CEOs to develop this capability in a short duration as family-owned SMEs are conservative and traditional (Rondi et al., 2019). Since family influences in family-owned SMEs have advantages and disadvantages (Zellweger et al., 2010), CEOs must focus on the advantages derived from the firm's traditional design identity, allowing experienced designers to compensate for the disadvantages.

Furthermore, government agencies and design consultant firms that support SMEs must strive to match SMEs with experienced designers capable of building and managing an external collaborators'

network and building a portfolio of traditional design identity and design renewal. The portfolio is built through the accumulation of multiple design projects rather than short-term initiatives. This study aimed to provide family CEOs with a short-term experience of a design-intensive firm's design process. However, SMEs lack access to design resources and skills to identify the appropriate design expertise to hire (Berends et al., 2011; Fernández-Mesa et al., 2013; Moultrie et al., 2007; Oakley, 1982). Therefore, in addition to providing short-term assistance, government agencies must foster long-term collaborations between skilled designers and SMEs to assist family CEOs in building and managing their portfolios in the long run.

This study has certain limitations. First, this study does not clarify how to make envisioning work when the envisioning process fails in the absence of a company's traditional identity. The case study in this study demonstrates how time constraints can act as a catalyst for idea convergence and promote a user-centred design thinking process. However, as in the inside-out process of Verganti (2017) and the outside-inside-out process of Goto et al. (2020), envisioning can be implemented without relying on the traditional identity and by using the intrinsic values of individuals as well as team and external interpreter criticism. The next challenge for future research is to integrate these various envisioning processes into the process and evolve it into a flexible program capable of responding flexibly to SMEs while considering the structural factors of their industries.

Second, the process of collaborative innovation, in this case, is yet to enable family CEOs to develop the capability to build and manage a network of external collaborators and a portfolio of traditional design identity and its renewal. The portfolio is constructed based on previous design practice, and it is impossible to construct a portfolio solely from short-term projects. Therefore, this study suggests that SMEs with no design experience can compose their portfolios by hiring designers with extensive design experience as intermediaries and substituting their portfolios. This proposal opens up new research avenues. Theoretical issues concerning the matching of designers and SMEs, such as what types of designers can assist SMEs in composing their portfolios, should be addressed by future studies.

Third, the case study tested the theory of design leadership capabilities for the aim of analytical generalization. Design thinking is becoming more widespread in SMEs, but cases of attempted transformation to design-intensive firms are still rare. Hence, it is a limitation that this study has not yet been able to be followed up with replication logic. However, as a first step, this study will contribute to the expansion of workshops for acquiring design leadership capabilities and attempts to transform the firm into a design-intensive firm. In the future, we will test the validity of the theory by following up the case with replicated logic.

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